

## Educating patients suffering from re-acutisation of chronic bronchitis. A pilot support project within Intermediate Care

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### Abstract

**Background:** Chronic Obstructive Pulmonary Disease (COPD) represents one of the main causes of hospitalization, disability and mortality worldwide; it is predicted that by the year 2020 it will become the third leading cause of death and the fifth leading cause of disability in industrialized countries.

An educational programme has been proposed to allow the COPD patient to prevent or to deal with a re-acutisation.

**Methods:** The project involved 50 patients with a diagnosis of moderate or severe COPD. The education program included information relating to disease process, proper use of medication, energy conservation methods, and the filling in of the Saint George's Respiratory Questionnaire (SGRQ), the Zung Self-Rating Depression Scale (ZSDS) and the State Trait Anxiety Inventory (STAI). Sociodemographic factors, assessment of living arrangements, social and family conditions were also collected. One year later the same questionnaires and learning assessment tests were re-administered.

**Results:** The mean age of the participants was 69.7±10.4 years with a mean low income and a limited degree of education. Following the educational program, an improvement of quality of life emerged consequent to the awareness of all of the forms of support provided for the pathology and socio-economic conditions. The ability to manage their therapy and their activities of daily living have improved. The mean total score on SGRQ was 78.07±7.2 pre-program and 73.12±7.2 post-program; 52% of the patients are now within normal parameters compared to the initial 30% suffering from depression syndrome, furthermore the mean anxiety value decreased from 59.54 ± 8.6 to 54.54±7.8. The number of hospital admissions and the number of smokers were also halved.

**Conclusion:** The improvements obtained after conducting all of the educational sessions are significant. The high value of the mean total score on SGRQ suggests overall poor health among patients affected by moderate/ severe COPD and according to other studies this population is inclined to anxiety and depression. The role of the social worker was very important because the explanation of the appropriate laws has led to the recognition of their disability status and therefore access to established benefits. The decrease in hospitalization has brought about an economic benefit for the educational program but further studies should be carried out on more patients over longer periods of time.

*Key words: chronic obstructive pulmonary disease (COPD), patient education, quality of life*

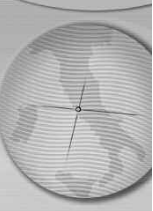
### Introduction

In Italy approximately thirty experimental models for intermediate care are currently in operation. These are all aimed at assisting the patient who, after being discharged from acute hospital care, cannot be directly reintegrated back into his original environment. That is, they are designed for patients for whom acute illness is followed by long periods of convalescence during which their physical condition no longer requires acute hospital care but they are not yet well enough to be declared fit for discharge. The aims of such

interventions are not exclusively medical. In fact, in order to improve patients' quality of life, social and healthcare interventions are needed to support the patients' full reintegration back into their original social or family environment [1,2].

All these experiments are aimed at patients who have undergone major orthopaedic surgery or who have suffered a stroke but excludes chronic bronchitis patients, even if their condition is severe.

Chronic obstructive pulmonary disease (COPD) is a multifactorial disease with inflammation at its core; patients experience a progressive



deterioration in their lung function, disease symptoms and quality of life, as well as an increase in exacerbations [3].

COPD represents one of the main causes of hospitalization, disability and mortality worldwide; it is predicted that it will become, by the year 2020, the third cause of death and the fifth cause of disability; it represents, therefore, a great social emergency and a huge economic burden for the healthcare system especially in industrialized countries [4-8].

Today, in Italy, approximately one fifth of severely disabled persons consist of patients suffering chronic bronchitis, furthermore, these patients will, in the immediate future, represent one third of the total number of individuals suffering from a severe handicap [9].

Numerically COPD involves a population of about 700,000 people and this is set to increase to more than a million within the next five or six years. COPD has distinctive characteristics in comparison to the other categories of disabled persons. It is a disease in which people are ill for a very long time, the disability degree increases with time regardless of therapeutic interventions, intellectual activity is jeopardized only in the more advanced stages and there are frequent exacerbations that generally bring about repeated hospital admissions [10].

The highest concentrations of cases are recorded among the populations residing in the following cities: Turin, Genoa, Milan, Bologna, Florence, Rome, Naples and Palermo [11]. This type of pathology involves a very high number of outpatient visits, more than 25,000 hospital admissions and at least 1,000 deaths every year [12]. Current existing hospital structures and support levels are not able to satisfy all the healthcare demands of acute chronic bronchitis patients, since no support phase is provided in them. These characteristics should have made chronic bronchitis an ideal disease for intermediate care experimentation, instead, of those intermediate care experiments currently being undertaken in Italy, none of them take into consideration this population.

Starting from these premises, we started a program of intermediate care for severe bronchitis patients based on the administration of a specially structured educational programme.

The objective of this pilot study was to examine the effect of a patient education program targeted at improving the patients quality of life, increasing their self assurance, controlling or avoiding breathing difficulties, while, engaging in daily activities, managing their medical therapies better, recognizing factors that cause their attacks/exacerbations and utilizing social support.

## Methods

### *The patient educational program*

The reference model from which this educational program drew its general principles from was originally established by the *Statement of the Royal College of Physicians* for the "intermediate care" of elderly patients [13], the only effective model that had dealt with a population having some characteristics similar to that of an acute chronic bronchitis population. This program was designed to reach three basic goals:

- To allow the COPD patient to prevent or quickly deal with a relapse;
- to facilitate his/her reintegration back into the family and social environment after hospitalization;
- to improve his/her quality of life.

The program was implemented by a group of professionals, hospital specialist physicians, social workers, nurses, physiotherapists and administrative staff, who played an active role in the care of these patients according to their own specific competences.

The physicians established the appropriate therapeutic protocol for each specific case; they cooperated with the general reference physician and they instructed the non-medical staff regarding the assigned specific tasks.

