



## REVISIONES

### Educational programs for patients with Chronic Obstructive Pulmonary Disease. Integrative Review

Programas educativos en pacientes con Enfermedad Pulmonar Obstructiva Crónica. Revisión integradora

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#### ABSTRACT

According to WHO, the aim of therapeutic education (TE) is help the patient to acquire the resources necessary to optimally manage your life with a chronic disease. The TE is part of treatment in secondary and tertiary prevention. The latest Cochrane review has shown positive results however, heterogeneity of populations, types of interventions and outcome measures makes it difficult to establish clear recommendations in this area. And what instruments are recommended to assess the therapeutic education in patients with COPD. It is therefore necessary a review with the aim of knowing the characteristics of clinical trials, the profile of COPD patient, the contents of ET and the variables studied in them. In this review are Identified 22 clinical trials with high methodological quality, Jadad scale > 3. Which showed that in clinical trials programs ET the most studied variables are the quality of life, hospital admissions and lung function variables, where ET decreases hospital admissions, promotes smoking cessation and improving knowledge of COPD. Whose interventions are group sessions with different educational materials. There being a rise in the number of publications in this area, there is a great variety of assessment tools and heterogeneity of interventions, to draw conclusions.

**Keywords:** COPD; nursing health education

#### RESUMEN

Según la OMS, el objetivo de la educación terapéutica (ET) es ayudar al paciente a adquirir los recursos necesarios para gestionar óptimamente su vida con una enfermedad crónica. La ET forma parte del tratamiento en la prevención secundaria y terciaria. La última revisión de la Cochrane ha demostrado resultados positivos, sin embargo, la heterogeneidad de las poblaciones, tipo de intervenciones y medidas de resultado hace que sea difícil establecer recomendaciones claras en este ámbito. Así como se desconoce qué instrumentos son los recomendables para evaluar el cumplimiento terapéutico en la EPOC. Por tanto es necesario realizar de una revisión con el objetivo de conocer las

características de los ensayos clínicos, el perfil del paciente EPOC, los contenidos de la ET y las variables estudiadas en los mismos. Identificándose 22 ensayos clínicos con una alta calidad metodológica, escala Jadad >3 que mostraron que en los ensayos clínicos de programas de ET las variables más estudiadas son la calidad de vida, ingresos hospitalarios y las variables de función pulmonar, donde la ET disminuye los ingresos hospitalarios, favorece la deshabituación tabáquica, mejora los conocimientos de la EPOC cuyas intervenciones son sesiones grupales, con diferentes materiales educativos, existiendo un auge en el número de publicaciones en este ámbito. Existe una gran variedad en los instrumentos de evaluación y heterogeneidad de las intervenciones, para establecer conclusiones.

**Palabras clave:** EPOC; educación en salud

## INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is characterized by the presence of chronic and poorly reversible airflow limitation associated with an abnormal inflammatory reaction, mainly due to tobacco smoke <sup>(1,2)</sup>.

COPD presents periods of abrupt worsening of symptoms, called acute exacerbations <sup>(3)</sup>, defined as episodes of clinical instability occurring in the natural course of the disease and characterized by a maintained worsening of the respiratory symptoms, going beyond their daily variations <sup>(4)</sup>. These exacerbations are prominent in the course of the disease <sup>(5)</sup>, with an average of 1-4 per year <sup>(6)</sup>, significantly affecting the health-related quality of life (HRQOL) <sup>(7)</sup> due to a progressive disability rather than immediate death <sup>(8)</sup>.

The disease and its complications generate a strong clinical and economic burden on health systems. In 2012 in Spain, 38,726 people suffering from COPD caused 664,545 hospitalizations with an average stay of 8 days <sup>(9)</sup>. In 2020 it is expected to be the third leading cause of death worldwide <sup>(10)</sup>. Exacerbations also increased by the presence of comorbidities, such as asthma, heart disease or hypertension <sup>(11)</sup>. It seems necessary to explore options for prevention of COPD exacerbations.

Education represents today an inseparable therapeutic practice in this type of patients, as reflected in the National Strategy for COPD patients <sup>(3)</sup>, where therapeutic education is proposed as a method for reducing the frequency of exacerbations, improving HRQOL and dyspnea measured by the Medical Result Council (MRC).

