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REVIEW

Nutritional Support and Physical Activity Intervention Programs with a Person-Centred Approach in People with Chronic Obstructive Pulmonary Disease: a Scoping Review

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Background: The knowledge is sparse in the literature on intervention programs using nutritional support and physical activity for patients with chronic obstructive pulmonary disease within a person-centred approach. We aimed to explore and map the existing evidence on intervention programs with a person-centred approach, focusing on nutritional support and physical activity for people with COPD.

Methods: A scoping review was conducted using Arksey & O'Malley's methodological framework. A search in the databases CINAHL and PubMed, and a grey literature search, was conducted in June 2022 and updated in June 2023. We identified studies published between 2012 and 2023. The PRISMA checklist for scoping reviews, supported by The PAGER framework was used for reporting the method.

Results: A total of 15 studies were included. The primary interventions comprised behavior of change or self-management, addressing needs assessment, motivation, personal goals, education, and physical activity. Health-related quality of life and hospital stay displayed no clinically significant variances. However, eight studies demonstrated differences in physical function and activity levels. Nutritional outcomes were addressed in one study, and three studies involved relatives.

Conclusion: This scoping review addresses a knowledge gap in nutritional support interventions with a person-centred approach. It indicates that there is a need to increase nutritional support and consider the patient's physical and social environmental resources within Behavior of change or Self-management intervention programs for patients with COPD. The review found no clinical effect on health-related quality of life, although there were some effects on physical activity. The results highlight how the interdisciplinary team can include the patients' resources when structuring the management of COPD by applying a person-centred approach.

Keywords: COPD, pulmonary rehabilitation, self-management program, motivational techniques

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive chronic inflammatory lung disease characterised by persistent respiratory symptoms due to airflow limitation.[1] COPD is a growing global health problem, with a prevalence of more than 200 million cases in 2019, and it is the third leading cause of death worldwide.[2,3] The majority of people diagnosed with COPD are older and frail, living with frequent exacerbations of their COPD and multi-comorbidities that affect the patients both physically and psychosocially.[4,5] COPD is associated with the development of malnutrition, with prevalence rates ranging from 13% to 45%.[6,7] Disease-related malnutrition negatively affects the immune response and physical capacity, as a low intake of macro- and micronutrients is a key factor in muscle wasting.[8] A reduction in muscle mass leads to physical inactivity, need for

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support, hospitalisation, low quality of life and increased mortality.[9,10] In addition to medications, supplemental oxygen, and non-invasive ventilation, regular physical activity combined with nutritional support are crucial for the long-term prevention of malnutrition and muscle wasting.[1] Despite a clear rationale for nutritional support, the definition and content of nutritional support is less clear in the literature. Within nutritional research, concepts like nutritional therapy, nutritional support or care, may refer to both parenteral and enteral nutritional treatment, dietary advice and organisation of the nutritional process, as well as the role of each member of the multidisciplinary team.[11,12]

Oral nutritional supplementation has, within enteral nutrition, shown a positive impact on physical function, body composition and patient survival in underweight patients with stable COPD.[13] Despite a positive effect of oral nutritional supplementation, the patients' ability to uphold their nutritional needs faces several barriers that are more related to their needs, eg, transporting groceries, fatigue, dyspnoea, lack of energy to prepare and eat the meals, loss of appetite, and loneliness.[14] So far, the nutritional intervention for patients with COPD, mainly focusing on enteral nutrition, has shown an inconclusive effect due to research heterogeneity and short timespan.[15]

Pulmonary rehabilitation aims to reduce symptoms and improve physical function and health-related quality of life.[16,17] Although pulmonary rehabilitation is internationally recognised and implemented, barriers still exist. For patients, these barriers include a lack of knowledge and belief in its benefits, frequent interruptions due to COPD exacerbation and hospitalisation, and personal issues such as poor scheduling, disruption of daily routines, and transportation problems, all of which lead to low participation and completion rates.[18]

Recently, the American Thoracic Society conducted workshops on modernising pulmonary rehabilitation, highlighting the need to personalise programs by incorporating patients' preferences and needs.[19] A review by Leplege (2007) explored person-centredness in rehabilitation and found it to be used as a multi-dimensional concept with a range of interpretations; thus, consensus on its meaning and implications remains elusive.[20] The concept of person-centredness in rehabilitation is still a challenge, due to a lack of consensus about its definition, and the absence of knowledge of how to operationalise the concept into a clinical rehabilitation setting.[21] To date, fifteen domains of supportive needs have been identified to promote and enhance interventions with a person-centred approach to patients with COPD.[22] Reviews have independently investigated nutritional support and physical activity for patients with COPD, but few studies have utilised these components within a person-centred approach.[15,23] Therefore, the aim of this study is to map the existing evidence, summarise components of nutritional support and/or physical activity interventions with a person-centred approach for people with COPD to make recommendations for future intervention research.

Material and Methods

Protocol Registration

The protocol is registered December 19th, 2022, in Open Science Framework https://doi.org/10.17605/OSF.IO/AZMFS. The registration was performed retrospectively following a pilot literature search for advancing the original search to encompass studies with a key relevance to this study.

Study Design

This review uses the methodological framework developed by Arksey & O'Malley with the following five stages: Identification of research questions, identification of relevant studies, selection of studies, charting of data, and summary and reporting of findings.[24] The latter is described according to the PAGER framework for improving the quality of reporting.[25] The Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews (PRISMA-ScR) guide was used to qualify the review.[26] The Template for Intervention Description and Replication (TIDieR) checklist was used to structure the data charting.[27]

Identification of Research Questions

The primary research inquiry was identified through the application of the PICo framework, comprising the population, the interventions, and the contextual elements.

The primary research question is:

What is the available evidence for nutritional support and/or physical activity interventions with a person-centred approach targeting people with COPD?

The research question is further addressed by the following sub-questions:

1. What characterises the interventions? (What? How much? Who delivered?)
2. Which outcomes are used to measure the interventions?
3. What is the effect of the interventions?

Identifying Relevant Studies

The literature search was conducted in June 2022 and updated in June 2023. We included two research databases, PubMed, and CINAHL, combined with a search for grey literature in four online databases (Google Scholar, Open Grey, National Grey Literature Collection, and NY Academy of Medicine Grey Literature Report) and five websites (European Respiratory Society, The Danish Lung associations, Danish Health Authority, The Danish pulmonary society, and Centre for clinical guidelines). The search strategy was planned in collaboration with a librarian from the University of Aarhus, Denmark. A full search string is attached in Appendix 1. We did a preliminary iterative search in PubMed and CINAHL to identify Medical Subject Headings, Mesh Terms, CINAHL headings, and Free text keywords with reference to "nutritional support", "physical activity", "COPD", and "Person-centred approach". Boolean terms "OR"/"AND" and truncation "*" were used in the final search. The following terms were used and combined with keywords and searched for as Free text in Title/Abstract:

- (Chronic obstructive pulmonary disease, COPD)

AND

- (Nutrition, Nutritional support, Nutrition assessment, Nutrition therapy, Nutritional care, Food, Mealtime, Malnutrition, Mobility limitation, Physical activity, Mobility, Exercise test, Exercise physical fitness)

AND

- (Person-centred care, Patient care management, Patient preference, Patient participation, Patient care planning).

The identified papers were imported into the Covidence Systematic Review software program, where duplicates were eliminated.[28] Additionally, the first author and a researcher separately searched for grey literature using a structured search strategy with the keywords: (COPD OR Chronic obstructive pulmonary disease) AND (Physical activity OR Movements OR Physical function OR Nutrition OR Nutritional care OR Clinical nutrition) AND (Person-centred OR Patient-centered). Finally, references listed in the included papers were screened to identify further relevant studies.

Study Selection

Studies were selected based on the following inclusion criteria and definitions presented as population, intervention, and context.

Population:

- People diagnosed with COPD at all stages and in all conditions.[1]

Interventions:

- A person-centred approach was used when patients expressed needs, wants, and/or preferences were a key part of the intervention.

AND

- A Nutritional support included any form of nutrition, nutrient delivery, educational and dietary advice, meal and eating support, and medical nutritional therapy.[8]

OR

- A physical activity was defined as any body movement produced by a skeletal muscle that requires energy expenditure.[29]

Context:

- All designs, measurements, analyses, and outcomes were eligible for inclusion: qualitative, before-after, quantitative and mixed methods intervention studies. We included all countries, hospitals, and primary care settings as we aimed for a wide range of contexts.

Studies with a mixed population or reviews were excluded as only primary intervention studies for people with COPD were of interest. The studies were limited to publications between January 2012 and June 2022 written in either English, Danish, Norwegian, or Swedish.

During the initial screening, the titles and abstracts were independently evaluated by three reviewers. The first 50 abstracts were screened as a pilot assessment to identify and clarify any discrepancies in meeting the inclusion and exclusion criteria. Subsequently, a full-text screening of the included literature was conducted by the main reviewer, who thus assessed all selected studies. This was done in collaboration with three reviewers, who each assessed one-third of the included literature. Disagreements in the results from the full-text screenings were resolved through discussion between all reviewers until consensus was reached. Finally, a total of fifteen papers were included in the scoping review. The screening is shown in the PRISMA flow diagram (Figure 1).

