Efficacy of a Pulmonary Rehabilitation Program on Knowledge and Self-Efficacy for Elderly Chronic Obstructive Pulmonary Disease patients

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Acknowledgment

In sending forth this study now brought to a close, I wish, here, to offer a cordial expression of thanks to the countless people who have supported and encouraged me these past two years. There are a few people, whose help has been ungrudging and of great value, that I would like to acknowledge on record.

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Abstract

Knowledge and self-efficacy are important to patient self-management. The interaction between knowledge and self-efficacy are still not clearly understood. The purpose of this study was to determine if a self-management program could increase knowledge and self-efficacy. A secondary objective was to examine the relationship between knowledge of COPD and self-efficacy improvement. In this prospective study, 191 elderly COPD outpatients were randomized into a usual care group or a self-management program group. Knowledge and self-efficacy were assessed at study entry, 4 months and 12 months using the Pulmonary Rehabilitation Health Knowledge Test and the COPD Self-Efficacy Scale respectively. Knowledge scores improved significantly more in the self-management group than in the usual care group. ($p<0.05$). No significant differences between the comparison groups were observed in self-efficacy scores ($p>0.05$). Logistic regression analyses showed that knowledge change was not related to self-efficacy improvement. Our study shows that the outpatient-based program improved knowledge, but not self-efficacy in COPD patients.

Résumé

Les connaissances et l'auto-efficacité sont importantes pour l'autogestion des patients. L'interaction entre les connaissances et l'auto-efficacité chez les patients atteints d'une MPOC n'a pas encore fait le sujet d'une évaluation. L'objectif principal de cette étude était de déterminer si un programme d'autogestion spécifique à la MPOC pouvait améliorer les connaissances et l'auto-efficacité. Un second objectif était d'examiner la relation entre les connaissances sur la MPOC et l'amélioration de l'auto-efficacité. Dans cette étude prospective, 191 patients atteints d'une MPOC ont été randomisés dans 2 groupes : soins réguliers ou programme d'autogestion. Un test pour évaluer les connaissances des patients sur leur maladie (Pulmonary Education Health Knowledge Test) et un test d'auto-efficacité (COPD Self-efficacy Scale) ont été administrés à l'entrée dans l'étude, à 4 et à 12 mois. Les connaissances des patients du groupe autogestion se sont améliorées de façon statistiquement significative ($p<0.05$) comparées à celles du groupe soins réguliers. Aucune amélioration d'auto-efficacité n'a pu été démontrée entre les 2 groupes de l'étude ($p>0.05$). Les analyses de régression logistiques ont démontré que le changement des connaissances ne permettait pas de prédire l'amélioration d'auto-efficacité. Les résultats de cette étude ont démontré qu'un programme d'autogestion permet d'améliorer les connaissances, sans qu'il soit de même pour l'auto-efficacité chez les patients atteints de MPOC.

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a near irreversible disease of the lungs, characterized by airflow limitation. It is an umbrella term that refers to a mixture of chronic lung disorders, which include chronic bronchitis and emphysema. The prevalence of COPD is highest in cigarette smoking populations. Exposures to chemical fumes, organic dusts and air pollution can contribute to the development of COPD, however, COPD is mainly caused by damage to the lungs from smoking cigarettes over many years. COPD is the fourth most common cause of death in North America today and is the only leading cause of death that is rising in prevalence (1, 2). According to projections, COPD will be the 5th leading cause of Disability Adjusted Life Years lost worldwide in 2020, which is a big jump from the ranking of 12th it received in 1990 (3). Available prevalence and morbidity data on COPD probably greatly underestimate the total burden of the disease because it is usually not recognized and diagnosed until it is clinically apparent and moderately advanced. COPD not only affects the lives of individuals and their families, but also has an astounding impact on health services and costs (4).