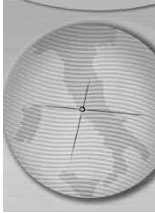
The coordination of group activities and periodic staff meetings, social activities and family counselling (functions of integration, secretariat and contact) were carried out by social workers.

The nurses dealt with the functional and laboratory measurements established by the protocol, the administration and collection of the questionnaires on quality of life, anxiety and depression according to the times and procedures established by the protocol, the examination of the patient's technical abilities and the verification of the correct implementation of the therapy.

The physiotherapists checked for the correct execution of controlled respiration techniques, the coughing techniques; they assessed the patients' Body Mass Index, nutritional status, muscle tone as well as the exercise techniques aimed at improving this.

Finally, the administrative staff took care of the planning for the educational sessions, appointments, data collection, the recording of inconsistencies and defaults as well as the creation of the Diagnosis Related Group.

Fifty patients (40 males, 10 females) who had been referred to the Rehabilitative Pneumology, Department of Pneumology, A. Cardarelli Hospital, Naples, with a diagnosis of moderate or severe COPD, stage II, III [14] were consecutively



enrolled; all gave their consent to participate in the study which took place during 2003-2004.

Sociodemographic factors, including age, gender, marital status, educational level, and the assessment of living arrangements, social and family conditions were carried out by filling in forms relating to each individual patient. In some cases the network of referential territorial services was consulted in order to obtain further information [15].

The education program that had been designed for this study was based solely on scientifically validated data, and it consisted of: information on the disease process, respiration, chronic bronchitis, smoking cessation and avoiding airway irritants, how to organize one's day, handling medical therapy, handling special supports (oxygen therapy, ventilation therapy), how to perform respiratory rehabilitation, handling a respiratory emergency and how to obtain social support (Table 1).

The program was prepared using the "web quest" technique, so that it could be used according to rather flexible procedures. Such a procedure allowed the immediate passage from one discussion topic to the other, following the patients' requirements, clarifying precisely the thread that bound one topic to the other, since it required proceeding within a conceptual map scheme [6]. The methodological approach consisted of meetings of small groups of three to five patients. The education program followed a flexible plan suitable for the group's demands. The

meetings took place over several sessions at intervals of one to two weeks and were accompanied by individual educational reinforcement which was given during the medical check-ups. Educational sessions lasted about fifty-sixty minutes, in order not to tire the patients and, for those on long-term oxygen therapy, to prevent the oxygen supply in the cylinders from running out.

Every group of patients participated in four educational sessions held every seven-fourteen days (Table 1).

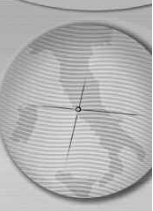
### Measures and statistical analysis

The education sessions were immediately preceded by laboratory measurements for health status in relation to COPD, and by the filling in of the Saint George's Respiratory Questionnaire (SGRQ), the Zung Self-Rating Depression Scale (ZSDS) and the State Trait Anxiety Inventory-Y Form (STAI-Y).

The SGRQ is a questionnaire made up of three components: *Symptoms*, a measurement of the frequency and severity of respiratory symptoms; *Activity*, which concentrates on physical activities that cause or are limited by breathlessness and *Impacts*, which quantifies the social and psychological effects of the disease on daily life. The SGRQ scores range from 0 to 100, with a zero score indicating no impairment in health status, while 100 represents maximum impairment [6,17,18,19,20]. Health status was assessed by the Italian version of the SGRQ, which has previously been validated [21].

Table 1. Content description of education sessions

Session	Scheduled Topics	Objectives
First	<ul style="list-style-type: none"> <li>• respiration</li> <li>• chronic bronchitis</li> <li>• smoking cessation</li> </ul>	To give the patient the basic facts in order to understand what chronic bronchitis really consists of, the role of cigarette smoking and exposure to non-specific irritants in the progression of the disease
Second	<ul style="list-style-type: none"> <li>• how to organize one's day</li> </ul>	a) To be aware of one's own limits b) How to avoid unnecessary physical exertion c) When and how to ask for help d) How to organize one's own time and space e) How to assume a rhythm of one's own f) What to avoid g) How to solve one's own problems related to daily activities
Third	<ul style="list-style-type: none"> <li>• handling medical therapy</li> <li>• handling special supports (oxygen therapy, ventilation therapy)</li> <li>• respiratory rehabilitation</li> <li>• handling an emergency</li> </ul>	a) To understand the meaning and importance of chronic and acute therapy b) To improve compliance with the therapy c) To improve the execution of technical gestures related to the administration of medication d) To improve – when prescribed – the practice of oxygen therapy and ventilation therapy
Fourth	<ul style="list-style-type: none"> <li>• social support</li> </ul>	a) To inform the patient about the most important rules that concern medium-acute COPD patients b) To introduce as simply as possible the procedures to be carried out in the various situations in which a social support is necessary



ZSDS is a 20-item self-report measure of depressive symptoms; the sum of items produces a raw score that is converted into a percentage of the depression measurable by the scale (SDS index). The index scores are then categorized into 4 levels to confer a global clinical impression as recommended by the instrument developers: I, within normal range, no significant psychopathology (SDS Index: <50); II, presence of minimal-to-mild depression (SDS Index: 50-59); III, presence of moderate-to-marked depression (SDS Index: 60-69); and IV, presence of severe-to-extreme depression (SDS Index:  $\geq 70$ ) [22].

The STAI-Y form for the assessment of anxiety related to the illness consists of 20 items: scores are derived from the 20 items which have been weighted from 1 to 4 (1= almost never, 2= hardly ever, 3 = sometimes, 4= most of the time). The total score then ranges from 20 to 80 [23,24].

In 2004, one year after receiving the educational program, the same questionnaires and learning assessment tests were re-administered to the patients.

The collected data were recorded in an Excel database and analysis was carried out using the Stata 8.2 software. The results regarding the pre-educational program in 2003 were compared with those obtained in the 2004 post educational program.

