Comprehensive care for COPD patients in primary care

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Abstract

Introduction: Evidence suggests that integrated disease management can be a transformative approach to improving the quality of life in COPD.

Objective: to develop a structured follow-up intervention for self-management of COPD in primary care.

Methods: A multicenter study with a 12-month parallel-group treatment design was conducted comparing COPD patients in primary care

Results: the MIE cohort improved their knowledge of COPD more than the usual care control group on the score of 29.6% ($p < 0.001$).

Conclusions: The study confirmed that a follow-up intervention structured by MIE and self-care with MIE substantially improved the quality of life in COPD patients.

Keywords: COPD, intervention, quality of life, primary care source: DeCS

Resumen

Introducción: La evidencia sugiere que el manejo integrado de enfermedades puede ser un enfoque transformador para mejorar la calidad de vida en la EPOC.

Objetivo: desarrollar una intervención de seguimiento estructurada para el autocontrol de la EPOC en la atención primaria.

Método: Se realizó un estudio multicéntrico con un diseño de tratamiento de grupos paralelos de 12 meses que comparó pacientes con EPOC en atención primaria

Resultados: la cohorte MIE mejoró su conocimiento de la EPOC más que el grupo de control de atención habitual en la puntuación total en un 29,6 % ($p < 0{,}001$).

Conclusiones: Se confirmó que una intervención de seguimiento estructurada por MIE y autocuidado con MIE mejoró sustancialmente la calidad de vida en pacientes con EPOC.

Palabras clave: EPOC, intervención, calidad de vida, atención primaria fuente: DeCS

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Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive lung disease characterized by increasing symptoms, decreasing quality of life, and increasing frequency of exacerbations. These interrelated patient outcomes are the building blocks of the current Global Initiative for Chronic Obstructive Lung Disease (GOLD) severity classification (A-D)[1]. GOLD A and B patients are low- and medium-risk patients who experience exacerbations infrequently. Collectively, GOLD C and D patients are high-risk patients defined by frequent exacerbations and severe exacerbations requiring hospitalization. International practice guidelines recommend effective pharmacologic and nonpharmacologic interventions to address these patient and health system outcomes; however, the impact of these recommendations on high-risk COPD patients in our communities has been limited by a substantial gap in knowledge implementation for care[2,3].

Primary care physicians treat the majority of COPD patients. Although evidence-based COPD management is increasingly complex, primary care providers manage high-risk COPD patients with multiple comorbidities within health systems that face enduring challenges. For example, there are diagnostic barriers related to access and utilization of spirometry[4]. In addition, there is a low level of provider awareness of COPD clinical practice guidelines. Bridging the knowledge implementation gap for care in primary care requires transformative innovation[5].

Evidence suggests that integrated disease management (IDM), which uses a team-based care model that supports physicians and patients to improve the implementation of best practices, can be a transformative approach. The team-based care model can bridge the knowledge implementation gap for care while improving health outcomes in COPD. EIM has been defined as"a group of coherent interventions designed to prevent or manage one or more chronic conditions using a systematic, multidisciplinary approach and potentially employing multiple treatment modalities" [6].

A recent meta-analysis of COPD EIM in various healthcare settings concluded that EIM improved quality of life, exercise capacity and reduced hospitalization. However, MIE interventions are not uniform; they are complex with various components[7,8]. In this study, our objective was to develop a structured follow-up intervention for self-management of COPD MIE in primary care, including patient identification, accurate diagnosis, case management, patient education and skills training, and then evaluate the MIE intervention in a population of frequent, high-risk exacerbations with poor baseline quality of life.