The purpose of COPD management is to prevent disease progression, to relieve symptoms and to help the patients cope with their disease in order to optimize quality of life. COPD management must contend with the symptoms of acute exacerbation, as well as the chronic symptoms. Patients often develop a lack of confidence regarding their ability to avoid dyspnea while engaging in

certain activities, however minimal the physical demand. As a result, some patients with COPD may refrain from participating in activities of daily living, even though they are physically capable of performing them (5,6,7).

Progression of COPD and the severity of symptoms can be controlled through appropriate activity and exercise training programs (8), medication, prevention of infection and smoking cessation. Interventions should be aimed at reducing risk factors, changing patients' response to the symptom of dyspnea, managing exacerbations and improving health status. Treatment, pharmacological and non-pharmacological, also depends on the patient's educational level and willingness to apply the recommended management.

Although patient education alone may improve patients' knowledge of disease, it does not seem to lead to improved health status in COPD patients (9). However, it can play a role in improving skills and offer patients an opportunity to increase their confidence in their own ability either to manage or to avoid breathing difficulty while engaging in routine activities (10). Another important component of education is to encourage individuals to perform activities of daily living by increasing their self-efficacy.

Self-efficacy refers to a person's belief that they can successfully execute particular behaviours in order to produce certain outcomes. It is an important determinant of people's action and the degree of anxiety they will have about

performing the action. As well, self-efficacy influences the effort and the perseverance patients will exert to successfully complete this action. It is due to this perceived self-efficacy that people with similar knowledge and skill can behave differently. Our beliefs about our capabilities are a better predictor of what we do and how we behave than our actual capabilities of accomplishing a task. Competent functioning, however, requires accuracy of perception and a combination between self-efficacy beliefs and knowledge (5).

Few health behaviour studies have specifically examined the relationship between knowledge and self-efficacy. The present study is a multi-centre randomized clinical trial on a comprehensive program of education, including disease specific self-management in COPD. It is the first study to examine the impact of self-management on knowledge and self-efficacy in COPD. The objectives of this study were to examine: 1) the effectiveness of a self-management program on increasing health knowledge and self-efficacy amongst patients with COPD; 2) the relationship between COPD specific health knowledge and self-efficacy in 191 COPD outpatients. This proposed study is expected to provide data and analysis enabling supported conclusions regarding the clinical efficacy of COPD education and self-management programs. This in turn will help care providers in shaping and refining self-management programs for COPD.

2. Management of COPD

COPD management involves managing patients through periods of stable conditions as well as exacerbation, in order to reduce symptoms and improve health (10). Another purpose of COPD management is to help patients cope with their respiratory symptoms in order to achieve an optimal quality of life. COPD management is a multifaceted approach that encompasses medical management, pulmonary rehabilitation and health education.

Management of COPD must contend with the symptoms of acute exacerbations, as well as the chronic symptoms. Acute exacerbations of COPD are commonly characterized by increases in dyspnea, cough, and sputum production. Patients with COPD may have on average two to four episodes of acute exacerbations per year (41). However, they become more frequent as condition worsens.

2.1. Pharmacological Management

Pharmacological therapy is used to prevent and control symptoms, reduce the frequency and severity of exacerbations, improve exercise tolerance and health status. Depending on the severity of the disease, treatments primarily include bronchodilators, which open up air passages in the lungs, and inhaled corticosteroids, although their roles are still controversial (42, 43). Improvements

of long-term decline in lung function, typical of COPD, have not yet been shown with any of the existing COPD medications (12-15). However, this should not prevent the use medications in order to decrease patients morbidity and mortality. Since multiple drugs are usually prescribed to COPD patients, a stepwise and systematic approach consistent with the treatment of COPD is recommended for the addition and deletion of specific medications. Medication may have to be adjusted when the patient is presented with an exacerbation. Sometimes they may require the use of antibiotics and systemic corticosteriods.