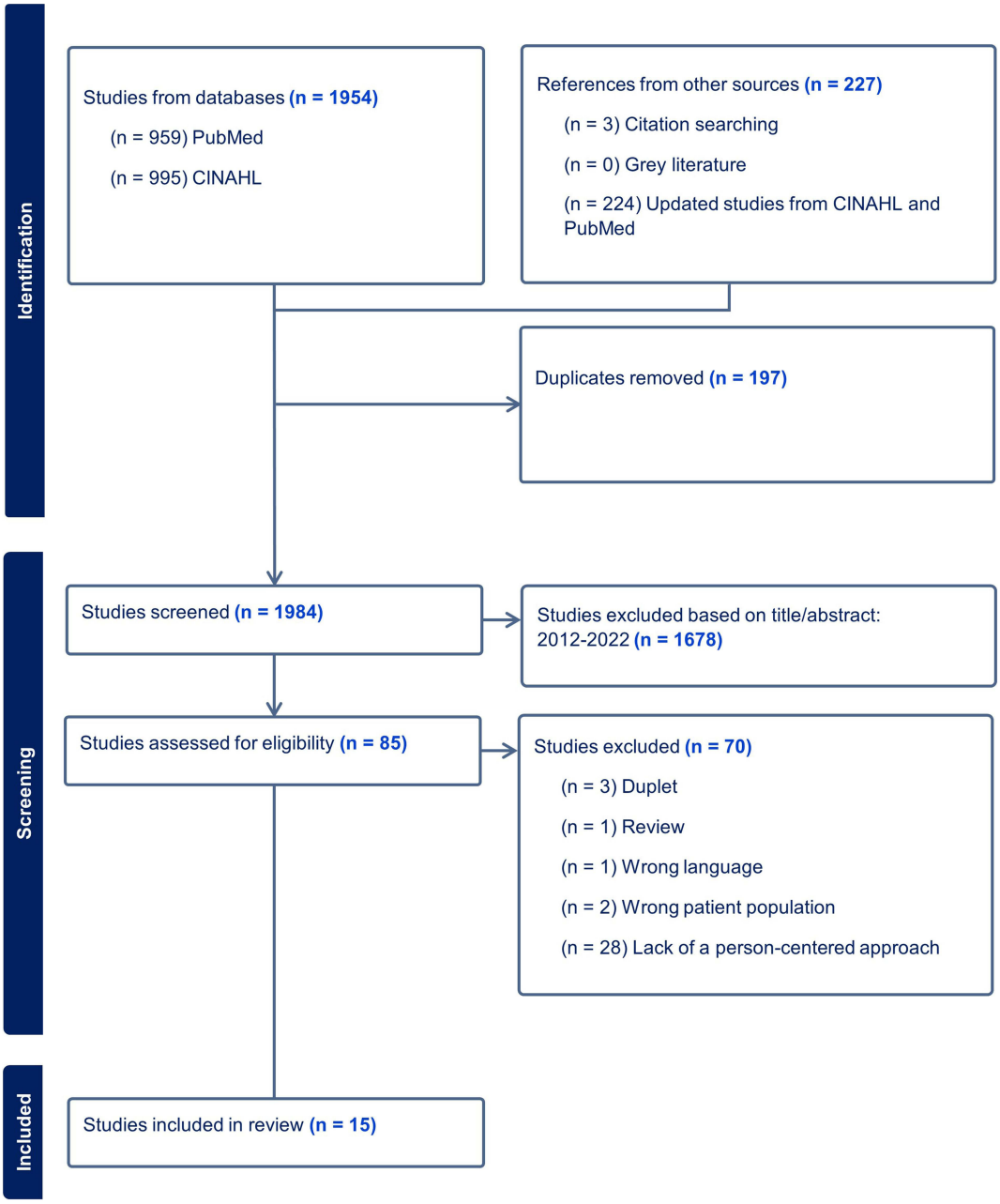

Figure 1 PRISMA flow diagram providing an overview of the review process.

Charting the Data

A data charting form was developed in line with the research question and the TIDieR checklist (see Appendix 2). A pilot test and adaptation of the charting table was conducted prior to charting the data. The reviewers performed the data extraction independently. The main reviewer extracted all data, while the other reviewers extracted one-third each. The data extractions were compared, and consensus was reached. Data extraction was iterative, and the data charting form was adapted during the process.

Summarise and Report the Results

The results are summarised and reported in Tables 1–4 supplemented by a narrative description. In the tables, the studies are presented in order by the year of publication. Studies using similar intervention are presented in groups with a headline. The study characteristics are presented in Table 1. Patterns from the intervention within physical activity, nutritional support, and person-centred approach are categorised according to TIDieR checklist and presented in Table 2 and Table 3. [27] The used outcome-measurements and the primary and secondary outcomes between the intervention and control groups are presented in Table 4.

Results

In total, 2181 studies were identified. After screening titles and abstracts, 1899 studies were excluded according to the inclusion and exclusion criteria, leaving 85 studies to be assessed for eligibility for full-text review. In total, 15 studies were included in the review (Figure 1).

Characteristics of Study Objectives, Design, Participants, and Key Findings

The reviewed studies cover a wide geographic range, spanning eight countries across four continents, with most studies conducted in Europe. The studies were published between 2013 and 2022. The results of the study characteristics are summarised in Table 1.

The overall patterns within the study objectives were to evaluate the effectiveness of the interventions on outcomes like health-related quality of life and hospitalisation. One intervention, known as the self-management program of activity, coping, and education (SPACE), was evaluated in various settings.[41–43] Prior to the evaluation, the SPACE intervention was developed, by involving patients and healthcare professionals, and pilot tested for effectiveness.[44] One study, developed and tested a home pulmonary rehabilitation programme that adapted health coaching,[39] which previously had shown to reduce the short-term readmission for patients hospitalised for an acute exacerbation.[40] Three of the included studies explored the acceptability or/and feasibility of their intervention,[35,36,39] while two studies tested the process of the delivery and acceptability alongside the randomised control trial (RCT) study.[30,41] Most of the studies used the RCT design to test the effectiveness of the intervention (n = 10). The patients' age ranged from 59 to 83 years with a primary pulmonary status from moderate-to-severe grade of COPD as per the GOLD standard. Five studies included patients with an acute COPD exacerbation.[32–34,40,42] One study included outpatients with home oxygen therapy.[37] Four studies described the patients as stable,[30,31,36,43] while the remaining studies did not include the COPD status as a criteria for participation. The key findings indicate notable improvements in the patient's functional capacity, health status, health-related quality of life, and disease knowledge. Additionally, the interventions demonstrated high feasibility and well-acceptance by the patients.

Patterns of the Intervention

A detailed description of the content of the interventions is presented in Table 2. The overall programme consisted of behaviour of change interventions (n = 7) or/and self-management (n = 10) where PR was included alongside or in combination but only explicitly described in three studies. Interventions involving partnership establishment[37,38] and shared decision-making components[32] were integrated into the self-management program. The intervention period lasted from four weeks to six months with six weeks being the most common duration. Seven studies had a follow-up period between three months to one year.

Table 1 Summary of study characteristics

Author, year, country, design	Patient description		Aim/objective(s)As described within each study	Intervention description	Key findings
	Pulmonary status	**Sample size n Age mean (±SD) Sex n (%)**			
Cheng et al[38] 2022 Australia RCT multi centre	Patients with stable COPD on a waiting list for pulmonary rehabilitation FEV1 % predicted mean (±SD) 58 (20) intervention 53 (19) sham GOLD grade Intervention/sham n 4/3 mild 15/10 moderate 10/20 severe 2/1 very severe	Size 31 intervention 34 sham Age 74 (9) intervention 73 (10) sham Sex (Male) 16 (52) intervention 16 (47) sham	To determine whether a 6-week behaviour change intervention was more effective than a sham intervention for reducing sedentary behaviour (SB) in people with COPD	Behaviour change intervention: Three target behaviours: Replacing SB with (1) stepping, (2) standing, and (3) break-up prolonged bouts of SB Face-to-face sessions and phone calls delivered at the pulmonary center or home-based Workbook with action plans, checklists, goal setting	No between-group difference in time spent in sedentary behaviour
Armstrong et al[43] 2021 UK RCT single centre	Patients with stable COPD FEV1 % predicted mean (±SD) 51 (19) intervention 50 (17) control GOLD grade No data	Size 24 intervention 24 control Age 71 (9.0) intervention 73 (9.0) control Sex (Female/male) 15/9 intervention 15/9 control	To compare the effect of physical activity behavioural modification interventions alongside pulmonary rehabilitation with pulmonary rehabilitation alone	Pulmonary rehabilitation + a behavioural modification intervention: Education and training alongside a behavioural modification intervention	Incorporation of a physical activity behavioural intervention, alongside a pulmonary rehabilitation program, conveys improvements in functional capacity and improves experiences of physical activity in COPD patients with low baseline physical activity and exercise capacity levels
Granados st ago et al[40] 2020 Spain RCT	Hospitalized patients with acute exacerbation of COPD FEV1 % predicted mean (±SD) 33.24 (12.88) intervention 37.15 (16.33) control GOLD grade No data	Size 21 intervention 21 control Age 69 (9.9) intervention 74 (9.3) control Sex No data	To evaluate the effectiveness of a shared decision-making and patient engagement program concerning in-hospital stay, and determine its impact on patients perceived health status and especially on their knowledge of COPD, general functionality, and lifestyle	**Shared decision-making program**:Evaluate and identify self-management goals Develop strategies for the care Discuss strategies with patients Deliver information, training, and feedback on selected goals	A shared decision-making and patient engagement program significantly enhanced overall health status, disease knowledge, and healthy lifestyle habits
Lopez Lopez et al[39] 2039 Spain RCT	Patients with severe COPD hospitalized due to acute exacerbation FEV1 % predicted mean (±SD) 36.58 (16.79) physical therapy 38.77 (17.87) physical therapy + self-management 34.50 (19.59) control GOLD grade No data	Size 22 physical therapy 22 self-management + physical therapy 22 control Age 71 (11.53) physical therapy 73 (7.4) self-management + physical therapy71.35 (9.88) control Sex No data	To evaluate the results of an in-hospital Self-management program in addition to physiotherapy in patients with severe chronic obstructive pulmonary disease compared to a physiotherapy program	**A self-management program**: An evaluation of the patients' beliefs, thoughts, and feelings about COPD Identification of goals Education Neuromuscular stimulation therapy	The result has shown that an individualized Self-management program administered once a day improves health-related quality of life and functionality compared to physical therapy and to a control group in patients hospitalized with severe COPD

