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Effects of telephone health mentoring in community-recruited chronic obstructive pulmonary disease on self-management capacity, quality of life and psychological morbidity: a randomised controlled trial

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ABSTRACT

Objectives: To assess benefits of telephone-delivered health mentoring in community-based chronic obstructive pulmonary disease (COPD).

Design: Cluster randomised controlled trial.

Setting: Tasmanian general practices: capital city (11), large rural (3), medium rural (1) and small rural (16).

Participants: Patients were invited (1207) from general practitioner (GP) databases with COPD diagnosis and/or tiotropium prescription, response rate 49% (586), refused (176) and excluded (criteria: smoking history or previous study, 68). Spirometry testing (342) confirmed moderate or severe COPD in 182 (53%) patients.

Randomisation: By random numbers code, block stratified on location, allocation by sequentially numbered, opaque and sealed envelopes.

Intervention: Health mentor (HM) group received regular calls to manage illness issues and health behaviours from trained community health nurses using negotiated goal setting: problem solving, decision-making and action planning. Control: usual care (UC) group received GP care plus non-interventional brief phone calls.

Outcomes: Measured at 0, 6 and 12 months, the Short Form 36 (SF-36) and St George's Respiratory Questionnaire (SGRQ, primary); Partners In Health (PIH) Scale for self-management capacity, Hospital Anxiety and Depression Scale (HADS), Center for Epidemiologic Studies-Depression (CES-D) questionnaire, Post-Traumatic Stress Disorder Checklist, Satisfaction with life and hospital admissions (secondary).

Results: 182 participants with COPD (age 68±8 years, 62% moderate COPD and 53% men) were randomised (HM=90 and UC=92). Mixed model regression analysis accounting for clustering, adjusting for age, gender, smoking status and airflow limitation assessed efficacy (regression coefficient, β, reported per 6-month visit). There was no difference in quality of life between groups, but self-management capacity increased in the HM group (PIH overall 0.15, 95% CI 0.03 to 0.29; knowledge domain 0.25, 95% CI 0.00 to 0.50). Anxiety decreased in both groups (HADS A 0.35; 95% CI −0.65 to −0.04) and coping capacity improved (PIH coping 0.15; 95% CI 0.04 to 0.26).

Conclusions: Health mentoring improved self-management capacity but not quality of life compared to regular phone contact, which itself had positive effects where decline is generally expected.

ARTICLE SUMMARY

Article focus

- People with even moderate chronic obstructive pulmonary disease (COPD) experience adverse emotional effects and impaired quality of life.
- Self-management support through education in group rehabilitation programmes improves quality of life but few community-based patients attend.
- Can telephone-delivered health mentoring by trained community health nurses increase self-management capacity and improve quality of life and psychological well-being in these patients with COPD?

Key messages

- There is no difference over 12 months in quality of life compared to having a regular phone call.
- Health mentoring increased self-management capacity and knowledge.
- Anxiety was reduced and coping improved with health mentor intervention and control phone calls over 12 months.

Strengths and limitations of this study

- Limited power to detect a significant difference in quality of life and low fidelity to delivery of some intervention elements.
- Use of an attention control group, suggesting that health mentoring was responsible for the observed benefits on self-management capacity.
- The study demonstrated community health nurses' capability and feasibility of delivering health mentoring within a service context.

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is a major contributor to healthcare costs and mortality[1] and sufferers report continually worsening emotional effects and impairment of their quality of life (QOL).[2] The management of COPD occurs mostly in primary care[3] where the demand for care related to chronic conditions is increasing. In Australia, and many other countries, the aims of care in chronic diseases are to maximise patients' well-being and reduce hospital admissions.[4] However, healthcare funding agencies tend to organise and deliver care in a predominantly encounter-based system oriented towards acute presentations.[5] Moving to community-based chronic disease care in COPD requires a multidisciplinary partnership approach that delivers structured evidence-based care[6] and enhances patients' self-management.[5 7] Achieving improved disease control and well-being not only requires optimum medical management but also more emphasis on appropriate changes in health behaviours[8] through support for self-management skills.[7] Pulmonary rehabilitation programmes support self-management, and although they are effective in improving QOL,[9] there is limited accessibility in many countries. In Europe, an audit showed that only 48% of patients admitted for COPD had access to rehabilitation after discharge[10] while figures for the UK showed that 39% of patients with COPD in primary care who could benefit had not been referred for pulmonary rehabilitation.[11] In Australia, the Lung Foundation estimates that only 1% of people with COPD who could benefit have access to rehabilitation.[12] Qualitative research in COPD suggests that self-management support should be community based and patient centred,[13] but capacity constraints in primary care restrict wider delivery to meet the need.[14] Health mentoring, a partnership between a patient and a health professional in which self-management strategies for chronic disease prevention and management are developed collaboratively, has been shown to improve QOL in patients following COPD exacerbation.[15] Mentors use cognitive behavioural techniques such as goal setting and motivational interviewing with problem solving, decision-making and effective action planning to improve self-efficacy to manage illness issues and health behaviours and modify lifestyle factors.[16]

This study investigated the hypothesis that telephone-delivered health mentoring by nurses in community-recruited patients with stable moderate or severe COPD would increase self-management capacity and improve QOL and psychological well-being.