2.2. Non-Pharmacological Management: Pulmonary Rehabilitation, Education and Self-management.

2.2.1. Pulmonary Rehabilitation

Pulmonary rehabilitation is a preventive health-care program usually provided by a team of health professionals to help patients cope physically, psychologically, and socially with COPD. There have been reviews that have discussed the merits and benefits of pulmonary rehabilitation with respect to exercise tolerance, dyspnea and fatigue (16,17). A comprehensive pulmonary rehabilitation program includes exercise training, self-management and education.

2.2.2. Education and Self-Management

Self-management is fundamental to a successful rehabilitative effort. Individuals are responsible for the control of the disease and disease progression. Self-management involves the patient making therapeutic, behavioural and environmental adjustments in accordance with advice that has been given to them by their health professional advisers. It involves the giving of information and the acquisition of certain skills by the patient, followed by an alteration in their behaviour. Following a medication schedule becomes increasingly difficult with the addition of each new medication, and non-compliance rises. Clinical benefit is possible only if patients take their medications properly. Dolce et al studied medication adherence patterns in a sample of COPD population with a medication regiment of 2 or more regular doses of inhaled bronchodilators. They found that 54% of those patients underused their medications and 50% overused their medication during periods of increased symptoms (18). Patients must also learn to monitor themselves for sign and symptom changes that will signal when to continue their regular medication treatment or when to adjust or add medications.

Education is an important component of pulmonary rehabilitation programs (19,20). Through education, patients can develop living patterns that incorporate self-management into their daily lives. It provides information and teaches patients about their lungs, disease, medications, limitations, and

necessary interventions. In patients with chronic lung disease, the goal of education should be to improve the patient's ability to cope with their condition and increase their sense of responsibility for their own care. It is less clear whether education alone can lead to improved health status in such patients. In a controlled study of the effect of an education program on health status of COPD patients, Howland et al found that education programs, when administered alone, may improve patients' knowledge of disease, but may not produce a significant change in health status (9). Attempts to educate respiratory patients focusing only on providing them with information about the disease and its treatment may improve their knowledge but may not change their behaviour. The real challenge is to achieve patient self-management and problem solving skills through education.

3. Knowledge and Self-Efficacy in managing Chronic Obstructive Pulmonary Disease

3.1. Knowledge

3.1.1. Definition of Knowledge

Knowledge is the fact of knowing something with familiarity gained through experience or association. When someone has full knowing, they understand in a complete way. This can be through learning or experience. Critical knowledge of COPD builds understanding and acceptance of the disease, and thereby

alleviates fear and may alter behaviour patterns. Sometimes a person can act negatively simply because they lack information regarding a certain aspect of their illness and its treatment. Once those areas are identified, the information can be easily provided. However, there has been very little research done to describe the role of knowledge on self-efficacy and on the behaviour changes in COPD patients.

3.1.2. Knowledge and Behaviour

Individuals use self-referent thoughts to mediate between knowledge and behaviour. According to Bandura, this self-reflective capability permits individuals to reflect on and evaluate their own experiences and thought processes. This allows for self-evaluation and may lead to an alteration in their thinking and subsequently their behaviour. However, Bandura argued that knowledge and skill are poor predictors of performance (21).

Although current literature on knowledge and self-efficacy in COPD is very limited, they suggest that an increased knowledge of the disease from a rehabilitation program can have a positive effect on self-management of the patients and thereby also improve patients' self-efficacy (22).

In a review looking at the effects of limited asthma education (i.e. information only) on health outcomes in adults with asthma, Gibson et al found

that these education programs did not reduce hospitalizations, doctor visits or medication use in asthma but may play a role in improving patients perceptions of their symptoms (23). They also found that only providing information of asthma reduces emergency visits to hospitals in high-risk adults.

This review of 11 trials also found that the limited asthma education programs do not reduce hospitalization rates or visits to the doctor for asthma attacks. Asthma education alone does not change medication usage for asthma or improve lung function. Two studies reported that limited asthma education could reduce subsequent ER visits in those subjects with a high attendance rate to the ER (24,25). These results are consistent with the theoretical proposition that limited education interventions have little influence on health related behaviours and skills (26).