Wang et al[41] 2020 China RCT single centre	Patients discharge from hospitalization with exacerbation of COPD FEV1 % predicted mean (±SD) 58.4 (17.3) intervention 59.2 (18.2) control GOLD grade n Intervention/control 1/0 mild 12 /14 moderate 43/45 severe 21/18 Very severe	Size 77 intervention 77 control Age 68.7 (6.2) intervention 69.2 (6.1) control Sex (Female/male) 18/59 intervention 15/62 control	To examine the effectiveness of a nurse-led self-management program on outcomes of patients with COPD To evaluate the impact of a nurse-led self management program on COPD-related hospitals admissions and emergency departments visit, exercise capacity, health-related quality of life and satisfaction	**A self-management program**: Assessment of self-management needs Face-to-face individually tailored education sessions under admission A discharge plan according to the needs and an education booklet. Training Home visits and telephone calls after discharge for follow-up	Patients with COPD in a nurse-led self-management program had significantly fewer COPD-related hospital admissions and emergency department visits A significantly greater improvement in exercise capacity and health status over time in the nurse-led program group than in the control group
Bartlett et al[36] 2017 UK Intervention development Mixed methods with interviews and questionnaires	People with COPD, carers, and Health care professionals FEV1 No data GOLD grade No data	Size 28 interviews 87 questionnaires Sex (Female/ male) 16 / 12 interviews 59/ 28 questionnaires Age 70.8 (8.3) Interviews 64 (8.5) questionnaires	To explore how acceptable different persuasive technology design principles were considered to be supporting and encouraging physical activity among people with COPD	**Persuasive technology designs**:Three prototypes of online persuasive technology techniques were designed to monitor a daily walk	The virtual coach was the most popular, however, the general opinion using persuasive technology was positive Techniques supporting dialogue and primary task support were better supported by participants than those related to social support The positive view of dialogue support and primary task support suggests that persuasive design principles and associated techniques are acceptable The competition element of the online community divided opinion Themes: The participants' "opinions" of the prototypes and preferences
Damps-Konstańska et al[37] 2016 Poland Non-control interventional study	Patients with stable COPD FEV1 No data GOLD grade n 20 Severe 10 very severe	Size 30 Sex (Female/male) 9/21 Age 66 (54 – 83) Range	To assess home visits provided by trained assistants are accepted by advanced COPD patients, and evaluate whether an individual short educational program can improve knowledge of COPD and inhaler use	**Educational program**: A home-based assistance intervention with an educational program	The results demonstrate full acceptance of this kind of support
Moriyama et al[42] 2015 Japan Non-randomised control trial	Outpatients with COPD undergoing home oxygen therapy FEV1 % predicted mean (±SD) 46.74 (10.74) intervention 61.25 (20.51) control GOLD grade Very severe	Size 15 intervention 15 control Sex (Female/male) 3/12 intervention 3/12 control Age 75 (9.8) intervention 72 (8.3) control	To examine the effectiveness of a nurse-led 6-month comprehensive pulmonary rehabilitation program for stage IV chronic obstructive pulmonary disease patients receiving home oxygen therapy	**A self-management program**: A face-to-face individualised educational demonstration of pulmonary rehabilitation activity practices	The program contributes to patients' learning of self-management skills and improves their dyspnea, social activity level, walking distance, and overall quality of life

(*Continued*)

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Table 1 (Continued).

Author, year, country, design	Patient description		Aim/objective(s)As described within each study	Intervention description	Key findings
	Pulmonary status	**Sample size n Age mean (±SD) Sex n (%)**			
Jonsdottir et al[44] 2015 Iceland RCT	Patients with COPD FEV1 % predicted mean (±SD) 54.02 (17.58) intervention 60.85 (17.26) control GOLD grade Intervention/control n 2/7 mild 30/34 moderate 11/8 severe 5/3 very severe	Size 48 intervention 52 control Sex (Female/male) 29/19 intervention 25/27 control Age 59 (4.66) intervention 59 (4.93) control	To evaluate the effectiveness of a partnership-based self-management programme	**A partnership-based intervention**: Family conversations on the patient/family main concerns, symptoms, and enhancing health Group meetings with self-management components and discussions of COPD topics	The 6-month partnership-based self-management program had benefits on the perception of the intrusiveness of COPD
Intervention included a health coach with motivational interviews					
Benzo et al[34] 2018 USA Intervention development Pilot study	Patients with COPD FEV1 No data GOLD grade Moderate to severe	Size 12 Sex No data Age > 40 years	To communicate the developmentand feasibility of a home pulmonary rehabilitation system and to provide preliminary results from the initial pilot studies that combined the system with a behavioural program	**A pulmonary rehabilitation system combined with a behavioural program**: Including a tablet computer, an activity monitor and a pulse oximeter to monitor the patients A weekly call by a health coach to discuss the patient's progress Exercise and walk program	The participants felt the tablet was helpful, and the home pulmonary rehabilitation program was found to be feasible and well-accepted by targeted users The system used off-the-shelf technology that will facilitate adoption, and indicated a high adherence to the prescribed pulmonary rehabilitation Three common themes: (1) support from the coach, (2) appropriateness of exercises, and (3) lack of negative feedback
Benzo et al[35] 2016 USA RCT multi centre	Patients hospitalized for an acute exacerbation of COPD FEV1 % predicted mean (±SD) 40.5 (17.1) intervention 40.3 (17.2) control GOLD grade No data	Size 108 intervention 107 control Sex (Male) 46 (43) intervention 51 (48) control Age 67.9 (9.8) intervention 68.1 (9.2) control	To determine the effect of comprehensive health coaching on the rate of COPD readmissions	**Health coach intervention**: One physical meeting at the hospital, one home visit, and subsequent sessions by telephone (minimum 15 calls) provided by a health coach The sessions included motivational interviews, goal setting, action plan, and feedbackExercise and walk program	Decreased COPD-related hospitalizations at 1, 3, and 6 months after hospital discharge Disease-specific quality of life improved significantly in the health coaching group compared with the control group at 6 and 12 months There were no differences between groups in measured physical activity at any time point
Interventions included The Self-management Program of Activity, Coping, and Education (SPACE) for COPD					
Bourne et al[32] 2022 UK RCT	Persons with COPD FEV1 predicted mean (SD) 1.7 (0.6) intervention 1.7 (0.6) control GOLD grade Intervention/control n (%) 19 (19.6)/19 (19.8) mild 53 (54.6)/57 (59.4) moderate 15 (15.5)/15 (15.6)severe 3 (3.1)/2 (2.1) very severe	Size 97 intervention 96 control Sex (Male) 52 (54) intervention 53 (55) control Age 69.6 (8.1) intervention 70.5 (8.4) control	Examine whether group-based delivery of SPACE for COPD, with sustained support, improves patient outcomes following the intervention compared with a control group Explore the feasibility, acceptability, and efficacy of the intervention to be delivered and supported by healthcare professionals	**SPACE FOR COPD group-based self-management programme**: 176 pages manual combined with six group-based self-management sessions using social cognitive theory/social Learning theory (self-efficacy and learning through social observations)	No difference in the primary outcome of health status measured by the CAT a supported self-management intervention is feasible and acceptable when delivered as a group-based intervention, by healthcare professionals in the community

Johnson-Warrington et al[31] 2016 UK RCT multi centre	Patients with an acute exacerbation of COPD FEV1 % predicted mean (±SD) 40.47 (15.71) intervention 42.45 (11.73) control GOLD grade n Intervention/control 10/10 moderate 16/12 severe 11/12 very severe	Size 39 intervention 39 control Sex (Female/male) 24/15 intervention 26/13 control Age 67.64 (8.54) intervention 68.33 (7.73) control	To investigate if Self-management Program of Activity, Coping, and Education (SPACE) for COPD employed upon hospital discharge reduce readmission and the effect of SPACE for COPD on exercise tolerance, psychological impact, health-related quality of life, and disease knowledge	SPACE for COPD hospitalised self-management program: 176 pages manual one-to-one introduction of the manual at the hospital using motivational interviewing techniques to facilitate behaviour change, goal setting, and problem-solving	SPACE for COPD, delivered upon hospital discharge and supported post-discharge, did not reduce the readmission rate Potential benefits in health-related quality of life and delaying time to first readmission
Mitchell et al[30] 2014 UK RCT single centre	Patients with stable COPD FEV1 % predicted mean (±SD) 56.04 (16.76) intervention 59.60 (17.42) control GOLD grade Intervention/control n 7/8 mild 51/60 moderate 22/20 severe 9/7 very severe	Size 89 intervention 95 control Sex (Female/male) 35/54 intervention 48/47 control Age 69 (8.0) intervention 69 (10.1) control	To test the effect of The Self-Management Programme of Activity, Coping and Education (SPACE) for COPD, and to reduce symptom burden for stable patients with COPD at six months	**SPACE for COPD to stable patients**: An introduction to the 176 pages self-management manual using motivational interviewing Follow-up phone calls with reinforcing skills and encouragement	The SPACE for COPD intervention in primary care did not improve dyspnea, there were some gains in anxiety, exercise performance, and disease knowledge
Apps et al[33] 2013 UK Intervention development with Focus groups Pilot study	Patients with COPD Pilot study FEV1 L mean 1.47 GOLD grade No data	Size 37 (pilot study) Sex (Female/male) 15/22 (pilot study) Age 68,05	To develop and test of a self-management manual for COPD (The Self-Management Programme of Activity, Coping and Education (SPACE))	**SPACE for COPD**: Introduction of the 176 pages self-management manual using motivational interviewing Follow-up phone calls with reinforcing skills and encouragement	The pilot study indicates that The Self-Management Programme of Activity, Coping, and Education (SPACE) for COPD is effective in changing exercise tolerance and dyspnea The approach was successfully developed together with patients, caregivers, and healthcare professionals Themes from the development phase: Educational needs; who should deliver self-management? When is the right time?; How should self-management be delivered?