Parametric tests (t test and ANOVA) and non parametric tests (Mann-Whitney/Wilcoxon) were used in the univariate analysis. The t-test was used for the comparison of two groups for normally distributed variables, while ANOVA was used for comparisons for more than two groups for normally distributed variables. In order to compare two groups for of variables which were not normally distributed we used the Mann-Whitney/Wilcoxon test. A P-value of <0.05 was considered statistically significant. Multivariate linear regression was used to identify the role of some of the independent factors for anxiety, depression and SGRQ scores in 2004.

## Results

A total of 50 patients with a diagnosis of moderate or severe COPD took part in the education program (40 males and 10 females), with a mean age of 69.7 years, sd =10.4 years. The most common level of education was that of elementary school diploma (40%) followed by middle school diploma (30%) and high school diploma (12%); 14% did not have any diploma and 4% had a university degree. More than half of the patients (52%) were married and 18 subjects (36%) lived alone. Manual occupations were most

frequent among males (70%) and housekeeping among females (80%). Fifty percent of responders declared that they had a low income.

With regards to the degree of knowledge on the subject-matters relating to the educational sessions, in the first session of 2003 the whole sample was correctly informed about respiration and its mechanisms, 54.9% knew of the methods for smoking cessation and this percentage improved after the educational program in 2004 (72%). Before the educational project (2003), 22 of the 40 male patients and 4 of the 10 females were smokers. They were invited to participate in courses organized by the anti-smoking center of the A.O.R.N.A. Cardarelli in Naples, following which 55% of the males and 50% of females quit smoking.

In the second meeting participants received information on how to organize one's day and solve daily problems: substantial learning differences were revealed between 2003 and 2004, with a much higher percentage of individuals reporting to have acquired the necessary skills in 2004 (Figure 1).

The objective of the third educational session was targeted at their ability to handle their medical therapy. At the end of the meetings 66% of the patients demonstrated an improvement in the ability to perform the technical skills related to their medication and 68% in the ability to handle special supports (oxygen therapy, ventilation therapy, etc) compared to 42% and 25% respectively in 2003.

With regards to social support, the focus of the fourth session, 6 patients benefited from mobility allowance in 2003, no one benefited from integrated assistance (helpline, pony project, voucher), 20 patients were identified as disabled but nobody was identified as having a handicap, finally 96% benefited from prescription charge exemption; these changes occurred after receiving the educational sessions (Figure 2). Regarding in-home facilities, in 2003, 20% had an elevator and 38% had a heating system; these percentages further increased in 2004 to 40% and 74% respectively.

The improvement in quality of life scores was correlated with the availability of integrated assistance (test ANOVA  $p=0.05$ ), while the significance for an association with the presence of a heating system was borderline (test ANOVA  $p=0.06$ ) and not significant with the presence of an elevator (test ANOVA  $p=0.16$ ). Men had a greater increase (+2.4 points) in quality of life score compared to women between 2003 and 2004, but the difference was not statistically significant (t test  $p=0.15$ ).

In terms of information, the correct information that the patients had concerned only the supply

Figure 1. Results of II educational session

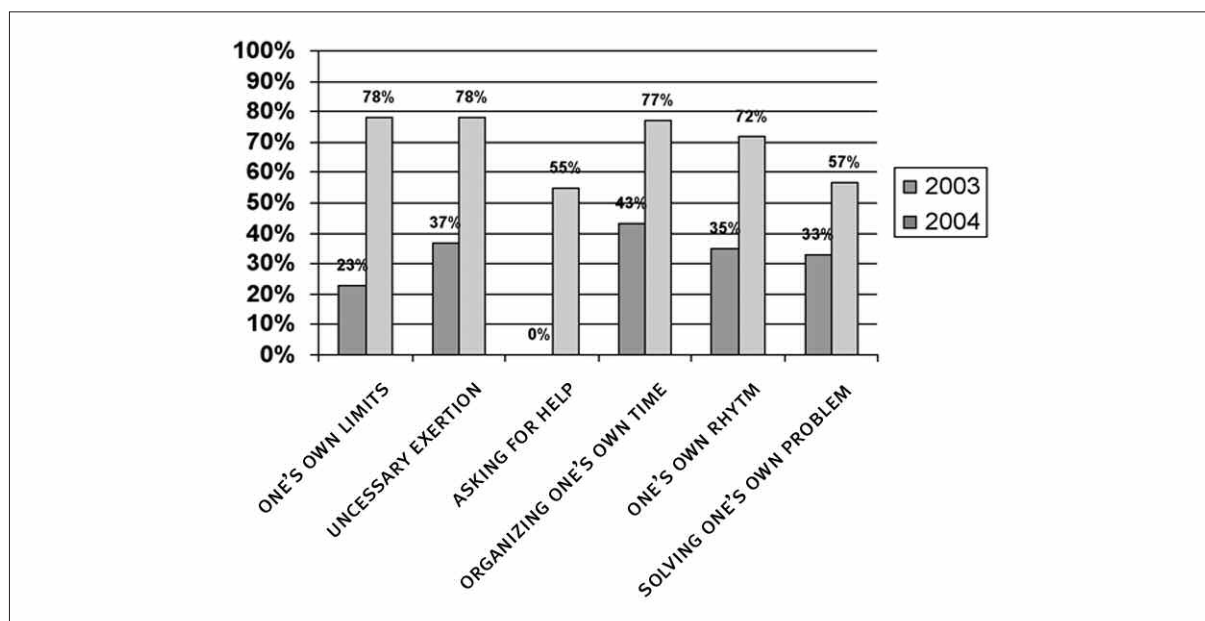
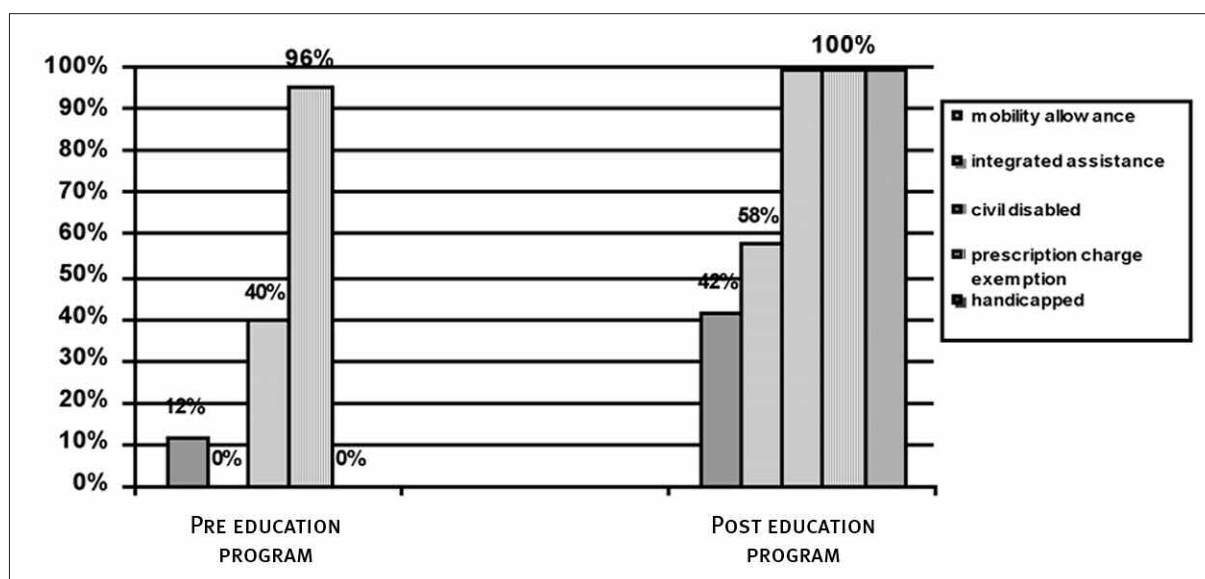