METHODS

Research design

A cluster randomised controlled trial was conducted between May 2008 and December 2010. Randomisation occurred at general practice level to avoid contamination between the intervention and control groups.

Recruitment

General practices

All practices using a computerised patient database in the three divisions of general practice in one Australian state (Tasmania, population 497 500; figure 1) were invited to participate. An investigator presented information to general practitioners (GPs), practice managers and practice nurses, obtained consent and collected practice demographics.

Randomisation

After recruitment, practices were randomised using a code generated by investigators from a random numbers table stratified in blocks of four by Rural, Remote and Metropolitan Areas (RRMA) classifications in Tasmania. Allocation occurred independently using sequentially numbered, opaque and sealed envelopes.

Patient recruitment

GPs identified patients with COPD aged over 45 years seen within the previous 12 months through database searches, based on a diagnostic code for COPD or prescription of tiotropium. They applied the exclusion criteria (unable to participate in self-care activities due to mental or physical incapacity, end-stage cancer, poor English language skills and nursing home resident). Eligible patients were mailed information and responders screened by telephone and by spirometry to confirm eligibility by the inclusion criteria: smoking history >10 pack-years, postbronchodilator FEV1/forced vital capacity ratio <0.7 and FEV1 30–80%, able to complete procedures and provide informed consent. An administrative payment ($A25) was made to practices for each patient recruited.

Ethics

The study was registered with the Australian and New Zealand Clinical Trials Research network (ACTR 12608000112369).

Intervention group: health mentoring in COPD

Health mentoring

Health mentoring has a cognitive behavioural basis and involves five core components to support self-management: (1) Psychoeducation about common psychological reactions to COPD diagnosis and treatment; (2) self-management skills training, including goal setting, action planning and problem solving skills to manage setbacks; (3) cognitive coping skills training to identify and challenge negative COPD-related cognitions that impede self-management; (4) communication skills to facilitate discussion between the health mentor (HM) and the patient; and (5) promoting self-efficacy to manage chronic illness.[17]

For the study, community health nurses undertook 12 h of HM training over 2 days that covered COPD management (1 h), chronic disease self-management and health behaviour change components including practice role plays (7.25 h), online training and study methods (3.75 h). The training was developed and