Notes: Bold: Intervention description.
Abbreviation: FEV1, forced expiratory volume in 1 second.

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Table 2 Patterns for the Intervention

	WHAT						HOW LONG	WHO PROVIDED	WHERE
Author, Year, Country	**Self-management programme**	**Behaviour of change intervention**	**Pulmonary rehabilitation**	**Shared decision making programme**	**Partnership establishment**	**Health coaching programmes**	**Δ = Intervention ¤ = Follow-up**	**Profession**	**(+) Home (++) Hospital (+++) Community**
Cheng et al[30] 2022 Australia		x					Δ 6-weeks ¤ Non	Physiotherapist	(+)
Armstrong et al[31] 2021 UK		x	x				Δ 8-weeks ¤ Non	Multidisciplinary team	(+)
Granados Santiago et al[32] 2020 Spain	x			x			Δ During hospital ¤ 3-months	Healthcare team	(++)
Lopez Lopez et al[33] 2020 Spain	x						Δ 5–7 sessions ¤ 3-months	Physiotherapist	(++)
Wang et al[34] 2020 China	x						Δ 1-week, 3-month ¤ 1 year	Nurse	(+) (++)
Bartlett et al[35] 2017 UK		x					Δ Non ¤ Non	An electronic device	(+) (+++)
Damps-Konstańska et al[36] 2016 Poland	x						Δ 4-weeks ¤ Non	Medical assistant	(+)
Moriyama et al[37] 2015 Japan	x		x		x		Δ 6-months ¤ Non	Nurse	(+)
Jonsdottir et al[38] 2015 Iceland	x				x		Δ 6-months ¤ 12-months	Nurse + intervention team	(+++)

Intervention included the health coach programme									
Benzo et al[39] 2018 USA		x	x			x	Δ 8-weeks ¤ Non	Health coach	(+)
Benzo et al[40] 2016 USA						x	Δ Not described ¤ 3,6,9,12-months	Nurse/ respiratory therapist	(+) (++)
Intervention included the Self-management Program of Activity, Coping, and Education (SPACE) for COPD									
Bourne et al[41] 2022 UK	x						Δ 5-months ¤ 9-months	Healthcare professionals	(+) (+++)
Johnson-Warrington et al[42] 2016 UK	x	x					Δ 10-weeks ¤ 3-months	Physiotherapist	(+) (++)
Mitchell et al[43] 2014 UK	x	x					Δ 6-weeks ¤ 6-months	Physiotherapist	(+)
Apps et al[44] 2013 UK	x	x					Δ 6-weeks ¤ Non	Health psychologist	(+)

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Table 3 Patterns of Elements of the Intervention

Author, year, country	Physical Activity Or/And Nutritional Support				Person-Centred Approach										
	Training modality (+) Resistance (++) Endurance (+++) Exercise (++++) Walk (+++++) NST (++++++) Reducing sedentary behavior	Education	Information	Monitoring	Motivational interview	Personal assessment of needs, believes, thoughts	Shared decision making	Personal goal setting	Personal action plans	Feedback/ advice/ support	Patient chosen conversation	Coarching	Group sessions	Involve relatives	Involve local community
Cheng et al[30] 2022 Australia	(++++++)	PA		PA		x		x	x	x				x	
Armstrong et al[31] 2021 UK	(+) (++)	PA NS		PA	x			x	x	x					
Granados Santiago et al[32] 2020 Spain	(+++)		PA NS				x	x	x	x					
Lopez Lopez et al[33] 2020 Spain	(+++) (+++++)	PA NS				x		x							
Wang et al[34] 2020 China	(+++)	PA				x		x	x	x				x	
Bartlett et al[35] 2017 UK	(++++)		PA NS	PA				x	x	x			x		x
Damps-Konstańska et al[36] 2016 Poland	(++)	PA									x				

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Moriyama et al[37] 2015 Japan	**(+++)**	PA NS		PA NS	x			x	x	x				x	
Jonsdottir et al[38] 2015 Iceland	**Non**	PA NS									x		x	x	
Intervention included the health coach programme															
Benzo et al[39] 2018 USA	**(+++) (++++)**		PA	PA	x			x	x		x	x			
Benzo et al[40] 2016 USA	**(+++) (++++)**		PA	PA	x			x	x		x	x			
Intervention included the Self-management Program of Activity, Coping, and Education (SPACE) for COPD															
Bourne et al[41] 2022 UK	**(+) (++++)**	PA NS			x			x	x	x			x		x
Johnson-Warrington et al[42] 2016 UK	**(+) (++++)**	PA NS			x			x		x					
Mitchell et al[43] 2014 UK	**(+) (++++)**	PA NS			x			x		x					
Apps et al[44] 2013 UK	**(+) (++++)**	PA NS			x			x		x					

Abbreviations: NST, neuromuscular stimulation therapy; PA, physical activity; NS, nutritional support.

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Table 4 Endpoints, Outcome Measurements, and Outcomes

	Endpoints and Outcome Measurements		Outcome Differences Between Intervention (IG) and Control Group (CG)	
Author, Year, Country	**Primary**	**Secondary**	**Primary**	**Secondary**
Cheng et al[30] 2022 Australia	Physical activity/function: • Reduction in time spent in sedentary behaviour, with a minimum clinically important difference of 75 minutes per day between the intervention and sham groups • Time spent in sedentary behaviour (minutes/day)	Physical activity/function: • Patient activity measure[a] (PAM) (0–100 points) • Step count (steps/day) • Six minutes walking distance (6MWD) (m) Health-related quality of life: • Saint George Respiratory Questionnaire[b] (SGRQ) (0–100 units) Anxiety/depression: • Hospital Anxiety and Depression Scale[e] (HADS) (0–21 points)	No significant differences at the end of the intervention in favour of the intervention group Physical activity/function: • No significant reduction in time spent in sedentary behaviour	Significant differences at the end of the intervention in favour of the intervention group Physical activity/function: • PAM - Significant improvement in the total score • Step count - Significant improvement in steps/day Health related quality of life: • SGRQ - Significant improvement in the activity score No significant difference Physical activity/function: • 6MWD Anxiety/depression: • HADS
Armstrong et al[31] 2021 UK	Physical activity/function: • Improvement in the patients experience performing physical activity with a minimum clinical important difference at 7.4 points in the total score between the intervention and control group • Clinical visit-PRO active[o] (C-PPAC) (0–100 points).	Physical activity/function: • Six Minutes Walking Distance (6MWD) • Quadriceps Muscle Voluntary Capacity (QMVC) (kg) • 30 seconds sit-to-stand (n) • Handgrip strength (HG) (kg) • Step count (steps/day) Health status: • COPD Assessment Test[c] (CAT) (0–40 points) • Clinical COPD Questionnaire[d] (CCQ) (0–60 points) Anxiety/depression: • Hospital Anxiety and Depression Scale[e] (HADS) (0–21 points)	Significant differences after two month in favour of the intervention group Physical activity/function: • Significant clinical improvement in the patients experience with performing physical activity at 8 points, 95% CI [4–12] p = 0.001	Significant differences at the end of the intervention in favour of the intervention group Physical activity/function: • Step count - Significant improvement in steps/day • HG - Significant improvement in handgrip strength (kg) • QMVC - Significant improvement in muscle capacity (kg) Health status: • CAT - Significant improvement in COPD assessment No significant difference Physical activity/function: • 6MWD, 30 seconds sit-to-stand Health status: • CCQ Anxiety/depression: • HADS