Figure 2. Forms of assistance pre e post educational program

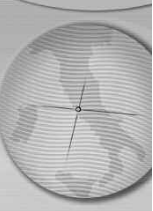


of oxygen and/or ventilators. In fact, in this case the administrative procedures are handled directly by the various suppliers who reduce these procedures as much as possible.

All the patients had at least one personal interview with the Social Worker. Twenty patients, who still had not applied for handicap recognition, after receiving a detailed explanation, were given a form which summarized the necessary information in order to apply for it. In six cases, due to the obvious difficulties that the patient and caregiver were having in handling the situation, contact was made directly by the referring Healthcare Facility with the social worker. They also established if there were other co-morbid conditions that might

be considered, even if they were not strictly medically-legal, as established in Art. 4 of the law of February 5, 1992, N. 104 and, in the cases where these were identified, they were reported to the District Social Worker who dealt with competence. During the personal interview the Social Worker had the chance to verify that 16 of the 50 patients were included among those entitled to personal welfare projects organized by the Municipality in accordance with law N. 328 of November 8. In connection with the territorial network of services, various forms of assistance were implemented:

1. **housing**, for restructuring and maintenance of the residence. In fact, the presence of water infiltration and bad ventilation made the



- residences unsuitable for their particular health status;
- 2. economic**, aimed at integrating income with social and healthcare vouchers. In this way a series of essential facilities were guaranteed, such as supplying meals, laundry service and house cleaning;
  - 3. domiciliary**, aimed at personal assistance and domestic assistance in order to encourage the patient to remain in his usual home environment;
  - 4. social life**, including educational, cultural, and recreational activities, in order to promote social integration.

From the hospital admission data the percentage of patients hospitalized in 2003 was 60%, this was reduced to 30% after the educational intervention, furthermore, in 2004, rehospitalization decreased from 27% to 7%.

Before the educational program 32.5% patients had symptoms of depression; after one year this value decreased to 28%. The percentages for the four levels, as measured by the ZSDS, are shown in Figure 3.

Anxiety was significantly more common in women (80%) than in men (32.5%) (Mann-Whitney/Wilcoxon 33.82;  $p=0.0133$ ). Both anxiety and depression were more common in current smokers compared with non-smokers ( $p<0.01$ , Mann-Whitney Wilcoxon test), while no significant relationship was found between age, education, living conditions and lung function. A higher number of COPD patients, suffering from anxiety syndrome whose conditions fell within

the normal range (STAY-Y), in fact the mean value changed from  $59.54\pm 8.6$  (pre educational program), to  $54.54\pm 7.8$ , (post educational program). Figure 4 shows the distribution of anxiety score in 2003 and in 2004, highlighting that the complete distribution shifted downwards in the second year.

The health quality of life relationship assessed by the SGRQ points out that in 2004 the educational sessions brought about an improvement in the patients' living conditions (Figure 5); the median total score on the SGRQ was 76 (range 65-92) in 2003 and 73 (range 60-85) in 2004. The increase was particularly large among males (Mann-Whitney/Wilcoxon 32.02;  $p=0.0375$ ).

Table 2 shows the results of the multiple linear regression analysis. It shows, for each independent variable, the coefficients (with 95% C.I.) derived from the analysis. The three models explained a large proportion of the variability in anxiety, depression and quality of life scores in 2004, as shown by the values of  $R^2$ . Once adjusting for the covariates reported in the table, all of the variables reflecting social support (integrated assistance, mobility allowance, the formal recognition of disability and handicap, prescription charge exemption) were not significantly associated with either of the scores, so they are not included in the final model.