For the World Health Organization therapeutic patient education is "*a continuous process, integrated in health care. It is patient-centered; it includes organized awareness, information, self-care learning and psychosocial support regarding the disease, prescribed treatment, care, hospital and other health care settings, organizational information, and behavior related to health and illness. It is designed to help patients and their families understand the disease and the treatment, cooperate with health care providers\*, live healthily, and maintain or improve their quality of life.*" <sup>(12)</sup>.

Two of the latest Cochrane <sup>(8,13)</sup> reviews published, show the greater capacity of COPD patients in recognizing and reacting appropriately to an exacerbation after receiving therapeutic education.

The main objective of this study is to perform an integrative literature review in order to identify studies evaluating educational interventions in patients with COPD. Secondary objectives are:

1. Knowing the sociodemographic characteristics of the patients.
2. Knowing the outcome variables and assessment instruments of patient education.

3. Knowing the methodological quality of the evaluated trials.
4. Knowing the contents of therapeutic patient interventions.

## **METHODOLOGY**

### **Design**

Integrative review of scientific literature on intervention studies based on therapeutic education programs for COPD patients, published in the international database Medline (PubMed) and search all references of included articles.

### **Selection criteria**

#### Type of study

Controlled, randomized clinical trials evaluating the implementation of a therapeutic education program for clinically diagnosed COPD regardless of the year of completion or language. Exclusion criteria: studies with a score between 0 and 2 points on the Jadad scale.

#### Type of participants

Patients with COPD as main diagnosis, confirmed by a health professional using spirometric criteria ( $FEV_1 < 80\%$  predicted and  $FEV_1/FVC < 70\%$  predicted). Studies excluded participants with asthma as a main diagnosis.

#### Type of intervention

The classification of the interventions was based on whether the studies included or not education on COPD. The following definition of COPD was used: a program that transfers information about COPD and its treatment in any of the following forms: written, verbal, visual or hearing. The minimum education included the provision of written material or a brief structured verbal interaction between a healthcare professional and a patient. However, it had to be part of a formal program, in which the first objective was to improve knowledge and understanding of COPD. The educational program could be focused on smoking cessation, instruction in breathing techniques, improving lifestyle, self-management during exacerbations, ability to perform daily activities, or a combination of the above.

#### Type of outcome

The primary outcomes chosen were those considered most relevant from a clinical point of view in patients with COPD, such a quality of life, ventilatory variables ( $FEV_1$ , oxygen saturation, arterial blood gases, dyspnea (MRC), walking test), and use of health resources (hospitalizations and emergency room visits).

Secondary outcomes included the variables that could affect the results: signs and symptoms of comorbidities, adherence, tobacco consumption, medication (drugs used at the time of the evaluation), vaccination in the past year, awareness of COPD, Body Mass Index (BMI), anxiety and depression, personal satisfaction.

### **Identification of the results**

The search was conducted using the Medical Subject Headings (MeSH) "COPD" and "education", with the Boolean "AND" in between. A search of all the references of the included articles was also performed. Unpublished results were not included in the review. There were no restrictions regarding the place of research, language or publication date, that is, from the start indexing each base until March 2014.

## Assessment of the methodological quality

The assessment of methodological quality was conducted pair wise, using the Jadad scale, which evaluates the quality of the included studies using a rating system based on the responses to the 7 questions of the questionnaire. Every positive answer adds 1 point and negative answer 0 points. The last 2 questions work differently if your answers are positive adds -1 and in the case of negative 0 points adds, considering 0-2 low quality studies and 3-5 good quality. The evaluated items are randomization, blinding and the description of dropouts or withdrawals and reasons for abandonment<sup>(14)</sup>. We selected all studies with a score of 3-5, and excluded those with a score of 0-2 on the Jadad scale. Blinding of the participants was not penalized due to the nature of the intervention of the clinical trials.