Granados santiago et al[32] 2020 Spain	Health-related quality of life: • Improvement in overall health state with a minimum clinical important difference at 15 points for VAS between the intervention and the control group • European quality of life 5 dimensions[f] (Euro Qol-5D) (VAS 0–100 points)	Physical activity/function: • Step count (steps/day) • Functional Independence Measure[g] (FIM) (18–126 points) Knowledge of COPD: • COPD Knowledge Questionnaire[h] (COPD-Q) (0–13 points) Nutritional assessment: • Minimal nutritional assessment[i] (MNA) (0–30 points)	Significant differences after 3 months of follow-up in favor of the intervention group Health-related quality of life: • Euro Qol-5D - Significant improvement in overall health state IG = 59.41 ± 20.57, 95% CI [−20.52;22.78] CG = 51.13 ± 28.28, 95% CI [−20.52;22.78] Difference p = < 0.001 Clinical important difference: • Euro Qol-5D - None No significant difference Health-related quality of life: • Euro Qol-5D - Anxiety/depression dimension	Significant difference at 3 months follow-up in favour of the intervention group Physical activity/function: • FIM - Significant improvement in the total and motor dimension score • Step count - Significant improvement in steps/day Knowledge of COPD: • COPD-Q - Significant improvement in knowledge of COPD Nutritional assessment: • MNA - Significant improvement in nutritional assessment No significant difference Physical activity/function: • FIM - Cognitive dimension score
Lopez Lopez et al[33] 2020 Spain	Health-related quality of life: • Improvement in overall health state with a minimum clinical important difference at 15 points ±19.9 for VAS within the groups • European quality of life 5 dimensions (Euro Qol-5D) (VAS 0–100 points)	Physical activity/ function: • 5 Sit-to-stand test (sec). • Handgrip strength (kg) • Functional Independence Measure[g] (FIM) • Dyspnea-related functional impairment (LCADL scale) Hospitalisation: • Hospitalisation (days)	No significant difference after 3 months follow-up in favour of the intervention group Health-related quality of life: • No significant difference in the VAS health-related quality of life	Significant difference after 3 months follow-up in favour of the intervention Physical activity/function: • FIM - Significant improvement in the general functionality (motor sub score) in the self-management group • 5 Sit-to-stand test No significant difference Physical activity/function: • LCADL • Handgrip strength Hospitalisation: • Hospitalisation

(*Continued*)

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Table 4 (Continued).

	Endpoints and Outcome Measurements		Outcome Differences Between Intervention (IG) and Control Group (CG)	
Author, Year, Country	**Primary**	**Secondary**	**Primary**	**Secondary**
Wang et al[34] 2020 China	Hospitalisation (COPD-related): • Reduction in COPD-related hospital admissions and emergency department visits. No description of a minimum clinically important difference between the intervention and control groups. • Emergency room visits (n) • Hospitalisation visits (n) • Days spent in hospital (n)	Physical activity/function: • Six minutes walking distance (6MWD) (m) Health-related quality of life: • St. George Respiratory Questionnaire (SGRQ) (0–100 points)	Significant differences after 6 and 12 months in favour of the intervention group Hospitalisation (COPD-related): • Reduction in emergency room visits 6 months IG = 1.2 ± 1.3; CG = 2.1 ± 1.7 Difference = −3.659 p = 0.02 12 months IG = 1.6 ± 0.8; CG = 3.4 ± 1.5. Difference = −3.784 p = 0.001 • Reduction in hospitalisation visits at 12 months IG = 1.3 ± 0.4; CG = 2.2 ± 1.2. Difference = −3.263 p = 0.03 • Reduction in days spent in hospital at 12 months IG = 12.4 ± 9.6, CG = 19.6 ± 11.4. Difference = −2.873 p = 0.03 No significant difference • Hospitalisation visits after 6 months • Days spent in hospital after 6 months	Significant differences after 3, 6, and 12 months in favour of the intervention group Physical activity/function: • 6 MWD - Significant improvement in walk at 3, 6, and 12 months Health-related quality of life: • SGRQ- Significant improvement SGRQ in all domains at 3, 6, and 12 months No significant differences None
Moriyama et al[37] 2015 Japan	Health-related quality of life: • Improvement in overall quality of life. No description of the minimum clinical important difference between the intervention and control group • St. George Respiratory Questionnaire[b] (SGRQ) (0–100 units)	Physical activity/function: • Activity of Daily Living (ADL) Nagasaki University Respiratory ADL[j] (NRADL questionnaire) (0–100 points). • Social activity in terms of range (How far they go out) and frequency (times of going out from home/week)	No significant difference after 3 and 6 months in favour of the intervention group Health-related quality of life: • No significant difference in the health-related quality of life after 3 and 6 months	Significant difference after 3 and 6 months in favour of the intervention group • Social activity - Significant improvement in frequency and range of social activity No significant difference Physical activity/function: • NRADL
Jonsdottir et al[38] 2015 Iceland	Health-related quality of life: • Improvement in health-related quality of life with a minimum clinical important difference at 4± 12.1 units between the intervention and control group • St. George's Respiratory Questionaire[b] (SGRQ) (0–100 units)	Physical activity/function: • International Physical activity Questionnaire (IPAQ) Health-related quality of life: • Illness Intrusiveness Rating Scale[n] (13–91 points) subscale (1–7) Depression/Anxiety: • Hospital Anxiety and Depression Scale[e] (HADS) (0–21 points)	No significant difference after 6 and 12 months in favour of the intervention group Health-related quality of life: • SGRQ - No significant difference in health-related quality of life after 6 and 12 months	Significant difference after 6 and 12 months in favour of the intervention group Health-related quality of life: • Illness Introversions - Significant reduction in illness intrusiveness of COPD after 6 months No significant difference Physical activity/function: • IPAQ Depression/Anxiety: • HADS

Benzo et al[40] 2016 USA	Hospitalisation (COPD-related): • Reduction in COPD-related hospitalizations at 12 months, with a minimum clinically important difference of 20% (50% in control group to 30% in intervention group) in readmission rates between the intervention and control groups • Hospitalisation visits (n)	Physical activity/function: • Step counts (Steps/day) (minutes/day) Health-related quality of life: • Chronic Respiratory Disease Questionnaire[l] (CRQ) Hospitalisation (COPD related): Hospitalisation visits (n) at 1, 3, and 6 months	No Significant difference after 12 months in favour of the intervention group Hospitalisation (COPD related): • No significant decrease in the absolute risk reduction (ARR) for COPD related hospitalisation visits.	Significant difference after 6 and 12 months in favour of the intervention group Health-related quality of life: • CRQ - Significant improvement physical- and emotional function dimension at 6 and 12 months Hospitalisation (COPD-related): • Significant decrease in the absolute risk reduction (ARR) for COPD-related hospitalisation visits at 1, 3, and 6 months No significant difference Physical activity: • Step count
Intervention included the Self-management Program of Activity, Coping, and Education (SPACE) for COPD				
Bourne et al[41] 2022 UK	Health status: • Improvement in the patient's health status with a minimum clinical important mean difference at 2.5 ± 5.0 points between the intervention and the control group • COPD Assessment Test[c] (CAT) (0–40 points)	Physical activity/function: • Endurance Shuttle Walk Test (ESWT) (sec). • Incremental Shuttle Walk Test (ISWT) (m) • Physical activity measure[a] (PAM) (0–100 points) Health-related quality of life: • European quality of life 5 dimensions[f] (Euro Qol-5D) (0–100 points) • Chronic Respiratory Disease Questionnaire[l] (CRQ) Knowledge of COPD: • Bristol COPD Knowledge Questionnaire[m] (BCKQ) (0–65 points) Anxiety and depression: • Hospital Anxiety and Depression Scale[e] (HADS) (0–21 points)	No Significant difference after 6 and 9 months in favour of the intervention group Health status: • No significant improvement in CAT score at 6 and 9 months	Significant difference after 6 and 9 months in favour of the intervention group Physical activity/function: • PAM - Significant improvement in physical activity score and level at 6 and 9 months Knowledge of COPD: • BCKQ - Significant improvement in COPD knowledge at 6 months Health-related quality of life: • CRQ - Significant improvement in the fatigue domain at 6 months • CRQ - Significant improvement in the mastery domain at 6 and 9 months No significant difference Physical activity/function: • ESWT • ISWT Anxiety and depression: • HADS

(*Continued*)

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Table 4 (Continued).

	Endpoints and Outcome Measurements		Outcome Differences Between Intervention (IG) and Control Group (CG)	
Author, Year, Country	**Primary**	**Secondary**	**Primary**	**Secondary**
Johnson-Washington et al[42] 2016 UK	Hospitalisation (Respiratory-related): • Reduction in respiratory-related readmissions at three months between the intervention and control groups No description of a minimum clinically important difference between the intervention and control groups • Readmission (Length and stay)	Physical activity/function: • Incremental Shuttle Walk Test (ISWT) (m). Minimal clinical important difference 47.5 m • Endurance Shuttle Walking Test (ESWT) (sec). Minimal clinical important difference 186 sec Health-related quality of life: • Chronic Respiratory Questionnaire – self reported[l] (CRQ-SR) Minimal clinical important differences of 0.5 points Knowledge of COPD: • Bristol COPD Knowledge Questionnaire[m] (BCKQ) (0–65 points) Anxiety and depression: • Hospital Anxiety and Depression Scale (HADS)[e] HADS Minimal clinical important difference of −1.5 points Self-efficacy: • Pulmonary Rehabilitation Adapted Index of Self-Efficacy[k] (PRAISE).	No Significant difference after 3 months in favour of the intervention group Hospitalisation: • No significant reduction in readmissions between the intervention and control groups after 3 months	Significant difference after 3 months in favour of the intervention group Health-related quality of life: • CRQ-SR - Significant improvement in the dyspnea and emotion domain at 3 months No significant difference Physical activity/function: • ISWT, ESWT Health-related quality of life: • CRQ-SR - Fatigue and mastery domain Knowledge of COPD: • BCKQ Anxiety and depression: • HADS Self-efficacy: • PRAISE