Young age, high educational level and a lower anxiety score in 2003 were associated with a lower anxiety score in 2004, although 95% C.I. for

Figure 3. Depression syndrome

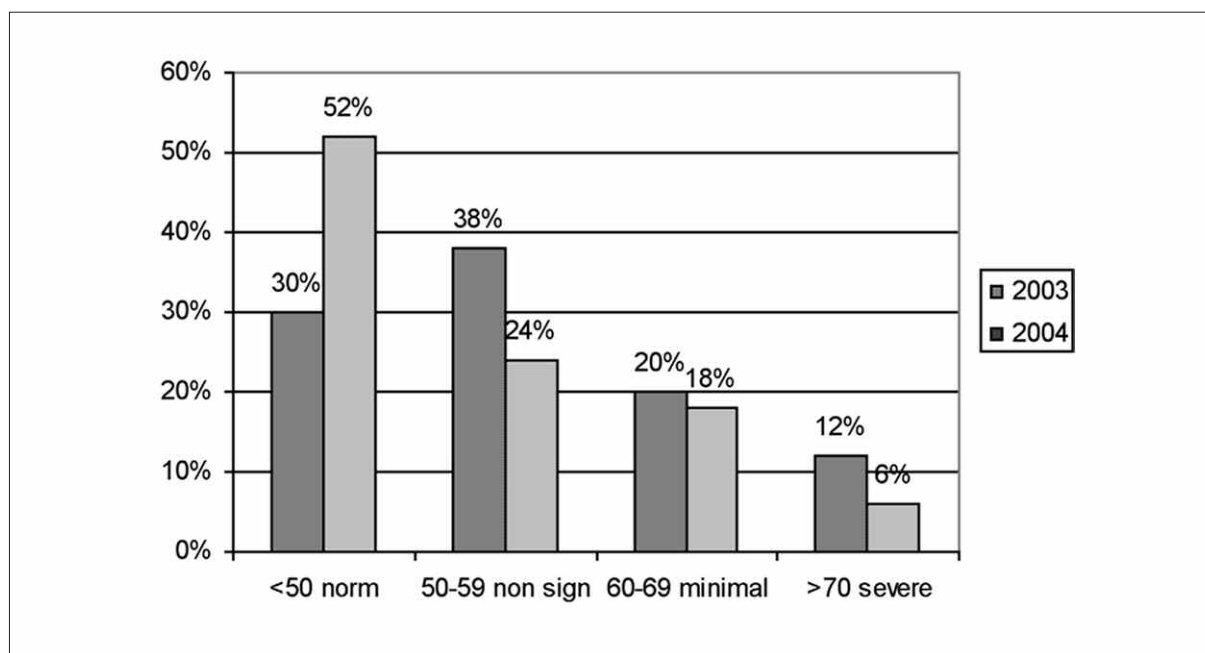


Figure 4. Anxiety score in 2003 and 2004

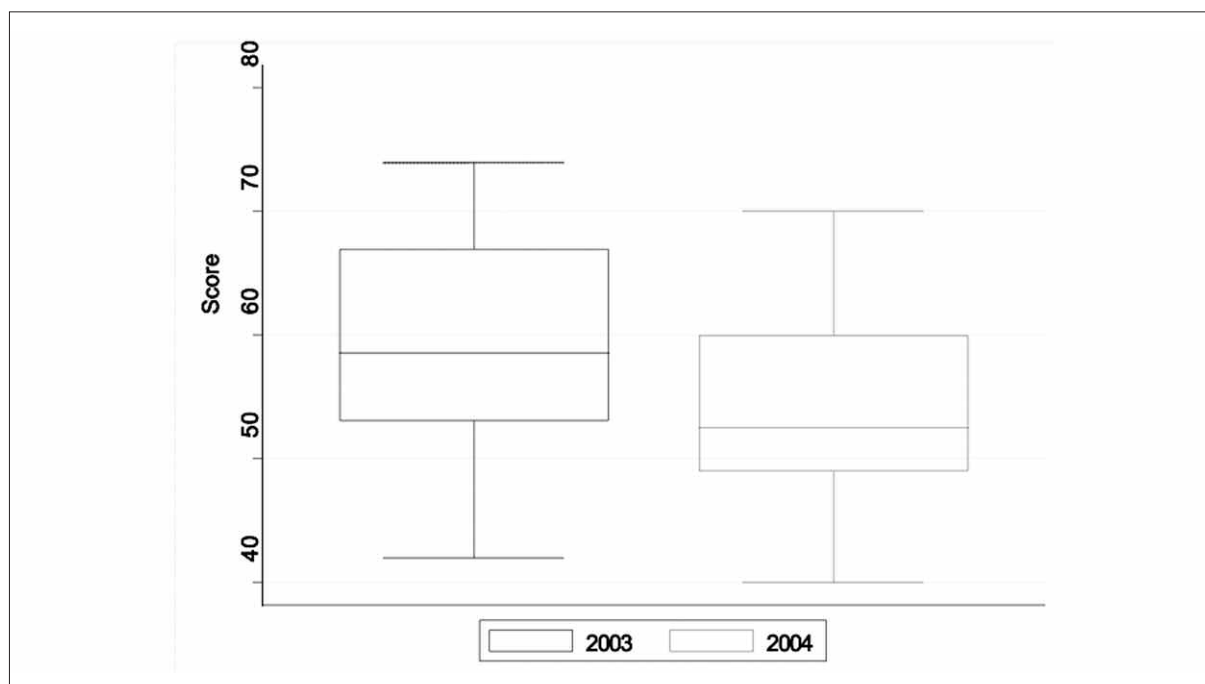
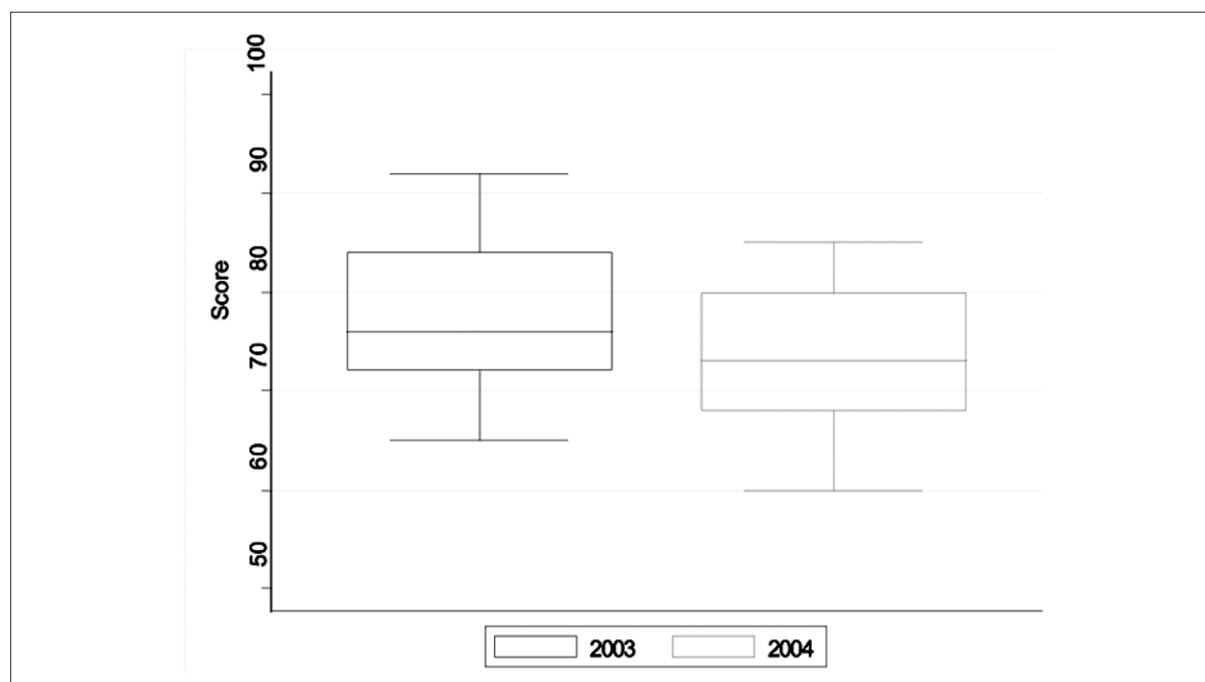