## Data extraction

We performed a qualitative analysis of the data obtained from the previously prepared template. The following data were thoroughly analyzed: study design, mean age, predominant sex, type of center conducting the study (university, hospital, primary care center), number of participants, number of patients assigned to the control group, number of patients assigned to the intervention group, the intervention program of each study, measured variables, follow-up period, evaluation and results. We also made a descriptive analysis of the variables, categorizing them as favorable, equal or unfavorable, since the variables had been analyzed in the studies using a different assessment scale, which has also been highlighted in another review<sup>(8)</sup>.

## RESULTS

321 items were identified with the aforementioned strategy. After reading the title and summary 58 items that could meet the selection criteria were selected. A complete reading of the article was conducted to verify the selection criteria, leaving a total of 28 selected items. The reasons for excluding 30 studies were:

Research protocols without results (n=7)<sup>(15-21)</sup>, Including COPD patients and healthy subjects (n=3)<sup>(22-24)</sup>. The subject assigned to the control group did not receive conventional care (n=7)<sup>(25-31)</sup>, Repeated study (n=5)<sup>(32-36)</sup>. The intervention was a singing program (n=1)<sup>(37)</sup>; There was no educational intervention (n=2)<sup>(38,39)</sup>

Mainly focused on a pulmonary rehabilitation program based on physical exercise (n=3)<sup>(40-42)</sup>, Based on a congress abstract (n=1)<sup>(43)</sup>; Aimed a validating a questionnaire for cough (n=1)<sup>(44)</sup>. A manual search for references of the 28 articles that met the criteria was made<sup>(5,45-71)</sup>, including 4 more articles<sup>(72-75)</sup>. The 32 articles were assessed on their methodological quality, excluding<sup>(51,52,56,59,61,65,66,68,72)</sup> because of a Jadad score of 0-2. Finally 22 articles were included and classified according to: design, country, type of center, total participants, participants assigned to control group (CG), participants assigned to the intervention group (IG), educational intervention, quantified variables, follow-up period and results<sup>(5,45-50,53-55,57,58,60,62-64,67,69-71,73-75)</sup>.

## Participants/recruitment

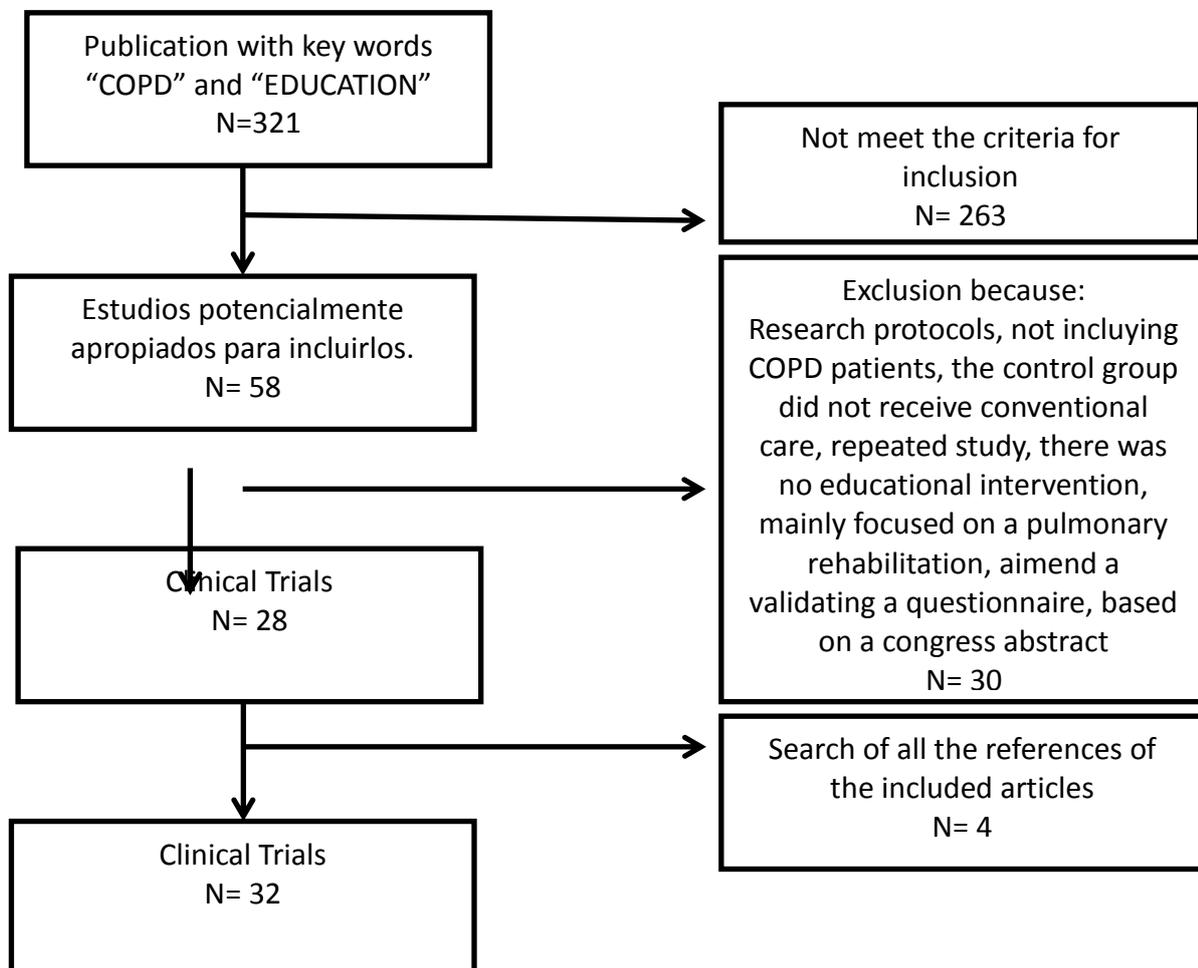
The included articles contained a total of 8369 randomized patients; 7211 (76,2%) completed the studies. Dropout rates ranged from 0% to 66,3%, with an average of 20,84%. 12 out of the 22 studies (54,6%) enrolled patients in hospitals, 8 (36,4%) in primary care centers, 1 (4,6%) at a university and one study did not indicate the type of institution<sup>(53)</sup>.