Although information alone may not be enough to change health related behaviours, Gibson et al suggested that knowledge could motivate patients to seek help, develop self-management skills and enhance behavioural self-efficacy.

3.1.3. Measurement of Knowledge

A number of approaches have been used to assess an individual's disease knowledge. The most common method of disease knowledge

assessment used in scientific studies is the use of questionnaires. A review of the literature revealed no other published instrument other than the Pulmonary Rehabilitation Health Knowledge Test to assess patient COPD knowledge (27). This questionnaire is a self-administered multiple-choice test consisting of 40 questions (Appendix A). It was constructed by following the item construction procedures given by Hopp et al and covers the areas identified as common to rehabilitation programs. The questionnaire has been originally developed in English. A systematic translation of the questionnaire into French Canadian has been done, however validation of the translated French version has been reassessed (Appendix B).

The questionnaire covers the content areas identified as common to rehabilitation programs. Item categories include: Activities of Daily Living, Anatomy and Physiology, COPD definitions, Diet and Nutrition, Emergency Care/Panic Control, Exercise, Keeping Airways Opens, Medicines, Mental Health, Pathophysiology, Sex education, Sleeping, Stress and Relaxation, Support Groups, and Tests. Knowledge is measured as a percentage of correct answers on a test divided by the total number of questions. Patients could have a total score of 0 to 40 or score a percentage of 0% to 100%.

The English questionnaire has been developed and validated in 27 rehabilitation programs (27). Hopp et al reported that 15 of the initial 42 programs, agreeing to participate in the study, failed to provide data (27).

Insufficient patient number, due to participants' health, was cited as reasons for lack of response. Changes in programs and changes of program directors were also mentioned as reasons for response rate. This raises issues about continuity of the training for the COPD patients. Other limitations of this questionnaire and knowledge testing reported in this study is that some people may memorize information well, but are unable to put the information to use. Other people do not want to take tests because of their inability to read.

However, the increased means between pre-test and post-test results provide evidence of information retention over time. The decrease in variability seen in the standard deviation can be credited to the patients learning the information provided. If a patient provides a wrong answer, immediate feedback and correction of misinterpretations were included in the rehabilitation programs, thereby reinforcing the learning of the correct answers. The results from these programs demonstrated an improvement from pre- and post- test scores ($F(1,57)=58.44$, $p = 0.000$ and the 3-month follow-up ($F(2,57)=9.99$, $p = 0.003$). The final form of the test has high internal consistency (Cronbach's alpha = 0.86).

3.2. Self-Efficacy

3.2.1. Definition of Self-Efficacy

In 1977, Bandura coined the term self-efficacy, which refers to a person's belief regarding whether or not they feel they can successfully execute particular

behaviours in order to produce certain outcomes. Bandura argued that the self-efficacy beliefs which people hold about their own capabilities directly influence their perception of the task and their motivation in completing tasks.

Self-efficacy is a response to an attempt to achieve a goal. It is part of self-regulatory processes through which individuals shape environmental and interpersonal resources and behaviour towards a desired end (28). Individuals managing chronic disease wish to reach a personal goal, for instance engaging in a desired level of physical activity. Patients draw from personal resources (e.g. information, beliefs) and from external sources (e.g. expert advice, role models) and make judgment about trying out the new behaviour, and react to the experience by drawing conclusions from the trial. If the behaviour produces a desired outcome, the behaviour is more likely to be repeated.

Behavioural performance and a patient's belief in their ability to perform in varied situations and disease states are linked by self-efficacy. The influence of self-efficacy before and after exercise training in predicting exercise compliance in cardiac patients has been documented (29). Preoperative self-efficacy has been related significantly to performance of post-operative behaviours. A review of 10 health behaviour studies noted that pre- and post-treatment self-efficacy has been found to be predictive of smoking reduction and cessation (30). These findings suggest that attending to participants' self-efficacy expectations can support programs designed to change health-related behaviours.