Method

A multicenter study was conducted with a 12-month parallel group treatment design comparing patients with COPD MIE with usual care patients in 8 primary care practices in Ambato. Patients with a self-identified COPD diagnosis were found through an electronic medical record (EMR) search of physician-generated billing codes and patient profiles or during a scheduled visit. All patients underwent pre-bronchodilator and post-bronchodilator spirometry for diagnostic confirmation based on GOLD criteria[9]. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

The study included patients who were ≥ 40 years of age, current or former smokers with a minimum of 10 pack-year smoking history, had a post-bronchodilator forced expiratory volume in one second (FEV1) of ≤ 70% after four puffs of salbutamol and an FEV1/forced vital capacity (FVC) ratio <0.7, and had a history of at least two exacerbations in the past 3 years or one exacerbation in the past year. An exacerbation was defined as a worsening of COPD that required treatment with prednisone or antibiotics, an urgent visit to a health care professional, an ED visit, or hospitalization. We excluded patients with a COPD exacerbation in the past 4 weeks, a diagnosis of asthma before age 40 years, long-term supplemental oxygen use, a comorbid disease that would interfere with study participation, scheduled for COPD rehabilitation, or a terminal illness. All patients sought written consent.

The primary outcome was the impact of MIE on COPD-related quality of life (QoL). Secondary clinical and physiological outcomes included quality of life as measured by the COPD Clinical Questionnaire (CCE), ranging from 0 to 6, with lower scores indicating better quality of life; COPD-specific knowledge as measured by the Bristol Knowledge Questionnaire, ranging from 0% to 100%, with higher scores reflecting greater knowledge[10] and airflow limitation as measured by absolute and percent predicted FEV1 and FEV1/FVC ratio.

Data were expressed as mean (SD) for continuous values. For continuous variables, including the difference in change in the COPD Endpoint Evaluation Test (PEE), Bristol Knowledge Questionnaire score, FEV1, and FEV1/FVC ratio, differences between groups were obtained by analysis of covariance adjusted for baseline and participating health center. Database and statistical processing of the data were performed and analyzed in SPSS 26 statistical software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

Intervention subjects received on-site spirometry, case management, education and skills training, including self-management education by a certified respiratory educator (CRE) at baseline (1 h), 3 months after enrollment (45 min), and either a Telephone Contact or face-to-face visit at 6 and 9 months (15-30 min). All visits occurred in the primary care practice where the individual normally received care.

Of 1186 subjects screened between November 2011 and January 2014, 974 were deemed ineligible (240 [20.2 %] with normal spirometry [excluding COPD] and 734 [61.9 %] who did not meet exacerbation criteria or had a predicted FEV1 ≥ 70 %), leaving 212 eligible patients, of whom 32 declined to participate. Of the 180 randomized participants, 12 withdrew before visit 1, leaving 168 participants in the study. A total of 22 subjects were lost to follow-up, 12 in the MIE arm and 10 in the usual care arm. Of the 74 usual-care subjects who completed the 1-year primary study, 42 (56.8 %) agreed to cross over to receive MIE and 32 (76.2 %) completed the 12-month crossover analysis (24 months after initial enrollment).

All patients in the study (MIE and control) had their clinical diagnosis of COPD confirmed by pre-bronchodilator and post-bronchodilator spirometry. In the MIE, ERCs achieved standardized elements of case management, education and skills training in many patients.

Quality of life improved in the MIE cohort with a PEE score of 22.6 (SD 6.8) at baseline and 14.8 (SD 6.0) at 12 months. However, the PEE score decreased in the usual care arm from 19.3 (SD 7.3) to 22.0 (SD 6.6). The adjusted difference between MIE and usual care at 12 months was 9.3 (95 % confidence interval [CI]: 7.8-10.8 [$p < 0.001$]).

The MIE cohort improved their knowledge of COPD more than the usual care control group on the total score by 29.6 % ($p < 0.001$) and on each of the topic domain scores (Table 1).