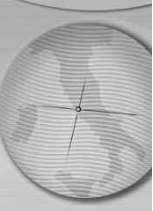
Figure 5. Quality of life score in 2003 and 2004



the coefficients were not significantly different from zero in some cases. Factors significantly associated with depression in 2004 were a higher score in 2003 and being hospitalized in the same year. A low educational level and living alone were borderline significant. The most important predictors of a low quality of life score in 2004 were a low quality of life in 2003, living alone and being hospitalised (borderline significant).

#### Discussion and conclusions

It is extremely difficult to measure the types of clinical outcomes, in fact, COPD patients have irreversible anatomic-pathological alterations and therefore are not subject to functional improvements. For a correct measure of survival indicators, long-term studies of at least five years are necessary, on more numerically significant samples; moreover, since this typology of patient

**Table 2. Results of the multivariate regression analysis on the association of the independent variables on anxiety, depression and quality of life total scores in 2004\***

	Anxiety score (R <sup>2</sup> =0.89)		Depression score (R <sup>2</sup> =0.88)		Quality of life score (R <sup>2</sup> =0.78)	
	Coef.	C.I. 95%	Coef.	C.I. 95%	Coef.	C.I. 95%
<b>Age (years)</b>						
40-59	-3.12	(-7.73; 1.49)	2.19	(-3.56; 7.95)	-3.17	(-8.17; 1.82)
60-69	-0.52	(-4.33; 3.28)	2.22	(-2.39; 6.84)	-2.02	(-6.42; 2.37)
70-79	-0.15	(-3.33; 3.04)	1.85	(-2.24; 5.95)	0.94	(-3.57; 5.47)
> 80 **	-		-		-	
<b>Sex</b>						
Female	1.06	(-1.64; 3.76)	-1.47	(-4.53; 1.60)	-2.14	(-5.3; 1.03)
Male**	-		-		-	
<b>Living alone</b>						
Yes	-0.23	(-2.08; 1.62)	1.6	(-0.73; 4.01)	2.75	(0.15; 5.35)
No**	-		-		-	
<b>Educational level</b>						
High (>13 years of instruction)	-1.11	(-2.81; 0.59)	-1.47	(-3.64; 0.70)	0.97	(-1.42; 3.36)
Low (≤13 years of instruction)**-	-		-		-	
<b>Hospital admissions in 2004</b>						
At least one	0.85	(-1.04; 2.74)	3.11	(0.70; 5.53)	1.96	(-0.89; 4.81)
None**	-		-		-	
<b>Score in 2003***</b>	0.89	(0.74; 1.05)	0.95	(0.78; 1.12)	0.68	(0.49; 0.86)

\* A higher score means a higher level of anxiety, depression and quality of life (see methods)

\*\* Reference group

\*\*\* It refers to 2003 anxiety, depression and quality of life scores for the dependent variables anxiety, depression and quality of life scores in 2004, respectively

always has acute comorbidities such as cardiopathy, arteriopathy, etc., which are important confounding factors in a survival study, the evaluation of these outcomes has been excluded. In our study, therefore, the preferential indicators were those used by healthcare and quality of life structures.

The improvements obtained following the educational session devoted to the organization of daily activities were significant (Figure 1) because bronchitis patients learnt the importance of analyzing their own habits accurately in order to eliminate or carry out in the most appropriate way the activities that involved high energy expenditure, even if they weren't essential; for example, doing certain jobs sitting down and not standing up involved an energy saving of up to 25%. Even *learning how to manage therapy* represented a fundamental part of the educational program for chronic patients: in fact, it is known that in COPD the wrong use of medication represents, after the failure to comply with the doctor's prescriptions [25], the main cause of therapy failure [26].