3.2.2. Social Cognitive Theory and Self-Efficacy

The Social Cognitive Theory, as outlined by Bandura, is based on environmental and internal forces: behavior, cognitive and other personal factors, and environmental factors. These factors influence each other. The strength of the influence between factors can vary by person and situation and take place over time. Self- efficacy is one of those cognitive and other personal factors.

Self-efficacy, knowledge, and outcome expectations are three key elements in the process of self-referent thought. However, Bandura stated that outcome expectations might not contribute to the prediction of behaviour since the outcomes we expect are the results of judgments of what we accomplish. The most influential mediator in human agency is self-efficacy. Self-efficacy is an important determinant of people's choices of action, the effort they will exert, their perseverance to see an action through, and the degree of anxiety they will have about the action. It is due to this perceived self-efficacy that people with similar knowledge and skill can behave differently. Our beliefs about our capabilities are a better predictor of what we do and how we behave than our actual capabilities of accomplishing a task. Competent functioning, however, requires accuracy of perception and a combination between self-efficacy beliefs and knowledge.

3.2.3. Sources of Self-efficacy Beliefs

The role of self-efficacy in human behavior can be made by exploring the 4 sources from which self-efficacy beliefs are developed. Bandura (21) identifies these 4 processes as: 1) mastery experience; 2) vicarious experience; 3) verbal persuasions; 4) physiological states.

Mastery experience, the most influential source of these beliefs, is the self-gauging of the effects of one's actions. The interpretations of these effects help create efficacy beliefs. Outcomes interpreted as successful raise self-efficacy; those interpreted as failures lower it.

The second source of efficacy information is the vicarious experience of the effects produced by the actions of others. This source of information is weaker than the interpreted results of mastery experiences, but, when people are uncertain about their own abilities or have limited prior experience, they become more sensitive to it.

Individuals also create and develop self-efficacy beliefs as a result of the verbal persuasions they receive from others. These persuasions involve exposure to the verbal judgments that others provide and is a weaker source of efficacy information than mastery or vicarious experiences, but persuaders can play an important part in the development of an individual's self-beliefs.

Physiological states such as anxiety, stress, arousal, fatigue, and mood states also provide information about efficacy beliefs. Self-efficacy beliefs, in turn, also powerfully influence the physiological states themselves. When people experience aversive thoughts and fears about their capabilities, those negative affective reactions can lower perceptions of capability and trigger the stress and agitation that help ensure the inadequate performance they fear.

It is important to state that these sources of efficacy information are not directly translated into judgments of competence. Individuals interpret the results of events, and these interpretations provide the information on which judgments are based. The types of information people attend to and use to make efficacy judgments, and the rules they employ for weighting and integrating them, form the basis for such interpretations. Thus, the selection, integration, interpretation, and recollection of information influence judgments of self-efficacy.

3.2.4. Self-Efficacy and Behaviour

Self-Efficacy affects behaviour in various ways. Firstly, self-efficacy influences the choice of behavior. People are more likely to take on tasks in which they feel competent and confident and avoid tasks in which they do not. However, individuals with high self-efficacy, but poor knowledge, run the risk of harming themselves by behaving according to their misguided sense of self-

efficacy. Therefore a reliable assessment of self-efficacy and knowledge is important.

Secondly, self-efficacy helps determine the amount of effort and perseverance people will expend on an activity. People with high self-efficacy are likely to expend more effort and be more persistent to produce a certain action. This leads to a behavioural cycle. Perseverance associated with self-efficacy is likely to lead to an increase in performance that will then raise self-efficacy, whereas low self-efficacy will lead to the same cycle in the opposite direction.

Thirdly, self-efficacy can affect behaviour by influencing a person's thought pattern and emotional reactions. It was found that a sense of efficacy shapes causal thinking (31). High self-efficacy people attribute failure in a task to insufficient effort and take the task on as a challenge to overcome, whereas low self-efficacy people attribute it to deficient ability and hold beliefs that create stress and depression. Efficacy beliefs also influence the amount of stress and anxiety a person feels when they engage in a task.