Mitchell et al[43] 2014 UK	Health-related quality of life: • Improvement in the Chronic Respiratory Questionnaire – self reported CRQ-SR dyspnea domain with a minimum clinically important mean difference at 0.5 ± 1.0 between the intervention and control group	Physical activity/function: • Incremental Shuttle Walk Test (ISWT) (m) Minimal clinically important difference 48 m • Endurance Shuttle Walking Test (ESWT) (sec). Minimal clinically important difference 186 sec.	No significant difference after 6 months in favour of the intervention group Health-related quality of life: • CRQ-SR - No significant improvement in the dyspnea domain after 6 months	Significant difference after 6 weeks and 6 months in favour of the intervention group Physical activity/function: • ISWT - Significant improvement in the ISWT (m) after 6 weeks, no clinical difference • ESWT - Significant improvement in the ESWT (sec). After 6 weeks and 6 months, no clinical difference
	• Chronic Respiratory Questionnaire – self reported[l] (CRQ-SR) dyspnea domain (1–7 likert scale)	Health-related quality of life: • Chronic Respiratory Questionnaire – self-reported (CRQ-SR) Emotion, Fatigue, Mastery domain Minimal clinically important difference of 0.5 points Knowledge of COPD: • Bristol COPD Knowledge Questionnaire[m] (BCKQ) (0–65 points) Anxiety and depression: • Hospital Anxiety and Depression Scale[e] (HADS) (0–21 points) Minimal clinically important difference of −1.5 points Self-efficacy: • Pulmonary Rehabilitation Adapted Index of Self-Efficacy[k] (PRAISE)	• CRQ-SR - Significant Improvement in the dyspnea domain after 6 weeks with a mean difference in change 0.29 (−0.12–0.56, P = 0.049)	Health-related quality of life: • CRQ-SR - Significant improvement in fatigue and emotion domain after 6 weeks and 6 months, no clinical difference • CRQ-SR - Significant improvement in mastery after 6 months, no clinical difference Anxiety and depression: • HADS - Significant reduction in anxiety after 6 weeks and 6 months, no clinical differences Knowledge of COPD: • BCKQ score - Significant improvement after 6 weeks and 6 months, no clinical difference No significant between groups Physical activity/function: • ISWT after 6 months Health-related quality of life: • CRQ-SR Mastery domain after 6 weeks Anxiety and depression: • HADS - Depression Self-efficacy: • PRAISE

Abbreviations: aPAM, Patient activity measure, the score ranges from 0–100, with a lower score indicating lower patient activation, levels 1–4; bSGRQ, Saint George Respiratory Questionnaire, the score ranges from 0–100, with higher scores reflect less quality of life; cCAT, COPD Assessment Test, the score ranges from 0–40 with a higher score indicating a more severe impact on a patient's life; dCCQ, Clinical COPD Questionnaire, the score ranges from 0–60 with a lower score indicating the best possible clinical control; eHADS Hospital Anxiety and Depression Scale, the score ranges from 0–21 with a higher score indicating depression/anxiety; fEuro Qol-5D, European quality of life 5 dimensions, a descriptive scale about health impairment and a numerical score scale ranges from 0 defined as the worst imaginable health state to 100 defined as the best imaginable health status; gFIM, Functional Independence Measure, the score ranges from 18–126 with a higher score indicating a higher level of independence; hCOPD-Q, COPD Knowledge Questionnaire, the score ranges from 0–13 with a higher score indicating the best COPD knowledge; iMNA, Minimal nutritional assessment, the score ranges from 0–30 with a score above 23.5 point indicating normal nutritional status; jNRADL questionaire, Nagasaki University Respiratory ADL, the score ranges from 0–100 with a higher score indicating improvement of the activity of daily living; kPRAISE, Pulmonary Rehabilitation Adapted Index of Self-Efficacy, is used to measure behaviour change in the context of pulmonary rehabilitation; lCRQ-SR, Chronic Respiratory Questionnaire – self reported, covering the dimensions of fatigue, emotional function, and mastery with a 7 point scale for each question; mBCKQ Bristol COPD Knowledge Questionnaire, (0–65 points) contains of multiple-choice questions within 13 topics, each with five statements giving a total of 65 questions; nIllness Intrusiveness Rating Scale, (13–91 points) subscale (1–7) a 13-item, self-report instrument, which can be scored with a total score or three subscale scores: relationships and personal development, intimacy, and instrumental; oC-PPAC Clinical visit-PRO active, (0–100 points) is a conceptual framework to understand experience with physical activity from the patients' experience; The references for each of the used outcome measurements are included in supplementary material (Appendix 3).

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The interventions were mainly delivered by physiotherapists (n = 4), nurses (n = 4) or multidisciplinary teams (n = 3). A focus group interview by Apps et al (2013) noted that those delivering the intervention should have knowledge of COPD and physical activity while being familiar with the patient and their abilities.[44]

The interventions were primarily delivered as home-based (n = 12), followed by hospital-initiated interventions for patients with an acute COPD exacerbation (n = 4). The interventions located in the community focused on enhancing patients' activity and participants' retention.[35,41] A focus group interview pointed to that the main factor for participation in a group-based intervention, was that the venue was placed in the local community nearby the patient's home.[41]

Patterns of Intervention Elements

Table 3 illustrates the patterns of person-centred approach, physical activity and/or nutritional support in the interventions. The overall structure of the person-centred approach is to assess and prepare the patients for change using motivational interview, personal assessment of needs or shared decision-making, followed by goal setting, a personal action plan and different supportive activities to ensure participation. The approach included family involvement with joint goal-setting,[30] elaboration of support from family members,[34,37] and a partnership-based educational programme.[38] The personalised supportive activities were primarily provided through a combination of face-to-face conversations in the beginning of the intervention, combined with telephone follow-up (n = 8), eg, a telephone follow-up with health coaching sessions.[40]

Physical activity was the primary intervention and applied in all studies. Half of the studies included more than one type of physical activity. Healthy lifestyle promotion and neuromuscular stimulation therapy of quadriceps accompanied by lower limb exercises were delivered during hospitalisation.[32,33] A home-based exercise program delivered after discharge consisted of, eg, upper extremity exercises combined with a step trainer,[40] or a daily walking-program combined with resistance training of the upper and lower limbs.[42] One intervention provided a personal assessment and a tailored educational programme delivered during and after hospitalisation.[34]

Another main element is the diverse and comprehensive educational programmes (n = 11) consisting of multiple components for COPD management, encompassing knowledge about physical activity (n = 11) and nutrition (n = 8). Overall, the educational programmes emphasise promotion and motivation for adopting a healthy diet and lifestyle while also providing advice on nutrition and improving physical activity. The educational programme for the SPACE intervention consists of an educational information manual (176 pp), providing an exercise program and addressing multiple topics with interactive tasks including healthy eating, how to stay fit, and the right food when you feel unwell.[44] In another intervention, focusing on reducing sedentary behaviour, the patients underwent education on the negative health consequences of sedentary behaviour.[30]

Self-monitoring of activity levels, goal attainment, nutritional status, or clinical scores is used to provide feedback or to adjust physical activity, provide encouragement, and motivate and/or setting new goals.[30,31,35,37,39,40]

Endpoints, Outcome Measurements and Outcomes

Table 4 presents the primary and secondary endpoints, outcome measurements, and the outcome differences between the intervention and the control group within the included RCT studies (n = 10) and a nonrandomised control trial (n = 1). Improvement in health-related quality of life is the most prevalent primary endpoint (n = 5), but no clinically significant differences were found between the intervention and control groups. One study showed a clinically significant difference using the clinical visit-PRO active survey[45] by aiming to improve the patients' experience of performing physical activity using a behaviour of change intervention.[31] Two studies found a positive effect on the overall health state,[32] using the European quality of life-5 dimensions scale[46] and a reduction in COPD-related emergency visits and length of stays at hospital.[34] All studies include physical activity/function as a secondary endpoint, but health status, physical parameters, and nutritional assessment were only present in one study. An overview of the included outcome measurements is listed with references in Appendix 3. Eight studies show an improvement within multiple secondary outcome measures, including physical activity[30,41] using the physical activity measurement (PAM),[47] step counts steps/day,[30–32] muscle capacity,[31] functional independence[32,33] by using functional independence measurements,[48] 6 minutes walking distance (6MWD),[34] activity of daily living,[37] and incremental/endurance shuttle walking test.[43] In the study by Granados-

Santiago et al (2020), nutritional assessment is quantified using the Minimal Nutritional Assessment Survey,[49] revealing a statistically significant advantage for the intervention group compared to the control group.

Discussion

This scoping review aims to map the evidence related to interventions with a person-centred approach, focusing on nutritional support and/or physical activity in people with COPD. The overall pattern that emerges highlights self-management programmes that use the rationale of supporting people with COPD to change behaviour, become more physically active, and manage their COPD to increase their health-related quality of life. The pattern underscores current research on COPD self-management interventions, which are defined as "structured but personalised and often multi-component, with goals of motivating, engaging and supporting the patients to positively adapt their health behaviour(s) and develop skills to manage their disease better". [50] Behaviour change techniques focus primarily on improving the motivational factor at the individual level. Motivational interviews are used in various settings as a technique to prepare and support the person to make individual changes of behaviour.[51] However, patients with COPD experience several barriers in their everyday life and in their communication with the health professionals that hinder their ability to respond positively to the recommendation of being physical active.[52] A notable deficiency within the included studies was the limited attention to patients' individual opportunities and capability to change their behaviour, particularly in relation to their physical and social environment. Changing one or several components related to motivation, capability, and/or opportunity plays a crucial role in shaping individuals' behaviour, and all the components should be considered when designing future behaviour of change interventions.[53] Additionally, the omission of incorporating the patients' relatives as a main and general component in the included studies is notable, in as much as people with severe COPD often depend on relatives who act as informal caregivers in patients' everyday life.[54] Involving relatives to the patient may enhance the ability of both patients and relatives to cope with and adjust to managing a complex disease such as COPD.[55] This indicates a need to include the informal caregivers and the patient's ability and resources to comply with health recommendations in interventions with a person-centred approach. This review explicitly identifies a knowledge gap regarding both person-centred nutritional support and physical activity that involves the patient's social environment, as well as how interventions should be designed to incorporate these aspects in future studies.