In 45,5% (n=10) of the studies the majority of enrolled patients were men, against 40,9% (n=9) where the highest prevalence were women, and in 13,6% (n = 3) there was an equitable distribution between sexes; all studies conducted in Spain show very significant differences in the prevalence of COPD in males. The average age of all studies is 66.43 years, and the most frequent comorbidity was heart disease in the studies where it was examined (n=5) <sup>(45,46,60,67,73)</sup>

One of the studies indicates that 90% of patients were vaccinated against influenza the previous year, but there were no data on the impact of vaccination after the implementation of the therapeutic education program <sup>(47)</sup>.

Half of the studies had a one-year follow-up period (n=10), followed by studies that had less than one year (n=9), those with a two-year follow-up (n=2) and one study with no available data on the follow-up period <sup>(74)</sup>. Most of the studies had an evaluation at the beginning and at the end, after the application of the educational program.

**Graphic 1.** Flowchart of the study showing the methodology of work



### Interventions

The 22 studies described self-care education in COPD in comparison with conventional care. In all studies except one <sup>(64)</sup>, there was group education, in some cases there was an additional individual plan (n=9) <sup>(45,46,48,55,60,64,71,73,74)</sup>, use of leaflets to enhance the education (n=8) <sup>(5,45,48,53,54,60,67,71)</sup>, telephone follow-up (n=3)

(45,70,71), or use of a diary (n=3)<sup>(50,53,71)</sup>. As for the content of the educational sessions, in 18 articles (81,1%) the sessions focused on the knowledge of COPD, with the following components: anatomy and physiology (n=3)<sup>(50,54,63)</sup>, description of the disease (n=10)<sup>(5,45-47,49,55,60,64,67,70)</sup>, signs and symptoms of COPD (n=3)<sup>(54,57,74)</sup>, signs and symptoms of the exacerbations (n=10)<sup>(50,54,55,57,60,63,64,67,70,74)</sup>, diagnosis of COPD (n=3)<sup>(57,60,63)</sup>, triggers of exacerbations (n=6)<sup>(50,60,63,64,67,70)</sup> and hospital services that can be used (n=3)<sup>(47,67,74)</sup>.