3.2.5. Measurement of Self-Efficacy

Patient self-efficacy has been assessed to help health care personnel implement specific treatment interventions designed to increase the patient's

self-efficacy in specific situations, thereby leading to an increase in activity. The broadest self-efficacy measurement tool is an omnibus instrument. This self-efficacy measure is a general sense of the patients' confidence. However, this measure does not take into account the context-specific nature of self-efficacy (32). The basic problem with such assessments is that individuals must generate judgments without a clear activity or task in mind. Bandura has advised that efficacy should be regarded as a differentiated set of beliefs linked to specific realms of functioning rather than an omnibus trait. Bandura suggests that the scales of perceived self-efficacy must be tailored to the particular function of interest. In the standard methodology for measuring efficacy beliefs, individuals are presented with items portraying different levels of task demands, and they rate the strength of their belief in their ability to execute the requisite activities.

Self-efficacy scales related to health issues, such as cardiac stress, smoking cessation, diabetes, have been developed and reported (30). Measures of self-efficacy directly related to behaviours that are the focus of pulmonary rehabilitation have been developed. Tobin and colleagues have described an asthma self-efficacy scale (33). There are two published self-efficacy questionnaires specific to COPD. Toshima et al adapted Ewert's cardiac self-efficacy scales to measure functional disabilities associated with COPD using a 46-item questionnaire (31). Subjects rate whether or not they can do an activity and indicate their level of confidence (0 to 100 %) that they can do it.

The questionnaire used in this study was the COPD self-efficacy scale (CSES) (5). Validity of the questionnaire was assumed based the apparent validity of Bandura's self-efficacy theory (21). The CSES is a 34-item self-administered questionnaire (Appendix C). Items were scored on a 5-point Likert scale, with 1 representing "very confident" and 5 representing "not at all confident" in managing breathing difficulty in a specific situation. The items can be divided into 5 domains: negative affect, emotional arousal, physical exertion, weather or environment, and behavioural risk factors. Total and domain scores are calculated by dividing the summed responses by the number of items.

The CSES has shown evidence of test-retest reliability (r=0.77) and internal consistency (Cronbach's alpha=0.95). There is preliminary evidence of responsiveness to change following pulmonary rehabilitation (31).

All present research using the CSES is limited in that the reliability and validity of the questionnaire has not yet been established (5). No correlation with any other health status instrument or physiologic measure has supported the construct validity of the CSES (8). Further psychometric testing is required to evaluate responsiveness, as well as construct and criterion validity and the minimal clinical importance difference. The questionnaire was developed in English. A Canadian French version has been developed and used successfully in a large randomized clinical trial (Appendix D). Formal psychometric testing of the French version is currently underway.

3.3. Summary of Previous Literature assessing Knowledge and Self-Efficacy in Respiratory Disease

There are few studies that have assessed the roles of knowledge and self-efficacy in respiratory disease. Education plays such an integral role to all comprehensive rehabilitation programs that it is difficult to measure its effects in isolation. In a controlled study of two matched communities, Howland et al found that education programs, when administered alone, may improve knowledge of disease. However, increased knowledge did not produce a significant change in health status unless accompanied by the other components typically included in comprehensive pulmonary rehabilitation programs (9). In another study comparing the effects of education alone and in combination with pulmonary rehabilitation on self-efficacy in COPD patients, Scherer (34) found that education alone was effective in improving self-efficacy scores, but patients' scores 6 months later were not significantly better than preprogram scores. This suggests that education alone programs are insufficient in improving long-term self-efficacy in patients with COPD. A meta-analysis was conducted on 65 studies on the effects of education, exercise and psychosocial support on COPD patients (39). Across the outcomes examined, education-alone programs had beneficial effects on the accuracy of performing inhaler skills. Based on a very small sample of studies, a non-significant effect of education-alone was evident

on health care utilization and on adherence to treatment regimen. Such results are inconclusive and suggest that further research may be needed.