This review describes a gap in the literature that relates to person-centred nutrition support as a primary intervention component for people with COPD. Nutritional support is primarily described as a subordinate part of educational programs and is also referred to among other topics as nutrition or dietary advice or counselling. This finding is consistent with the pulmonary rehabilitation guideline, in which physical activity is the primary intervention.[16] To date, dietary counselling for older adults with disease-related malnutrition has demonstrated some efficacy in promoting weight gain, yet its comparative advantage over oral nutritional supplementation remains uncertain.[56] A recent review concluded, based on two older studies, that clinical guideline recommendations for nutritional support were of moderate quality.[57] In addition, the review found that international clinical guidelines gave limited consideration to nutritional support and family involvement. This is notable as the prevalence of malnutrition among patients with COPD is reported at 30%, while the risk of malnutrition is up to 50%.[58] Unintentional weight loss is a key component of malnutrition and an independent risk factor for poor outcomes and mortality.[59] Disease-related malnutrition leads to increased protein catabolism and, for patients with COPD, increases the risk of developing cachexia.[60] Poor nutritional status contributes to the development of muscle weakness and exercise intolerance, leading to dyspnoea,[60] which enhances unintentional weight loss, leading to extended hospitalisations and a low quality of life.[9]

Another review investigated nutrition's role in managing COPD, demonstrating a persistently significant impact on the patient's symptoms and future health risks.[61,62] The main conclusion was the identification of a therapeutic window for personalised nutritional interventions during and after an acute exacerbation of COPD, necessitating interventions to formulate strategies for personalised nutrition.[58,61] For patients with COPD, taking part in a meal can be complex and challenging and requires emotional and physical support in addition to nutritional counselling or oral nutritional supplementation.[59,63] Person-centred nutritional support interventions must be expanded in a broader context of nutritional care.

Strength and Limitations

This review offers a comprehensive analysis of studies with a person-centred approach, using a well-described method to extract and synthesise knowledge related to physical activities and nutritional support. This can in turn serve as

a foundation for the development of person-centred interventions that encompass the patient's environmental context and available social resources, with a focus on nutritional support and physical activity. Heterogeneity is to be expected when complex interventions, such as person-centred nutritional support and/or physical activity, are being tested with reference to vulnerable patients. The lack of transparency in the description of the interventions makes the development of evidence-based care strategies difficult as the level of replication will be low. In this study, we used the templates of TIDieR as a guide to structure and qualify the extracting data of the intervention content. The TIDieR templates have been developed to increase the ability to replicate interventions, by offering structured descriptions of the components in the intervention.[27] The search strategy applied here was comprehensive and included several keywords, not all were inherently linked to nutritional support, physical activity, and a person-centred approach, resulting in a large number of excluded studies. In addition, the inclusion criteria for a person-centred approach: "When patients expressed needs, wants, and/or preferences were a key part of the intervention", proved to be ambiguous. This made interpretation difficult due to the lack of explicit descriptions of the intervention components.

Finally, several of the studies in this review include additional components (eg, education and disease adherence, smoking cessation, and action plan for exacerbation) to complement the nutritional support and physical activity intervention. This presented a challenge for the evaluation of effectiveness, as this review did not include the effect of the other component, although all primary endpoints of the intervention studies were included in the analysis.

Conclusion

Nutritional support and physical activity interventions incorporating a person-centred approach are primarily characterised as behaviour of change and/or self-management interventions. Physical activity is the main element of the interventions, while the focus on nutritional support is limited. Despite the person-centred approach, there is minimal involvement of the patient's physical and social environment. Motivational techniques to enhance physical activities appear to have limited clinical effect on health-related quality of life, and moderate effect on physical capacity. Future person-centred interventions should include patients' opportunities to engage in physical activity and improve or maintain nutritional status.

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References

1. Global Initiative for Chronic Obstructive Lung Disease. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management, and prevention of COPD Global Initiative for Chronic Obstructive Lung Disease. Global Initiative for Chronic Obstructive Lung Disease - GOLD. Published 2022. Available from: https://goldcopd.org/2022-gold-reports-2/. Accessed May 23, 2022.
2. Safiri S, Carson-Chahhoud K, Noori M, et al. Burden of chronic obstructive pulmonary disease and its attributable risk factors in 204 countries and territories, 1990-2019: results from the Global Burden of Disease Study 2019. *BMJ*. 2022;378:e069679. doi:10.1136/bmj-2021-069679
3. World Health Organisation. The top 10 causes of death. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death. Accessed January 2, 2024.
4. Brown JP, Martinez CH. Chronic obstructive pulmonary disease comorbidities. *Curr Opin Pulm Med*. 2016;22(2):113–118. doi:10.1097/MCP.0000000000000241
5. Yohannes AM, Alexopoulos GS. Depression and anxiety in patients with COPD. *Eur Respir Rev*. 2014;23(133):345–349. doi:10.1183/09059180.00007813
6. Christensen T, Mikkelsen S, Geisler L, Holst M. Chronic obstructive pulmonary disease outpatients bear risks of both unplanned weight loss and obesity. *Clin Nutr ESPEN*. 2022;49:246–251. doi:10.1016/j.clnesp.2022.04.010
7. Hogan D, Lan LTT, Diep DTN, Gallegos D, Collins PF. Nutritional status of Vietnamese outpatients with chronic obstructive pulmonary disease. *J Hum Nutr Diet*. 2017;30(1):83–89. doi:10.1111/jhn.12402
8. Cederholm T, Barazzoni R, Austin P, et al. ESPEN guidelines on definitions and terminology of clinical nutrition. *Clin Nutr*. 2017;36(1):49–64. doi:10.1016/j.clnu.2016.09.004