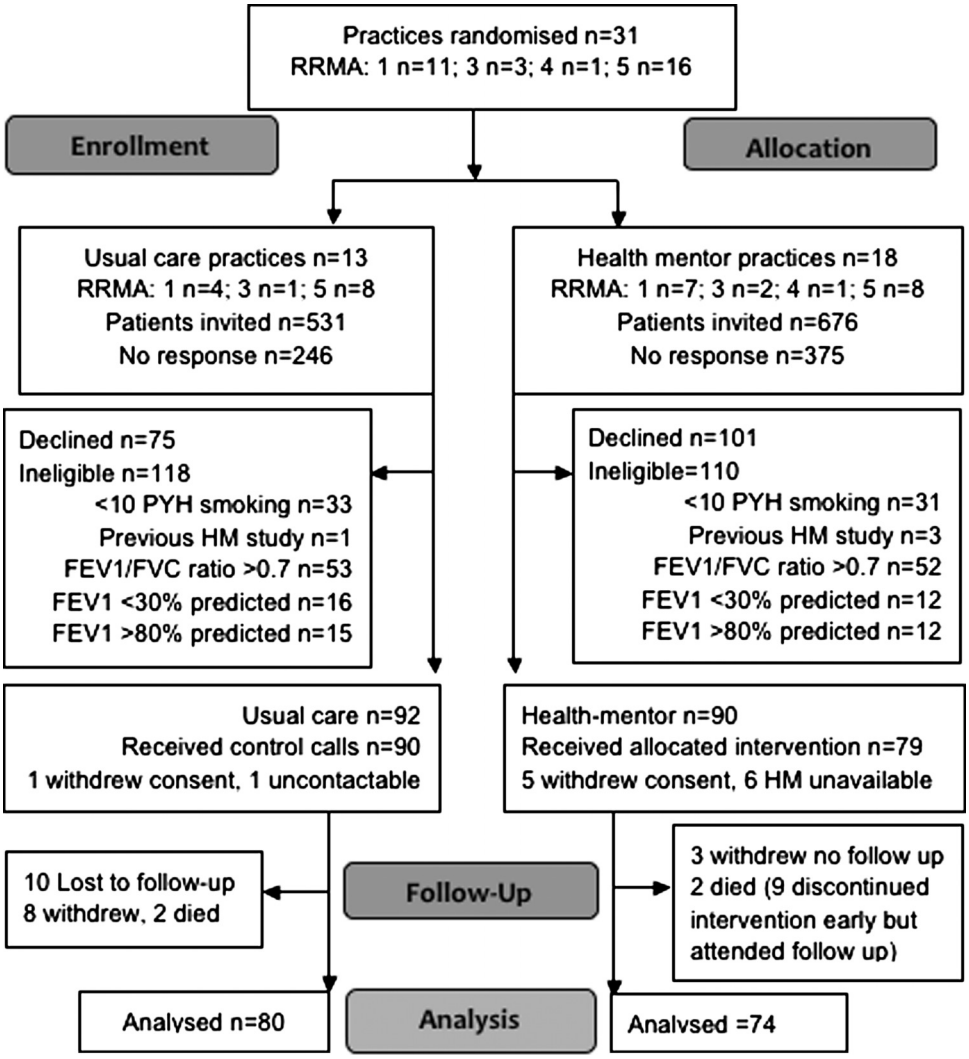

Figure 1 Inclusion of practices and participant flow during study, Rural, Remote and Metropolitan Areas (RRMA) classifications: 1, metropolitan capital city; 2, other metropolitan urban centre (population >100 000); 3, large rural centre (population 25 000–99 000); 4, medium rural centre (population 10 000–24 999) and 5, small rural centre (population <10 000).

delivered by investigators (HC-T, L Joseph and E Cummings), with the format informed by experience in our previous self-management studies.[15 16] Community health nurses employed by state community health services (n=31) were trained as HMs[17] and received ongoing support during the study, via a resource manual (see online supplementary appendix 1) and through regular meetings with each other facilitated by the trainers.

Delivery of intervention

The recommended predetermined schedule for mentor telephone calls to a participant was 16×30 min over 12 months, with increasing time between calls. On each occasion, mentors completed a session adherence checklist (see online supplementary appendix 1).

Participants set medium-term to long-term goals in collaboration with their HM using a specified framework of health behaviour targets, namely: Smoking, Nutrition, Alcohol, Physical activity, Psychosocial well-being and Symptom management ('SNAPPS'). Individualised 'action' plans to reach their goals were specified by participants in negotiation with HMs during phone calls (see online supplementary appendix 1).[17] Achievement of such plans and goals was reviewed and revisions made collaboratively. Telephone calls were recorded for quality control. Mentors recorded goals and related plans using an online database, rating confidence (self-efficacy for the target behaviour), importance and subsequent progress for each goal-related 'action plan' (see online supplementary appendix 1).

Participants' GPs and HMs received a COPD management plan corresponding to Australian guideline recommendations[18] based on each individual participant's COPD baseline assessment (see online supplementary appendix 2).

Control group (UC)

Patients in the control group received their usual care (UC) as provided by a GP plus regular monthly phone calls from a research nurse, to avoid confounding by

difference in periodic contact. The telephone calls did not provide specific psychological advice or skills training but were recorded for content analysis.

Outcome measures

Data were collected on determinants of health status and health outcomes. The variables considered to be potential determinants of health were as follows: demographic characteristics, smoking history, degree of airflow limitation, comorbid medical conditions, current medications, social support and symptom status Medical Research Council (MRC) scale for functional dyspnoea.[19] The outcomes reported here are health-related QOL (primary outcome), self-management capacity and self-efficacy, psychological well-being, satisfaction with life and hospital admissions for COPD (secondary outcomes).

QOL was measured by the Medical Outcomes Short Form 36 (SF-36) and St George's Respiratory Questionnaire (SGRQ).[20] The 14-Item Partners In Health (PIH) Questionnaire measured participant-rated chronic condition self-management (scale 0–8 standardised)[21] with four domains being identified: knowledge, coping, condition management and adherence to treatment.[22] A six-item questionnaire assessed Self-Efficacy for Managing Chronic Disease (SE MCD).[8] Psychological well-being was assessed with the Hospital Anxiety and Depression Scale (HADS),[23] using clinical state cut-off scores of 8 for possible anxiety and depression,[24] the Center for Epidemiologic Studies-Depression (CES-D) Questionnaire[25] and the Post-Traumatic Stress Disorder Checklist-Civilian Version (PCL-C).[26] The five-Item Satisfaction With Life Scale (SWLS) measured subjective well-being.[27] Data on hospital admissions related to COPD were retrieved from the Tasmanian Department of Health and Human Services electronic records.