Another section was the non-pharmacological treatment addressed in 19 studies (86,4%), with the following components: tobacco cessation (n=15)<sup>(5,45,46,48,53-55,57,60,62-64,67,71,73)</sup>, regular physical exercise (n=9)<sup>(5,46,48,49,54,55,60,63,71)</sup>, nutritional habits (n=10)<sup>(5,46-49,53,55,60,62,71)</sup> control of emotions (n=3)<sup>(49,55,71)</sup>, management of dyspnea (n=3)<sup>(49,55,71)</sup>, breathing techniques (n=6)<sup>(45,47,55,63,70,71)</sup>, sleep and rest (n=4)<sup>(5,49,53,55)</sup>, cleaning of sputum (n=1)<sup>(53)</sup>, sexuality (n=1)<sup>(55)</sup>, hand hygiene (n=1)<sup>(63)</sup>, weight loss (n=1)<sup>(48)</sup> leisure activities and travelling (n=1)<sup>(55)</sup>.

Pharmacological treatment was addressed in 86,4% (n=19) of the studies, specifically in the instruction of inhaling techniques (n=12)<sup>(5,48,50,54,55,60,63,64,67,70,73,75)</sup>, measurement of exacerbations (n=7)<sup>(5,55,60,63,64,70,71)</sup>, oxygen therapy (n=3)<sup>(47,55,64)</sup> and vaccination (n=3)<sup>(48,64,73)</sup>. 3 studies used the educational material *Living well with COPD*<sup>(76)</sup>.

## Outcomes

The included studies reported the following outcomes:

Sociodemographic variables (sex and age) (n=22)<sup>(5,45-50,53-55,62-64,69-71,73-75)</sup>, HRQOL (n=17)<sup>(5,45-47,49,50,53,55,57,58,60,62,63,67,71,73,74)</sup> Ventilatory variables: FEV<sub>1</sub> (n=16)<sup>(5,45,53-55,57,58,60,62,64,67,70,71,73-75)</sup>, Walking Test (n=5)<sup>(55,62,70,73,75)</sup> FEV<sub>1</sub>/FVC (n=9)<sup>(5,53-55,60,64,67,70,71)</sup> Arterial blood gases (n=2)<sup>(5,75)</sup> Dyspnea (MRC) (n=8)<sup>(5,54,55,60,62,67,70,75)</sup> Smoking (n=9)<sup>(45,46,49,54,60,62,63,67,75)</sup> Body mass index (BMI) (n=5)<sup>(5,45,46,60,62)</sup>, comorbidities (n=5)<sup>(5,45,46,60,62)</sup>, medication (n=6)<sup>(45,53,55,60,67,73)</sup>, number of hospitalizations (n=17)<sup>(5,45-50,53,55,57,58,60,62,63,67,75)</sup>. Anxiety and depression (n=2)<sup>(49,75)</sup>, Signs and symptoms (n=3)<sup>(5,47,53)</sup>, Satisfaction (n=3)<sup>(53,63,75)</sup>, vaccination (n=1)<sup>(47)</sup>, Adherence (n=1)<sup>(45)</sup>, Assessment of inhalation technique (n=4)<sup>(5,58,64,67)</sup> Knowledge of COPD (n=8)<sup>(45,48,53,54,60,63,64,71)</sup>.

## Results of the educational programs

The educational intervention decreased hospital admissions and visits to emergency room in 58,8% of the studies, favored or modified tobacco cessation in 77,8%, improved knowledge of COPD in 62,5%<sup>(5,45-50,53-55,62-64,69-71,73-75)</sup>, and the knowledge to perform the inhalation technique correctly in 100% of the studies where this was analyzed. Satisfaction improved in 66,6 % of the studies.

50% of the studies that evaluated quality of life conclude that no change was noted after the educational intervention compared with 43% claiming an improvement of the quality of life, and a single study<sup>(62)</sup> which shows impairment after the educational intervention. The same happens in those studies evaluating the ventilatory variables where 66,7% notes that the educational intervention does not harm or affect them negatively, whereas 25% of the studies show that results can benefit the respiratory parameters, as shown in Table 1.