Table 1. Bristol Knowledge Questionnaire

	Integrated disease management (n = 72)			Usual care (n = 74)			Difference between groups	
	Basal	12 months	Change from baseline	Basal	12 months	Change from baseline	Adjusted difference (95% CI)	p-value
domain of knowledge								
Epidemiology	34,3 (20,8)	72,3 (26,0)	38,0 (26,0)	37,8 (19,6)	38,9 (21,6)	1,1 (24,9)	35,2 (28,0, 42,5)	<0.001
Etiology	54,3 (28,9)	86,0 (17,8)	31,7 (23,5)	58,9 (30,5)	60,0 (25,8)	1.1 (29.0)	28,0 (21,5, 34,4)	<0.001
Symptoms	54,3 (26,8)	85,7 (23,1)	31,4 (30,6)	55,1 (23,3)	63,0 (27,0)	7,9 (27,0)	23,7 (15,9, 31,5)	<0.001
dyspnea	38,9 (24,3)	79,1 (26,5)	40,3 (31,5)	38,6 (19,1)	45,3 (24,9)	6,7 (25,1)	34,2 (26,0, 42,4)	<0.001
Phlegm	45,4 (26,4)	79,1 (22,2)	33,7 (25,1)	52,3 (22,5)	50,7 (29,3)	-1,6 (28,4)	32,0 (24,3, 39,7)	<0.001
Infections	37,1 (27,9)	73,7 (19,7)	36,6 (26,8)	44,1 (24,5)	46,6 (26,0)	2,5 (25,8)	29,9 (22,8, 37,0)	<0.001

Exercise	57,1 (27,5)	87,7 (21,1)	30,6 (29,0)	51,0 (23,3)	61,1 (29,0)	10,1 (33,4)	25,6 (17,3, 33,9)	<0.001
Smoking	58,0 (22,1)	73,1 (19,5)	15,1 (22,7)	58,6 (22,9)	63,3 (23,8)	4,7 (23,5)	10,5 (4,0, 17,0)	0.002
Vaccination	50,6 (25,4)	80,9 (20,3)	30,3 (21,5)	55,3 (25,1)	60,0 (23,1)	4,7 (24,8)	22,9 (16,9, 29,0)	<0.001
Inhaled bronchodilators	30,3 (28,2)	66,6 (31,3)	36,3 (28,1)	26,6 (23,6)	33,7 (25,4)	7,1 (22,5)	31,2 (23,6, 38,8)	<0.001
antibiotics	33,1 (25,0)	66,9 (24,8)	33,7 (24,9)	34,5 (25,9)	37,3 (28,0)	2,7 (26,5)	30,6 (23,0, 38,1)	<0.001
oral steroids	24,9 (26,9)	68,0 (34,5)	43,1 (31,7)	20,0 (26,2)	22,7 (26,5)	2,7 (30,2)	43,3 (34,4, 52,3)	<0.001
inhaled steroids	14,6 (21,0)	54,3 (33,0)	39,7 (32,6)	11,8 (19,4)	18,9 (26,0)	7,1 (24,8)	34,5 (25,4, 43,6)	<0.001
Total	41,0 (16,2)	74,9 (18,5)	33,9 (14,2)	41,9 (13,8)	46,2 (16,6)	4.4 (15.4)	29,6 (24,9, 34,2)	<0.001

Source : statistical analysis, $p \leq 0.05$.

The proportion of patients with MIE who experienced a severe exacerbation of COPD was 48.9% lower than that of usual care patients ($p < 0.001$). Similarly, 30.2 % fewer patients with MIE required an urgent physician visit and 23.6 % fewer patients required an emergency department (ED) visit for COPD exacerbation ($p < 0.001$ and $p = 0.001$, respectively).

Patients who crossed over from usual care to MIE improved their PEE score from a baseline of 22.2 (SD 6.7) to 14.2 (SD 8.3) 12 months after crossover, a difference of 8.0 (SD 5.4) ($p < 0.001$). In addition, SCC total score and domain scores improved, decreasing the total score from 2.58 (SD 1.15) to 1.65 (SD 0.99), the symptom domain from 2.97 (SD 1.23) to 2.11 (SD 1.20), the function domain from 2.31 (SD 1.17) to 1.53 (SD 1.04), and mental domain 2.34 (SD 1.87) to 0.94 (SD 1.20) (all $p < 0.001$).