Outcomes were measured at recruitment (baseline), 6 months and at 12 months after allocation. Assessments were conducted by research officers not directly involved in delivering the intervention or control phone calls, and undertaken at study offices or at GPs' practices according to patient preference. Blinding of participants or research officers was not possible given the nature of the study. Study research officers performed the spirometry and received training and quality control feedback from researchers (JW, RW-B). Recorded telephone calls from the first three HM contacts were coded by two raters for content and fidelity to prespecified components of the intervention to assess adherence. To ensure concordance, both raters coded a random sample of 20 calls. To ensure that there was no leakage of therapy components, a random sample of 10% of calls in the control arm was timed and the content assessed.

Analysis and power

Baseline differences in the potential determinants of health outcomes were compared between groups using t tests for continuous outcomes and χ^2 tests for categorical outcomes. Baseline measures that differed between groups were included as covariates in multivariable regression models. The proportions of participants admitted to hospital with a respiratory diagnosis in the 12 months prior to and following enrolment in the study were compared using χ^2 tests. The analysis was based on intention to treat and effects of the intervention on outcome measures over 12 months were estimated using multilevel mixed-effects linear models. Intervention, time (coded as a 3-state categorical variable to denote visit number) and the interaction between intervention and time were entered as fixed factors in the model. Participant identification number was included as a random effect to account for the dependence of repeated observations. Adjustment for sex, age, smoking status and FEV1% predicted was made in final models. Robust SEs were specified to allow for clustering within practices. Stata V.12 (StataCorp, College Station, Texas, USA) was used for all analyses and a p value of 0.05 was considered to be statistically significant.

The study was powered on a sample size of 200 participants to detect differences in mean QOL scores in SF-36 in COPD[28] for physical functioning (PF) of 8.1 and for general health (GH) of 6.3, with 80% power at level of significance α=0.05, assuming an intraclass correlation coefficient of ρ=0.05 and cluster size n=10.

RESULTS

Patient enrolment and baseline characteristics

Thirty-one practices in Tasmania were recruited and 1207 eligible patients identified and invited to participate, of whom 586 (48.6%) responded and were assessed for eligibility. Figure 1 shows an overview of the patient flow during the study. Principal reasons for exclusion (n=224) were: non-confirmation of COPD on spirometry (47%) and less than 10 pack-years' smoking history (29%). There was no difference in the proportion of men or mean age of patients who declined participation compared to participants (data not shown). In the HM group, 11 of 90 participants (12%) did not receive the allocated intervention either due to withdrawal of consent (n=5) or unavailability of a mentor (n=6) due to operational issues in the community nursing service related to an influenza epidemic. There were four deaths (UC 2; HM 2) and 22 withdrawals (UC 10 personal circumstances; HM 12, 7 due to intercurrent illness and 5 felt no value from mentoring).

Table 1 shows the baseline characteristics of participants (mean age 68 years, 52% men).

There were no differences between study groups in severity of COPD, QOL or symptom severity at baseline (table 2). Treatment for anxiety or depression was currently reported by 15% of participants, while a possible clinical anxiety state and clinical depression were present in 40% and 20%, respectively, with no difference between groups.

Adherence to protocol

The median number of phone contacts logged by HMs was 9.5 (range 1–21). Concordance between the raters

Table 1 Baseline demographics by group, UC and HM

	UC (n=92)	HM (n=90)
Age, years, mean (SD)	67.3 (7.6)	68.2 (7.9)
Gender, male	47 (51)	49 (54)
BMI, mean (SD)	26.7 (4.8)	26.3 (4.9)
Living alone	39 (42)	36 (40)
Education level		
≤Year 10	69 (75)	60 (68)
Year 11–12	7 (8)	12 (13)
Postschool qualification	16 (17)	18 (20)
Currently employed	17 (19)	18 (20)
Smoking history pack-years mean (SD)*	43.4 (21.4)	53.9 (26.3)
Current smoker	33 (36)	43 (48)
FEV1 % predicted mean (SD)	56.4 (13.2)	54.0 (13.4)
MRC Dyspnoea Score (1–5)	2.5 (0.9)	2.8 (1.2)
Other comorbidities, mean (SD)	1.7 (1.4)	1.6 (1.3)
Prior pulmonary rehabilitation or CDSM education	17 (19)	19 (21)
≥1 Antibiotic course within 12 months	44 (48)	47 (53)
≥1 Oral corticosteroid course within 12 months	18 (20)	18 (20)
Admission for COPD in past 12 months reported	0 (0)	5 (6)
Influenza vaccination in past 12 months	76 (82)	72 (80)
Pneumococcal vaccination in past 5 years	61 (66)	60 (67)
Medication at baseline (based on UC n=83 and HM n=63)		
Inhaled short-acting bronchodilator	47 (57)	27 (44)
Inhaled long-acting bronchodilator	69 (83)	42 (69)
Inhaled corticosteroids	48 (58)	29 (48)
Oral steroids	5 (6)	2 (3)