9. Tramontano A, Palange P. Nutritional state and COPD: effects on dyspnoea and exercise tolerance. *Nutrients*. 2023;15(7):1786. doi:10.3390/nu15071786
10. Waschki B, Kirsten A, Holz O, et al. Physical activity is the strongest predictor of all-cause mortality in patients with COPD: a prospective cohort study. *Chest*. 2011;140(2):331–342. doi:10.1378/chest.10-2521
11. Jefferies D, Johnson M, Ravens J. Nurturing and nourishing: the nurses' role in nutritional care. *J Clin Nurs*. 2011;20(3–4):317–330. doi:10.1111/j.1365-2702.2010.03502.x
12. Volkert D, Beck AM, Cederholm T, et al. ESPEN practical guideline: clinical nutrition and hydration in geriatrics. *Clin Nutr*. 2022;41(4):958–989. doi:10.1016/j.clnu.2022.01.024
13. Ferreira IM, Brooks D, White J, Goldstein R. Nutritional supplementation for stable chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2012. doi:10.1002/14651858.CD000998.pub3
14. Odencrants S, Theander K. Assessment of nutritional status and meal-related situations among patients with chronic obstructive pulmonary disease in Primary health care – obese patients; a challenge for the future. *J Clin Nurs*. 2013;22(7–8):977–985. doi:10.1111/j.1365-2702.2012.04184.x
15. Furulund E, Bemanian M, Berggren N, et al. Effects of nutritional interventions in individuals with chronic obstructive lung disease: a systematic review of randomized controlled trials. *COPD*. 2021;Volume 16:3145–3156. doi:10.2147/COPD.S323736
16. Spruit MA, Singh SJ, Garvey C, et al. An official American thoracic society/European respiratory society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med*. 2013;188(8):e13–e64. doi:10.1164/rccm.201309-1634ST
17. Mccarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y. Pulmonary rehabilitation for chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2015;2015(2):CD003793. doi:10.1002/14651858.CD003793.pub3
18. Cox NS, Oliveira CC, Lahham A, Holland AE. Pulmonary rehabilitation referral and participation are commonly influenced by environment, knowledge, and beliefs about consequences: a systematic review using the theoretical domains framework. *J Physiotherapy*. 2017;63(2):84–93. doi:10.1016/j.jphys.2017.02.002
19. Holland AE, Cox NS, Houchen-Wolloff L, et al. Defining modern pulmonary rehabilitation. an official American thoracic society workshop report. *Ann Am Thorac Soc*. 2021;18(5):e12–e29. doi:10.1513/AnnalsATS.202102-146ST
20. Leplege A, Gzil F, Cammelli M, Lefeve C, Pachoud B, Ville I. Person-centredness: conceptual and historical perspectives. *Disability Rehabil*. 2007;29(20–21):1555–1565. doi:10.1080/09638280701618661
21. Yun D, Choi J. Person-centered rehabilitation care and outcomes: a systematic literature review. *Int J Nurs Stud*. 2019;93:74–83. doi:10.1016/j.ijnurstu.2019.02.012
22. Gardener AC, Ewing G, Farquhar M. Enabling patients with advanced chronic obstructive pulmonary disease to identify and express their support needs to health care professionals: a qualitative study to develop a tool. *Palliative Med*. 2019;33(6):663–675. doi:10.1177/0269216319833559
23. Xiang X, Huang L, Fang Y, Cai S, Zhang M. Physical activity and chronic obstructive pulmonary disease: a scoping review. *BMC Pulm Med*. 2022;22:22. doi:10.1186/s12890-022-02099-4
24. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19–32. doi:10.1080/1364557032000119616
25. Bradbury-Jones C, Aveyard H, Herber OR, Isham L, Taylor J, O'Malley L. Scoping reviews: the PAGER framework for improving the quality of reporting. *Int J Soc Res Methodol*. 2022;25(4):457–470. doi:10.1080/13645579.2021.1899596
26. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467–473. doi:10.7326/M18-0850
27. Hoffmann TC, Glasziou PP, Boutron I, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ*. 2014;348(mar07 3):g1687. doi:10.1136/bmj.g1687
28. Covidence. Covidence - Better systematic review management; 2014. Available from: https://www.covidence.org/home. Accessed September 27, 2019
29. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep*. 1985;100(2):126–131.
30. Cheng SWM, Alison J, Stamatakis E, et al. Six-week behaviour change intervention to reduce sedentary behaviour in people with chronic obstructive pulmonary disease: a randomised controlled trial. *Thorax*. 2022;77(3):231–238. doi:10.1136/thoraxjnl-2020-214885
31. Armstrong M, Hume E, McNeillie L, et al. Behavioural modification interventions alongside pulmonary rehabilitation improve COPD patients' experiences of physical activity. *Respir Med*. 2021;180:106353. doi:10.1016/j.rmed.2021.106353
32. Granados-Santiago M, Valenza MC, López-López L, Prados-Román E, Rodríguez-Torres J, Cabrera-Martos I. Shared decision-making and patient engagement program during acute exacerbation of COPD hospitalisation: a randomised control trial. *Patient Educ Couns*. 2020;103(4):702–708. doi:10.1016/j.pec.2019.12.004
33. Lopez-Lopez L, Valenza MC, Rodriguez-Torres J, Torres-Sanchez I, Granados-Santiago M, Valenza-Demet G. Results on health-related quality of life and functionality of a patient-centered self-management program in hospitalised COPD: a randomised control trial. *Disability Rehabil*. 2020;42(25):3687–3695. doi:10.1080/09638288.2019.1609099
34. Wang LH, Zhao Y, Chen LY, Zhang L, Zhang YM. The effect of a nurse-led self-management program on outcomes of patients with chronic obstructive pulmonary disease. *Clin Respir J*. 2020;14(2):148–157. doi:10.1111/crj.13112
35. Bartlett YK, Webb TL, Hawley MS. Using persuasive technology to increase physical activity in people with chronic obstructive pulmonary disease by encouraging regular walking: a mixed-methods study exploring opinions and preferences. *J Med Internet Res*. 2017;19(4):e124. doi:10.2196/jmir.6616
36. Damps-Konstańska I, Werachowska L, Krakowiak P, et al. Acceptance of home support and integrated care among advanced COPD patients who live outside large medical centers. *Appl Nurs Res*. 2016;31:60–64. doi:10.1016/j.apnr.2015.12.003
37. Moriyama M, Takeshita Y, Haruta Y, Hattori N, Ezenwaka CE. Effects of a 6-month nurse-led self-management program on comprehensive pulmonary rehabilitation for patients with COPD receiving home oxygen therapy. *Rehabil Nurs*. 2015;40(1):40–51. doi:10.1002/rnj.119
38. Jonsdottir H, Amundadottir OR, Gudmundsson G, et al. Effectiveness of a partnership-based self-management programme for patients with mild and moderate chronic obstructive pulmonary disease: a pragmatic randomised controlled trial. *J Adv Nurs*. 2015;71(11):2634–2649. doi:10.1111/jan.12728
39. Benzo RP, Kramer KM, Hoult JP, Anderson PM, Begue IM, Seifert SJ. Development and feasibility of a home pulmonary rehabilitation program with health coaching. *Respir Care*. 2018;63(2):131–140. doi:10.4187/respcare.05690
40. Benzo R, Vickers K, Novotny PJ, et al. Health coaching and chronic obstructive pulmonary disease rehospitalization. A randomised study. *Am J Respir Crit Care Med*. 2016;194(6):672–680. doi:10.1164/rccm.201512-2503OC

41. Bourne C, Houchen-Wolloff L, Patel P, Bankart J, Singh S. Self-management programme of activity coping and education—SPACE for COPD(C)—in primary care: a pragmatic randomised trial. *BMJ Open Respir Res*. 2022;9(1):e001443. doi:10.1136/bmjresp-2022-001443
42. Johnson-Warrington V, Rees K, Gelder C, Morgan M, Singh S. Can a supported self-management program for COPD upon hospital discharge reduce readmissions? A randomised controlled trial. *COPD*. 2016;1161. doi:10.2147/COPD.S91253
43. Mitchell KE, Johnson-Warrington V, Apps LD, et al. A self-management programme for COPD: a randomised controlled trial. *Eur Respir J*. 2014;44(6):1538–1547. doi:10.1183/09031936.00047814
44. Apps LD, Mitchell KE, Harrison SL, et al. The development and pilot testing of the self-management programme of activity, coping and education for chronic obstructive pulmonary disease (SPACE for COPD). *COPD*. 2013;317. doi:10.2147/COPD.S40414.
45. Dobbels F, de Jong C, Drost E, et al. The PROactive innovative conceptual framework on physical activity. *Eur Respir J*. 2014;44(5):1223–1233. doi:10.1183/09031936.00004814
46. EuroQol Group. EuroQol - a new facility for the measurement of health-related quality of life. *Health Policy*. 1990;16(3):199–208. doi:10.1016/0168-8510(90)90421-9.
47. Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the patient activation measure (PAM): conceptualising and measuring activation in patients and consumers. *Health Ser Res*. 2004;39(4p1):1005–1026. doi:10.1111/j.1475-6773.2004.00269.x
48. Keith RA, Granger CV, Hamilton BB, Sherwin FS. The functional Independence measure: a new tool for rehabilitation. *Adv Clin Rehabil*. 1987;1:6–18.
49. Guigoz Y, Vellas B, Garry PJ. Assessing the nutritional status of the elderly: the mini nutritional assessment as part of the geriatric evaluation. *Nutr Rev*. 1996;54(1 Pt 2):S59–65. doi:10.1111/j.1753-4887.1996.tb03793.x
50. Effing TW, Vercoulen JH, Bourbeau J, et al. Definition of a COPD self-management intervention: international Expert Group consensus. *Eur Respir J*. 2016;48(1):46–54. doi:10.1183/13993003.00025-2016
51. Miller WRS. *Motivational Interviewing: Preparing People for Change*. Vol 2nd ed ed. New York, NY: Guilford Press; 2002.
52. Zhang X, Buttery SC, Sterniczuk K, Brownrigg A, Kennington E, Quint JK. Patient experiences of communication with healthcare professionals on their healthcare management around chronic respiratory diseases. *Healthcare*. 2023;11(15):2171. doi:10.3390/healthcare11152171
53. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci*. 2011;6(1):42. doi:10.1186/1748-5908-6-42
54. Nakken N, Janssen DJ, van den Bogaart EH, et al. Informal caregivers of patients with COPD: home sweet home? *Eur Respir Rev*. 2015;24(137):498–504. doi:10.1183/16000617.00010114
55. Marques A, Jácome C, Cruz J, Gabriel R, Brooks D, Figueiredo D. Family-based psychosocial support and education as part of pulmonary rehabilitation in COPD: a randomised controlled trial. *CHEST*. 2015;147(3):662–672. doi:10.1378/chest.14-1488
56. Baldwin C, van der Schueren MA, Kruizenga HM, Weekes CE. Dietary advice with or without oral nutritional supplements for disease-related malnutrition in adults. *Cochrane Database Syst Rev*. 2021;2021(12):CD002008. doi:10.1002/14651858.CD002008.pub5
57. Fu Y, Chapman EJ, Boland AC, Bennett MI. Evidence-based management approaches for patients with severe chronic obstructive pulmonary disease (COPD): a practice review. *Palliative Med*. 2022;36(5):770–782. doi:10.1177/02692163221079697
58. Deng M, Lu Y, Zhang Q, Bian Y, Zhou X, Hou G. Global prevalence of malnutrition in patients with chronic obstructive pulmonary disease: systemic review and meta-analysis. *Clin Nutr*. 2023;42(6):848–858. doi:10.1016/j.clnu.2023.04.005
59. Kwan HY, Maddocks M, Nolan CM, et al. The prognostic significance of weight loss in chronic obstructive pulmonary disease-related cachexia: a prospective cohort study. *J Cachexia, Sarcopenia Muscle*. 2019;10(6):1330–1338. doi:10.1002/jcsm.12463
60. De Brandt J, Beijers RJHCG, Chiles J, et al. Update on the etiology, assessment, and management of COPD cachexia: considerations for the clinician. *Int J Chron Obstruct Pulmon Dis*. 2022;17:2957–2976. doi:10.2147/COPD.S334228
61. Yde SK, Mikkelsen S, Brath MSG, Holst M. Unintentional weight loss is reflected in worse one-year clinical outcomes among COPD outpatients. *Clin Nutr*. 2023;42(11):2173–2180. doi:10.1016/j.clnu.2023.09.012
62. Sørensen D, Wieghorst AR, Elbek JA, Mousing CA. Mealtime challenges in patients with chronic obstructive pulmonary disease: who is responsible? *J Clin Nurs*. 2020;29(23–24):4583–4593. doi:10.1111/jocn.15491
63. Beijers RJHCG, Steiner MC, Schols AMWJ. The role of diet and nutrition in the management of COPD. *Eur Respir Rev*. 2023;32(168):230003. doi:10.1183/16000617.0003-2023