Discussion

The present study is a structured follow-up intervention of COPD MIE and self-management of MIE in primary care to demonstrate that MIE substantially improves COPD-related quality of life. MIE also improved a secondary quality of life measure, FEV1 and COPD-related knowledge. In addition, it demonstrated that fewer patients with MIE had severe exacerbations that required an urgent visit to their primary care physician or a visit to the emergency department.[21]

The results of this study are consistent with those reported in a recent systematic review of MIE in COPD. Kruis and colleagues summarized the worldwide literature by analyzing 26 trials involving 2997 people from 11 countries in various healthcare settings and concluded that MIE improved quality of life, exercise capacity and reduced hospitalization[11,12]. Although the authors confirmed this finding in a primary care subanalysis with five studies, only one study in the meta-analysis evaluated a predominant MIE self-care intervention, and that study was negative.

A direct comparison of effect size between our study and those in Kruis' systematic review is complicated by using different QoL tools. We used the PEE score to measure QoL in this study because it is a concise, reliable, and validated instrument easily implemented in primary care[13]. The St. George's Respiratory Questionnaire (SGRQ) and the PEE score function similarly but operate on different numerical scales (0-100 vs. 0-40) and have different minimal clinically important differences (MCIDs). The difference in our study's quality of life between MIE and usual care was PEE 10.4 (DMCI 3). In the Kruis meta-analysis, the mean improvement in quality of life measured by the SGRQ in the primary care subset was 4.68 (DMCI 4). Conservatively, the quality of life measured in our study is consistent with the improvements reported in the predominant primary care MIE pulmonary rehabilitation interventions. While pulmonary rehabilitation is the first choice in patients with poor onset, MIE self-management and structured MIE follow-up may be an option for patients in whom pulmonary rehabilitation is not available or for patients who are unable or unwilling to participate in an exercise program[14,15].

Bischoff and colleagues assigned 165 subjects equally into three arms: self-management, written self-management action plan, education and case management, routine monitoring or usual care[8]. None of the intervention arms had a differential impact on QoL. Another study enrolled 1086 patients from 40 primary care practices in a cluster RCT comparing EIM with usual care according to international guidelines and found no difference in QoL. Taken together, the authors of these studies suggest that the failure to find a differential benefit in favor of EIM may be explained by the overall high quality of guideline-based care provided by general practitioners, a COPD population with relatively good baseline QoL (ceiling effect), incomplete implementation of targeted interventions (mean < 50%), and heterogeneity in the skill set of community practice nurses delivering the intervention[16].

MIE is a complex intervention, and it was impossible to identify the specific intervention(s) or mechanism that led to improved QoL; however, reasonable inferences can be made. First, case management with periodic clinical review and a self-management action plan was effectively delivered in this study and is known to improve COPD-related QoL[17]. Second, it reports improvements in the ECC's activity and mental status domains directly related to QoL. Our study's improvement in the mental domain may have been related to patients having access to a highly competent ECC case manager, with care planned rather than provided "as needed," and with improved COPD-related knowledge. Third, exacerbations significantly reduce the quality of life in COPD[18]. Therefore, preventing severe exacerbations in our population likely contributed to improved quality of life. Prior interventions that may have contributed to the prevention of exacerbations in our study include the prescription of inhalers appropriate for disease severity, improved adherence, and improved inhaler technique. Critical errors in inhaler dispositive technique occur in 15.4 to 46.9% of activations[19,20]. Although it did not directly track prescriptions, measure adherence, or objectively assess inhaler technique, patients with MIE received case management, education, and skills training, which are likely to impact adherence and inhaler device technique. [22]

Conclusions

In a high-risk primary care population, the study confirmed that a structured follow-up intervention by MIE and self-care with MIE substantially improved QoL, lung function, reduced severe exacerbations and COPD-related urgent health service utilization.

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