Values are n (%) unless stated otherwise.
*p<0.05.
BMI, body mass index; CDSM, chronic disease self-management; HM, health mentoring; MRC, Medical Research Council; UC, usual care.

of coded telephone calls was high, overall weighted κ 0.72. Fidelity assessments, based on 80 calls (mean length 29.3±15.7 min), confirmed that specific health mentoring components were addressed with some clarity in the following proportions: (1) COPD symptom management, 49%; (2) unhelpful self-talk explored and identified, 37%; (3) unhelpful self-talk challenged and new self-talk developed, 35%; (4) action plan for achieving goals made, 54%; (5) problems and barriers to achieving goals identified and clarified, 46%; and (6) positive changes in behaviour praised, 83%.

For UC participants, the median number of recorded phone calls over the 12-month study was 9 (range 1–14) with a mean length of coded calls (n=99) of 1.1 ±0.9 min. No calls addressed the components (1)–(4) above while positive changes in behaviour were praised in 4% of calls. Good rapport and empathy were uniformly observed during these calls.

Response to health mentoring

Table 2 shows the unadjusted scores for primary and secondary outcome at the different measuring points. Results of multilevel mixed-effects linear regression models are presented in the next sections and in table 3.

Quality of life: health mentoring did not show significant benefit on either physical or mental health summary scales or individual domain scores of SF-36, or on overall or individual domains in SGRQ compared to UC (table 3).

Chronic disease management impact: chronic disease self-management scores improved in the mentored group compared to UC; the interaction of treatment group by time was statistically significant for the overall PIH score and for the PIH knowledge domain (table 3). For the PIH coping domain, there was a significant increase over time in both study groups. Neither self-efficacy for chronic disease management nor satisfaction with life was better in the mentored group (see appendix 3 online supplementary table S1).

Psychological morbidity: there was a significant decrease in anxiety over time in both the mentored and UC groups measured by HADS in adjusted analyses (table 3). A decrease in intrusiveness on PCL-C in the mentored group compared to control just failed to achieve significance for the interaction of group×time. Other measures of depression or anxiety did not show significant treatment effects.

Hospital admissions: in the UC and HM groups, 5 (5.4%) and 11 (12.2%) participants, respectively, had at least one admission for COPD during the 12-month study participation (p=0.11, χ^2=2.61).

DISCUSSION

Among patients in primary care with mainly moderate COPD, we found that health mentoring by community nurses improved self-management capacity and knowledge when compared to the control group, although QOL, general or respiratory-related, did not differ significantly. However, clinical outcomes may have been affected in the control group by the monthly empathetic phone calls from a research officer. Psychological distress, especially anxiety, was high, present in up to 40% of participants, and improvement in anxiety was seen over 12 months in both groups, not only those receiving health mentoring calls but also those receiving only a regular 'contact' phone call. Self-management coping capacity also improved in both groups. The PIH scale used in this study was developed to assess self-management knowledge and behaviour objectively,[21] where self-management embodies five aspects: knowledge, negotiation of care, engaging in positive health behaviour, monitoring and managing symptoms, and managing impacts on function. The four key factors in the scale, knowledge, coping, recognising and managing symptoms and adhering to treatment, explained 80% of the variance and had high internal consistency in a study on a population with a range of chronic

Table 2 Quality of life, self-management capacity, psychological morbidity, well-being and self-efficacy by time and group