Other parameters such as the signs and symptoms, according to two <sup>(5,53)</sup>, of the three studies that analyzed them, remained unaffected after the educational intervention, nor negatively or positively, and the remaining study showed a negative impact <sup>(47)</sup>. Only one study analyzed the impact on pharmacological adherence and showed no changes after the educational intervention <sup>(45)</sup>. Another parameter studied by the researchers of the different trials was the Body-Mass Index (BMI); in one trial it was only evaluated at the beginning of the investigation <sup>(46)</sup>, and the studies evaluating BMI both at the beginning and the end of the investigation obtained that, in general, educational intervention did not improve this parameter, but neither deteriorated it <sup>(45,60,62)</sup>, and only one of them showed improvement <sup>(5)</sup>.

**Table 1.** Educational programs for patients with COPD

	Age	Gender	Tracing (years)	Quality live	V. ventilatory	Hospital Admissions	Tobacco	COPD Knowledge
<b>Khdour et al. 2011</b>	66,5	W	1	+	=	-	-	=
<b>Hoogendoorn et al. 2010</b>	66,5	M	2	+		+	+	
<b>Koff et al. 2009</b>	65,8	=	0	+		-		
<b>Siddique et al. 2012</b>	70,0	M	1			=		=
<b>Taylor et al. 2012</b>	69,8	W	0	=		-	+	
<b>Bucknall et al. 2012</b>	69,1	W	1	+		-		
<b>Soler et al. 2006</b>	73,0	M	1	+	-	-		
<b>Watson et al. 1997</b>	67,5	M	0	=	=	-		+
<b>Hill et al. 2010</b>	64,5	W	0		=		=	+
<b>Bourbeau et al. 2006</b>	69,5	W	1	+	=	-		
<b>Coultas et al. 2005</b>	69,0	W	0	=		=		
<b>Kiser et al. 2012</b>	63,0	W	0	At first		+		
<b>Wakabayashi et al. 2011</b>	71,7	M	1	=	=	=	-	+
<b>Theander et al. 2009</b>	65,0	=	0	-	=		=	
<b>Efraimsson et al. 2008</b>	67,0	=	0	+	+		-	+
<b>Rootmensen et al. 2008</b>	60,5	M	0			+		+
<b>Hesselink et al. 2004</b>	47,3	W	2	=	=		=	
<b>Rea et al. 2004</b>	68,0	W	1	=	+	-		
<b>Cockcroft et al. 1987</b>	69,9	M		=	=	-	-	
<b>Littlejohns et al. 1991</b>	62,7	M	1		+			
<b>Seden et al. 2009</b>	69,25	M	1			-		
<b>Fan et al. 2012</b>	66	M	1	=		+		=

\* In the gender variable, it has measured the predominant sex research the M value refers to the men and the W value refers to women.  
The + values of the variables refer to better results in the intervention group compared to the control group or with respect to the baseline  
Values - the variables refer to worse outcomes in the intervention group compared to the control group or with respect to the baseline  
= The values of the variables refer to similar results between the two intervention and control groups or with respect to the baseline

### Methodological quality

Regarding the assessment of methodological quality through the Jadad scale, the total average of all the studies was 3,9. Of the 22 studies included, n=5 of them obtained the highest methodological score, n=9 obtained 4 points and n=8 got 3 points. The

concealment of allocation was the least valued item, due to the nature of the intervention.

## DISCUSSION

COPD is one of the most prevalent diseases in developed countries, where there is a growing concern for implementing new solutions to these patients, as reflected in the increase in the number of publications over the last five years, and also the an important amount of study protocols without published results, as highlighted by the Cochrane review of 2011<sup>(77)</sup>.

As for the content of the educational sessions, we have not interfered in the content to avoid affecting positively the best results of the studied variables, but we have unified the content of different educational programs and made a description of their components. We have found few reviews seeking to address the components of educational programs for COPD patients, and in one of them, due to the heterogeneity of the interventions it was impossible to draw any conclusions<sup>(77)</sup>. But reviews such as Bourbeau's claim that in order to obtain therapeutic benefits for COPD patients, it is necessary to develop individual plans, in addition to health education and telephone follow-up<sup>(24)</sup>.