In COPD patients, especially those who are severely affected, the percentages of serious errors that jeopardize the therapeutic effectiveness of the product are very high, often as a consequence of old age: 40% for metered-dose sprays, 7-19% regarding the type of inhaler used for dry powder

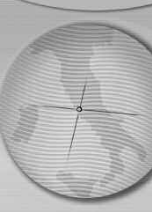
inhalatuibs [27,28]. COPD is associated with intermittent exacerbations representing the main cause for hospitalisation in these patients [5]. The exacerbations require an increase in the dose and/or frequency of bronchodilators and/or additional medication; mild exacerbations can be managed by the patients themselves, while severe exacerbations can only be managed with the aid of a physician [29].

It is clear that the physician's job is fundamental, he has to prescribe medication in the most suitable pharmaceutical forms for that particular patient; but it is important for the patient to receive adequate education regarding the correct dosage and application of the therapeutic protocol [3]. There are in fact some indications of a relationship between the use of medication and the rate of hospitalisation [8].

Also, the improvements obtained following the social support educational session are important; it is essential to emphasize the role of the social worker because with the elucidation of the laws N. 104 of 5 February 1992 and the following N. 162 of 21 May 1998 and 328 of 8 November 2000 it has been possible to have the status of disability recognized and therefore have access to established benefits.

The achievement of many of the indicated objectives involved an improvement in quality of life assessable by positive repercussions on





depression (Figure 3) and anxiety. A study of patients with obstructive lung diseases receiving emergency care found that those with anxiety and depression were at much higher risk of hospitalisation or relapse 1 month later. The prevalence of poor health status, anxiety and depression, more common in women than in men, is in keeping with the results of other studies [5].

Progressive improvement in treatment, in particular the availability of long-term oxygen therapy, has increased the life-expectancy of COPD patients, extending the interval between onset of disability and death. In our study, SGRQ scores were high, thus confirming the effect of the disease on quality of life according to other studies [20].

This is a new finding that highlights the importance of health status in chronic lung disease. In addition, health-related quality of life has shown to be a valuable tool in the evaluation of the therapeutic effect of drugs and their interactions [6].

Having pursued social objectives has certainly given the patient a positive attitude toward the intervention itself by helping to break the vicious circle of *anxiety - depression - physical inactivity - muscle wasting - dyspnoea* which represents the most dangerous factor of disease progression as well as being statistically correlated to the number of hospitalizations and their duration [30].

With regards to smoking cessation, although it represents the only scientifically established valid intervention that can stop the evolution of chronic bronchitis [30,31] and the highest priority for COPD patients [33,8], long term cessation should be assessed in order to determine if smoking cessation has been definitive and therefore capable of bringing clinical improvements. Furthermore, smoking cessation may also help to reduce the risk of co-morbidity in patients with COPD [34].

Although the studies that have been undertaken indicate that patient education alone does not improve exercise performance or lung function, it can play a role in improving skills and the ability to cope with illness and health status, which may be important in COPD where even pharmacologic interventions generally confer only a small benefit in terms of lung function [14,35].

The annual cost of COPD to the healthcare system was estimated at €1261.25 per patient. The highest per patient cost of any individual healthcare resource was for inpatient hospitalization (€963.10) which accounted for three-quarters of the total direct costs of COPD [34].

So the decrease in hospitalisation, which was recorded just one year after this study, has brought about an economic benefit for the educational

program and this result alone would suffice to completely justify the continuation and the expansion of the research.

Patients participating in this pilot study benefited from the educational program; the results suggest that it may improve their knowledge of issues relating to their condition and that the interventions provided individuals with skills to better manage their limitations. There was a decrease in all of the measures for depression, anxiety and quality of life but several factors may limit this preliminary survey.

Firstly, the sample may not have been representative since it was small and not randomized.

Secondly, we undertook follow up with the participants only 1 year after the education program and we cannot correctly determine the temporal stability of the changes or how much the skill-sets will be used in future contexts. A one-year interval was a short follow-up period to estimate the effectiveness of social support. This might have resulted in an underestimation of the strength of the effect of the interventions. However, it is important to note that implementation of interventions to provide social support should be as considered routine care.

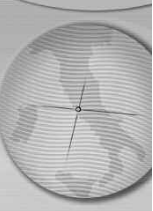
Another limitation to our evaluation was the absence of a comparison group of similar patients who did not attend the education sessions, since this stopped us from determining how much of the increase in perceived competence was due exclusively to our education program.

Even if our educational sessions were to be made available on the internet, it is possible that in order to be effective, they would require follow-up calls, and the creation of training materials. In conclusion our education program has been well-received by the COPD patients, since they had a satisfying learning experience and were able to learn something useful about improving their health. The sessions were simple to deliver and if more rigorous evaluation reflected these outcomes, it may provide an effective and not expensive support within intermediate care.

Given the design limitations, the study results cannot be generalized to other COPD patients and should be considered with care. Further study is strongly recommended to investigate the applicability of this education program on larger samples and for longer periods to obtain more effective and reliable outcomes.