	Usual care			Health mentor		
	Baseline n=92	6 months n=83	12 months n=80	Baseline n=90	6 months n=74	12 months n=74
SGRQ overall (0–100, higher score worse)						
Overall	42.3 (17.9)	41.7 (17.8)	40.5 (17.4)	45.4 (18.5)	39.8 (20.5)	41.9 (18.9)
Symptoms	52.9 (21.7)	53.4 (22.0)	49.6 (21.7)	59.3 (23.0)	53.0 (26.4)	53.4 (25.4)
Activity limitation	55.8 (19.6)	56.7 (19.3)	54.7 (20.2)	58.9 (22.2)	52.8 (25.7)	56.7 (23.7)
Impacts	30.6 (19.5)	28.7 (18.8)	28.5 (18.9)	32.5 (19.5)	27.4 (18.9)	29.2 (18.9)
SF-36 (0–100, higher score better)						
Physical functioning	35.3 (10.6)	35.7 (11.1)	35.4 (10.7)	36.0 (10.6)	37.0 (10.8)	36.4 (11.3)
Role physical	44.1 (7.8)	44.9 (8.7)	45.5 (7.9)	44.0 (8.4)	46.0 (7.5)	44.2 (8.4)
Bodily pain	47.0 (12.3)	47.9 (13.1)	47.6 (12.8)	49.2 (12.2)	49.6 (12.5)	49.6 (11.9)
General health	37.5 (10.5)	37.5 (10.8)	38.3 (9.8)	37.5 (11.3)	37.8 (10.3)	37.2 (10.6)
Vitality	46.5 (9.8)	46.4 (9.2)	48.0 (9.5)	46.5 (10.3)	47.5 (10.1)	46.9 (10.7)
Social functioning	45.9 (11.5)	47.9(10.7)	47.9 (10.6)	46.6 (11.4)	48.4 (10.4)	47.9 (11.6)
Role emotional	44.7 (9.6)	46.1 (10.1)	47.1 (8.9)	46.2 (9.4)	47.3 (8.6)	46.7 (9.9)
Mental health	47.6 (10.6)	48.2 (10.9)	49.2 (10.2)	47.4 (11.1)	48.6 (10.9)	50.1 (9.9)
PCS	38.0 (10.0)	38.4 (10.1)	38.5 (9.4)	38.8 (10.0)	39.9 (10.2)	38.5 (10.3)
MCS	47.5 (11.3)	48.9 (12.0)	50.5 (10.5)	48.2 (11.5)	49.7 (10.6)	50.2 (11.4)
PIH self-management capacity (0–8 better)						
Overall	6.3 (0.9)	6.5 (1.0)	6.5 (1.1)	6.3 (1.0)	6.9 (0.8)	6.8 (1.0)
Knowledge	6.0 (1.5)	6.3 (1.3)	6.3 (1.3)	5.9 (1.6)	6.8 (1.2)	6.7 (1.4)
Recognition symptoms	5.9 (1.8)	6.1 (1.9)	5.9 (1.9)	6.1 (1.9)	6.6 (1.8)	6.6 (1.8)
Coping	5.8 (1.6)	6.2 (1.6)	6.2 (1.6)	5.8 (1.6)	6.5 (1.3)	6.3 (1.6)
Adherence	7.7 (0.8)	7.6 (1.0)	7.6 (1.3)	7.7 (1.0)	7.9 (0.4)	7.7 (0.8)
HADS (0–21 high worse)						
Anxiety	7.0 (4.1)	6.6 (3.8)	6.2 (4.0)	6.7 (4.1)	6.0 (3.6)	6.2 (4.1)
Depression	5.1 (3.6)	4.7 (3.5)	4.7 (3.5)	4.6 (3.1)	3.8 (2.8)	4.1 (3.1)
CES-D (0–53)	13.2 (8.2)	13.6 (8.9)	12.3 (8.3)	12.8 (8.7)	10.7 (8.0)	11.6 (8.9)
PCL-C (0–85)	29.5 (10.2)	28.4 (9.9)	30.0 (11.4)	29.7 (11.9)	27.7 (9.5)	28.1 (10.8)
SE MCD (1–10)	6.4 (2.4)	6.5 (2.3)	6.8 (2.1)	6.6 (2.5)	7.0 (1.9)	6.8 (2.2)
SWLS (1–35)	22.0 (7.9)	23.5 (8.1)	23.4 (7.2)	23.9 (6.6)	24.8 (6.4)	24.4 (6.4)

Values are mean (SD).
CES-D, Center for Epidemiologic Studies-Depression; HADS, Hospital Anxiety and Depression Scale; MCS, Mental Health Component Summary; PCL-C, Post-Traumatic Stress Disorder Checklist-Civilian Version; PCS, Physical Component Summary; PIH, Partners In Health; SE MCD, Self-Efficacy for Managing Chronic Disease; SF-36, Medical Outcomes Short Form 36; SGRQ, St George's Respiratory Questionnaire; SWLS, Satisfaction With Life Scale.
Statistically significant results are shown in italics.

conditions, including diabetes, osteoporosis, arthritis, cardiovascular and respiratory diseases.[22] To our knowledge, this is the first study to show a significant change in self-management capacity using the PIH scale in COPD.