It should be noted that many of the included studies analyzed nutritional variables, as research has shown the importance of nutrition in COPD patients; a diet on vegetables, fruits, soy, fiber and olive oil can promote the good evolution of the disease, compared to diets rich in sugar and cured meat that negatively affect the course of the disease<sup>(78)</sup>, as well as nutritional supplements, for their low body weight, and the positive impact on the respiratory muscle strength, physical activity and quality of life<sup>(79)</sup>.

As shown in the obtained results, one of the components that is most present in educational programs for COPD patients is smoking cessation, as it is the treatment that has shown the greatest results in improving the disease, although there are studies that suggest that the combination of the psychosocial intervention and pharmacological treatment gives higher cessation rates, compared to the educational programs for<sup>(80)</sup>.

As for the outcome variables, there is a major number of studies reporting a decrease in hospital admissions<sup>(31)</sup>, as this has also occurred in studies evaluating the quality of care in integrated care units<sup>(81)</sup> and home hospitalization<sup>(82)</sup> versus conventional care in patients with COPD. The higher rates of smoking cessation and increased knowledge of COPD<sup>(22)</sup> are also benefits, as reflected in a study conducted in patients with asthma and COPD are beneficial, as are also reflected in a study conducted in patients such as asthma and COPD<sup>(25)</sup> with respect to the baseline or control group. Other investigations have also obtained positive results in other aspects such as quality of life<sup>(28,29)</sup>, functional respiratory parameters<sup>(23,77)</sup> and variables that in our case did not have any impact. On the other hand, two other reviews show that there is little evidence that educational programs for COPD patients improve the quality of life, satisfaction, readmissions, or visits to emergency rooms<sup>(13,83)</sup>. Contrary to these results there exist telecare programs applied to COPD patients that have shown significant levels of improvement in these variables<sup>(84)</sup>.

One of the aspects of great relevance in chronic patients is treatment adherence, which is discussed in one of the analyzed studies, where no improvement was shown after the application of an educational program, being necessary to assess age, treatment and pathology to improve this parameter <sup>(85)</sup>.

Programs that include exercise, pulmonary rehabilitation and health education in COPD are identified, with positive results in areas such as exercise tolerance, dyspnea and quality of life, and their benefits last longer than those generated by an educational program only <sup>(30,41,42)</sup>. They are not only beneficial for COPD, but also for other chronic diseases, as evidenced by a systematic review of 2015 which analyzes the application of therapeutic education programs in patients with different pathologies <sup>(86)</sup>.

As for the assessment of the methodological quality, it is of note that our results are superior to those of the review prepared by the team of the Pneumology Department of the Hospital 12 de Octubre in Madrid <sup>(87)</sup>, where the results obtained a 2,5 Jadad score <sup>(14)</sup>. Another review prepared in 2012 in the UK <sup>(88)</sup> coincides with our research in the sense that the methodological quality of the studies is changing and that the best results are found in the concealment technique.

## Limitations

In order to reduce the methodological limitations we used the Jadad scale <sup>(14)</sup> and the PRISMA checklist <sup>(89)</sup>, and 90% of the stipulated questions were completed in all studies.

## CONCLUSIONS

According to the data from 1987 to 2013, 22 studies examined the application of therapeutic education in COPD patients, mostly including more men than women, with an average age of around 66, 43 years.

The most studied variables were health-related quality of life, hospital admissions, ventilatory variables such as VEF<sub>1</sub>, dyspnea, tobacco consumption, pharmacological treatment and knowledge about COPD. Most studies showed that therapeutic education reduces hospital admissions, favors or modifies smoking cessation, improves knowledge and management of COPD, satisfaction with the service, anxiety levels and depression. It does not affect negatively any of the studies parameters.

Almost all the education sessions are conducted through group sessions, supported by leaflets. The contents that are most addressed in educational programs are description of the disease, signs, symptoms, triggers and management of an exacerbation, smoking cessation, regular exercise, nutritional habits and training of the inhalation technique.

As for the methodological quality, it should be noted that the concealment is poorly valued due to the nature of the intervention.

Coinciding with the statements of all the analyzed studies, further research in this area is needed, because the inability to generate conclusions that generate powerful evidence for the variety of instruments used for the evaluation and heterogeneity of educational interventions.

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