## References

- 1) Gatteschi D. Servizi socio sanitari e difesa degli anziani. NIS, Roma, 1994.
- 2) Maggiani R. I servizi socio-assistenziali. NIS, Roma, 1995.
- 3) Hanania NA, Ambrosino N, Calverley P, Cazzola M, Donner CF,



- Make B. Treatments for COPD. *Respir Med* 2006; 99: 528-540.
- 4) Garcia-Aymerich J, Farrero E, Félez MA, Izquierdo J, Marrades RM, Antò JM, on behalf of the EFRAM investigators. Risk factors of readmission to hospital for a COPD exacerbation: a prospective study. *Thorax* 2003; 58: 100-105.
- 5) Gudmundsson G, Gislason T, Janson C, Lindberg E, Ulrik CS, Brøndum E, Nieminen MM, Aine T, Hallin R, Bakke P. Depression, anxiety and health status after hospitalisation for COPD: A multicentre study in the Nordic countries. *Respir Med* 2006; 100: 87-93.
- 6) Miravittles M, Ferrer M, Pont A, Viejo JL, Masa JE, Gabriel R, Jimenez-Ruiz CA, Villasante C, Fernandez-Fau L, Sobradillo V. Characteristics of a population of COPD patients identified from a population-based study. Focus on previous diagnosis and never smokers. *Respir Med* 2005; 99: 985-995.
- 7) Rutschmann OT, Janssens JP, Vermeulen B, Sarasin FP. Knowledge of guidelines for the management of COPD: a survey of primary care physicians. *Respir Med* 2004; 98: 932-937.
- 8) Wouters EFM. Economic analysis of the Confronting COPD survey: an overview of results. *Respir Med* 2003; (Suppl C): S3-S14.
- 9) Feenstra TL, Genugten LL, Hoogenveen RT, Wouters EF, Rutten-van Mölken MPMH. The impact of aging and smoking on the future burden of chronic obstructive pulmonary disease. A model analysis in the Netherlands. *Am J Respir Crit Care Med* 2001; 164: 590-596.
- 10) Murray CJL, Lopez AD. Alternative projections of mortality and disability by cause 1990 - 2020: global burden of disease study. *Lancet* 1997; 349: 1498 - 504.
- 11) Viegi G, Scognamiglio A, Baldacci S, Pistelli F, Carrozzi L. Epidemiology of chronic obstructive pulmonary disease (COPD). *Respiration* 2001; 68: 4 - 19.
- 12) Riccioni G, De Benedictis M, Della Vecchia R, Di Ilio C, Guadagno MT, D'Orazio N. Prevalence and severity of airway obstruction in an Italian adult population. *Monaldi Arch Chest Dis* 2005; 63: 88-92.
- 13) Statement from The Royal College of Physicians of London and British Geriatrics Society. Online publications, London, 2001.
- 14) Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease, updated 2003 available at: [www.goldcopd.com](http://www.goldcopd.com).
- 15) Marshall M. Il lavoro sociale con l'anziano. Erickson, Trento, 1997.
- 16) Croft DR, Peterson MW. An evaluation of the quality and contents of asthma education on the world wide web. *Chest* 2002; 121: 1301-1307.
- 17) Incalzi RA, Bellia V, Maggi S, Imperiale C, Capparella O, Pistelli R, Grassi V. Reversible bronchial obstruction and disease-related health status in COPD. *Qual Life Res* 2002; 11: 517-525.
- 18) Jones PW. Health status measurement in chronic obstructive pulmonary disease. *Thorax* 2001; 56: 880-887.
- 19) Jones PW, Quirk FH, Baveystock CM, Littlejohns P. A self-complete measure of health status for chronic airflow limitation. The St George's Respiratory Questionnaire. *Am Rev Resp Dis* 1992; 145: 1321-1327.
- 20) Peruzza S, Sergi G, Vianello A, Pisent C, Tiozzo F, Manzan A et al. Chronic obstructive pulmonary disease (COPD) in elderly subjects: impact on functional status and quality of life. *Respir Med* 97: 612-617.
- 21) Carone M, Bertolotti G, Anchisi F, Zotti AM, Jones PW, Donner CF. Il Saint George's Respiratory Questionnaire (SGRQ): la versione italiana. *Rass Mal App Resp* 1999; 14: 31-37.
- 22) Passik SD, Lunderberg JC, Rosenfield B et al. Factor analysis of the Zung self-rating depression scale in a large ambulatory oncology sample 2000; 41: 121-127.
- 23) Kennedy BL, Schwab MD, Morris RL, Beldia MD. Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *Psychiatric Quarterly* 2001; 72: 263-276.
- 24) Spielberger CD, Gorsuch RL, Lushene RD. Manual of State-Trait Anxiety Inventory. Palo Alto, California: Consulting Psychologist Press, 1970.
- 25) Viejo JL, Martin Escribano P, Romero S, Rodriguez Suarez JR, Sobradillo V, Valencia A. Compliance with inhalation treatment of patients with chronic obstructive pulmonary disease. *Arch Broncopneumol* 2000; 36: 319-25.
- 26) Van Beerendonk I, Mesters I, Mudde AN, Tan TD. Assessment of the inhalation technique in outpatients with asthma or chronic obstructive pulmonary disease using a metered-dose inhaler or dry powder device. *J Asthma* 1998; 35: 273-9.
- 27) Allen SC. Spirometry in old age. *Age Ageing* 2003; 32: 4-5.
- 28) Broeders MF, Molema J, Hop WC, Folgering HT. Inhalation profiles in asthmatic and COPD patients: reproducibility and effects of instruction. *J Aerosol Med* 2003; 16: 131-141.
- 29) Worth H, Dhein. Does patient education modify behaviour in the management of COPD? *Patient Education and Counseling* 2004; 52: 267-270.
- 30) Debigarè R, Cotè CH, Maltais F. Peripheral muscle wasting in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2001; 164: 1712-1717.
- 31) Anthonisen NR, Connett JE, Murray RP for Lung Health Study Research Group. Smoking and lung function of Lung Health Study participants after 11 years. *Am J Respir Crit Care Med* 2002; 166: 675-9.
- 32) Kerstjens HA, Rijcken B, Schouten JP et al. Decline of FEV1 by age and smoking status: facts, figures, and fallacies. *Thorax* 1997; 52: 820-7.
- 33) Rennard SI. Treatment of stable chronic obstructive pulmonary disease. *Lancet* 2004; 364: 791-802.
- 34) Dal Negro R, Rossi A, Cerveri I. The burden of COPD in Italy: results from the Confronting COPD survey. *Respir Med* 2003; (Suppl C): S43-S50.
- 35) Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease, updated 2005 available at: [www.goldcopd.com](http://www.goldcopd.com).