In the HM group, intrusiveness or reawakening of stress associated with illness experiences showed moderate evidence towards improvement. A study that used a composite measure of interference with aspects of life and involved nurse-assisted patient-centred collaborative management using monthly phone calls also resulted in a reduction in perceived illness intrusiveness compared to UC in a comparable primary care recruited COPD population but again without improving QOL.[29] However, the positive effect of patient-centred self-management support on stressful COPD-related memories needs to be noted.

The limitations of the study were the high rate of misclassification of COPD in general practices, which impacted on enrolment,[30] and higher than expected withdrawal rates, especially in the HM group, which reduced the intended statistical power. The strengths of the study were the inclusion of a credible attention control group, suggesting that health mentoring was responsible for the observed benefits of self-management capacity and formal assessment of nurses' adherence to delivery of mentoring.

A previous study of health mentoring delivered by community health nurses in hospital-recruited patients with COPD with more severe disease, who also used a daily symptom diary, resulted in significantly improved aspects of health-related QOL measured using the SF-36, PF and GH, over 12 months compared to UC.[15] In that study, the UC group did not receive any phone calls and the HM made an initial home visit followed by phone calls whose frequency was not predetermined. Importantly in that study, HM training differed, being based on motivational interviewing and assessment of readiness to change using the transtheoretical model.[16]

Table 3 Main effects in multilevel mixed-effects linear regression models for 12-month study outcomes, β coefficient and 95% CI for group (HM vs UC), time (per 6 monthly visit), group by time interaction (adjusted for age, gender, smoking status and FEV1% predicted)

	Group		Time		Group* time	
Outcome	**β**	**95% CI**	**β**	**95% CI**	**β**	**95% CI**
Quality of life: SF-36						
PF	1.55	−3.22 to 3.50	−0.08	−0.85 to 1.03	0.22	−1.60 to 1.32
RP	0.99	−2.43 to 4.58	0.54	−0.45 to 1.79	−0.42	−2.10 to 1.03
BP	2.69	−1.44 to 6.82	−0.09	−1.24 to 1.06	0.30	−1.41 to 2.00
GH	0.14	−3.22 to 3.50	0.09	−0.85 to 1.03	−0.14	−1.60 to 1.32
VT	1.08	−2.43 to 4.58	0.67	−0.45 to 1.79	−0.54	−2.10 to 1.03
SF	1.16	−2.55 to 4.87	0.67	−0.40 to 1.74	−0.09	−1.47 to 1.29
RE	2.13	−1.50 to 5.77	0.94	−0.45 to 2.32	−0.69	−2.59 to 1.22
MH	0.17	−3.27 to 3.61	0.54	−0.52 to 1.60	0.75	−0.99 to 2.49
PCS	1.55	−2.20 to 5.30	−0.13	−0.74 to 0.49	−0.09	−1.18 to 1.00
MCS	1.26	−2.64 to 5.17	1.13	−0.32 to 2.59	−0.23	−2.29 to 1.83
Quality of life: SGRQ						
Overall	1.57	−5.41 to 8.55	−0.58	−2.37 to 1.22	−0.50	−2.85 to 1.85
Symptoms	4.34	−2.70 to 11.38	−1.36	−5.09 to 2.37	−1.36	−5.63 to 2.91
Activity	0.85	−7.14 to 8.84	−0.13	−1.99 to 1.72	−0.46	−3.56 to 2.64
Impacts	1.17	−5.66 to 7.99	−0.62	−2.02 to 0.78	−0.4	−2.56 to 1.76
Self-management capacity: Partners In Health						
Overall	0.09	−0.19 to 0.35	0.06	−0.02 to 0.14	*0.15**	*0.03 to 0.29*
Knowledge	−0.07	−0.47 to 0.33	0.11	−0.07 to 0.30	*0.25**	*0.00 to 0.50*
Recognition	0.25	−0.18 to 0.68	0.01	−0.16 to 0.19	0.19	−0.07 to 0.44
Coping	0.18	−0.32 to 0.68	*0.15***	*0.04 to 0.26*	0.03	−0.19 to 0.25
Adherence	0.00	−0.21 to 0.22	−0.07	−0.23 to 0.09	0.10	−0.07 to 0.27
Psychological measures						
CES-D	−1.18	−4.37 to 2.01	−0.16	−0.97 to 0.65	−0.27	−1.56 to 1.01
PCL-C	0.18	−4.00 to 4.35	0.42	−0.75 to 1.60	−0.90	−2.64 to 0.84
PCL-C I	0.78	−0.34 to 1.89	0.26	−0.09 to 0.61	−0.49†	−0.99 to 0.01
PCL-C A	−0.48	−2.40 to 1.44	0.25	−0.29 to 0.78	−0.27	−1.00 to 0.46
PCL-C HA	−0.09	−1.44 to 1.25	−0.09	−0.52 to 0.34	−0.08	−0.81 to 0.64
HADS D	−0.66	−1.90 to 0.59	−0.17	−0.57 to 0.22	0.03	−0.49 to 0.55
HADS A	−0.26	−1.39 to 0.86	*−0.35**	*−0.65 to −0.04*	0.13	−0.43 to 0.69

*p<0.05.
†p<0.1.
**p<0.01.
Statistically significant results are shown in italics.
A, avoidance; BP, bodily pain; CES-D, Center for Epidemiologic Studies-Depression; GH, general health; HA, hyper arousal; HADS A/D, Hospital Anxiety and Depression Scale; HM, health mentor; I, intrusions; MCS, Mental Health Component Summary; MH, mental health; PCL-C, Post-Traumatic Stress Disorder Checklist-Civilian Version; PCS, Physical Component Summary; PF, physical function; RE, role emotional; RP, role physical; SF, social functioning; SF-36, Medical Outcomes Short Form 36; SGRQ, St George's Respiratory Questionnaire; UC, usual care; VT, vitality.

The present study focused on self-management, building rapport and collaborative partnerships with patients with COPD, as well as the application of a specific framework for health behaviour changes.[17] Our population also had less severe disease, where behavioural interventions need to be focused on for preventing deterioration in COPD.[18]

The apparent benefit from brief regular phone contacts was unexpected but may relate to the impact of personal contact in the light of the known social isolation often imposed by COPD.[13 31] While it is possible that we were merely seeing regression to the mean with this change, this is unlikely as there is generally progressively worsening QOL[29] and psychological morbidity in COPD.[32] A likely explanation is that control calls were therapeutic, providing participants with regular empathetic support. Satisfaction with social support, especially emotional support, predicts adjustment to chronic illnesses[33 34] and brief or minimal interventions that enhance this are effective for improving psychosocial adjustment to cancer[35] and stroke.[36] There are no such data for COPD.

Translating self-management support into positive health behaviour changes is likely to depend on individual motivation, which fluctuates and is affected by personal and external factors[37] and individual perception of COPD.[38] This may partly explain why health mentoring produced better self-management capacity and knowledge, although no effect was seen on QOL. The change in attitude detected may be followed by clinical improvements, which although slight may be important at an individual level. A high proportion of mentored participants

in this study made plans to increase physical activity,[17] which emphasises its importance to patients. The HM intervention aimed to promote health behaviour change most relevant to the individual with COPD, that is, to be patient centred; however, had we included an action plan for walking for each participant, the results might have been different. A positive relationship has been shown in COPD between exercise and psychological well-being,[32] but it is possible that the intensity of physical activity undertaken was insufficient to cause a change in the overall QOL. Indeed, making clinically important, sustained improvements in physical activity in COPD is difficult. In another study, after three counselling sessions by general practice nurses (total 1 h) assessing and communicating cardiovascular disease risk with motivational interviewing, there were no positive changes in physical activity or in any other lifestyle risk factor compared to a minimal intervention.[39] A lifestyle activity intervention that did improve QOL gave patients 36 h of face-to-face and telephone contact time plus group exercise sessions, which would not be practical in community care.[40]

Community nurses acted as HMs in our study, in accord with the recommended change in focus for community health and health systems towards prevention.[16] With a wider role envisaged for general practice nurses, training in health mentoring could increase availability of self-management support with the benefits we have demonstrated on self-management capacity.[14] In our study, nurses received formal training as HMs over 2 days, complemented by ongoing support. Training of similar length in motivational interviewing for community nurses in general practice gave no advantage over a minimal intervention.[39] However, our study differed in that we specifically measured the important aspect of adherence to delivery of a behavioural intervention.[41] We identified areas for improvements in HM training. Whereas community nurses' adherence to the delivery of the component of praise for positive changes was high, adherence was low for some key cognitive and behavioural skills, for example negative self-talk and identification of barriers.

In summary, health mentoring delivered by community health nurses increased the self-management capacity of people with COPD in the community but did not change QOL. A short empathetic phone call had some positive effects and should be further assessed. Optimising training and supporting HMs' skill development in routine practice will also be an important area for future research.

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Contributors JW contributed to the development of the study design, data collection and statistical analysis and led the writing of drafts for publication. RW-B and EHW led the development of the study conceptualisation, design and refining of the protocol and made substantial contributions to the preparation of drafts and the final version of the manuscript. HC-T contributed to the development of the study design and data collection and made substantial contribution to writing up for publication. KW and NS contributed to the statistical analysis and writing up for publication. MN, AR, JS and PT contributed to the study and intervention development as well as to writing the publication drafts and the final version of the manuscript.

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