Research on the role of self-efficacy on pulmonary rehabilitation is equally scarce and inconclusive. In a case study, Scherer used the self-efficacy theory to examine the expectations of a patient with COPD who attended a pulmonary rehabilitation program (35). The CSES scores for the patient increased in most areas after a month and were sustained after 6 months. The findings of this study are limited to the study subject and lack generalizability to other COPD patients. In another study, Scherer reported the effects of a pulmonary rehabilitation program on self-efficacy in 60 COPD patients (40). Scores on the CSES significantly improved after completion of the program ($p < 0.01$). However, this study is a preliminary study and has limitations. There was no control group and therefore no conclusions can be drawn about the effectiveness of the rehabilitation program. The study's external validity is limited because documented improvement in self-efficacy may not apply to patients participating in other pulmonary rehabilitation programs. For both studies, Scherer recommends a larger randomized control trial.

4. Study Objectives and Hypotheses

The long-term purpose of this study is to facilitate a clearer understanding of both the concepts of knowledge and self-efficacy and their relevance to health education research and clinical practice in patients with COPD.

4.1 Study Hypotheses

1. Relative to other COPD patients under the same circumstances, individuals exposed to a disease specific self-management program will show greater COPD health knowledge and greater self-efficacy than those exposed to usual care.
2. Increasing patients' disease knowledge will improve their self-efficacy.

Specific questions were:

- What is the disease specific health knowledge and self-efficacy status in patients with COPD?
- What is the effectiveness of a self-management program on changing health knowledge and self-efficacy in patients with COPD?
- What is the relationship between patient disease specific health knowledge and patient self-efficacy in the patients COPD?

5. Manuscript

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Introduction

The purpose of chronic obstructive pulmonary disease (COPD) management is to prevent disease progression, to relieve symptoms and to help the patients cope with their disease in order to optimize quality of life. COPD management must contend with the symptoms of acute exacerbation, as well as the chronic symptoms. Patients often develop a lack of confidence regarding their ability to avoid dyspnea while engaging in certain activities, however minimal the physical demand. As a result, some patients with COPD may refrain from participating in activities of daily living, even though they are physically capable of performing them (1,2,3).

Although patient education alone may improve patients' knowledge of disease, it does not seem to lead to improved health status in COPD patients (4). However, it can play a role in improving skills and offer patients an opportunity to increase their confidence in their own ability either to manage or to avoid breathing difficulty while engaging in routine activities (5). Another important component of education is to encourage individuals to perform activities of daily living by increasing their self-efficacy.

Self-efficacy refers to a person's belief that they can successfully execute particular behaviours in order to produce certain outcomes. Self-efficacy is an important determinant of people's choices of action, the effort they will exert, and

their perseverance to see an action through, and the degree of anxiety they will have about the action. It is due to this perceived self-efficacy that people with similar knowledge and skill can behave differently. Our beliefs about our capabilities are a better predictor of what we do and how we behave than our actual capabilities of accomplishing a task. Competent functioning, however, requires accuracy of perception and a combination between self-efficacy beliefs and knowledge (1).

Few health behaviour studies have specifically examined the relationship between knowledge and self-efficacy. The present study is a multi-centre randomized clinical trial on a comprehensive program of education, including disease specific self-management in COPD. It is the first study to examine the impact of self-management on knowledge and self-efficacy in COPD. The objectives of this study were to examine: 1) the effectiveness of a self-management program on increasing health knowledge and self-efficacy amongst patients with COPD; 2) the relationship between COPD specific health knowledge and self-efficacy in 191 COPD outpatients. This proposed study is expected to provide data and analysis enabling supported conclusions regarding the clinical efficacy of COPD education and self-management programs. This in turn will help care providers in shaping and refining self-management programs for COPD.

Methods

Study design

This prospective study took advantage of a pre-existing database from the Quebec multi-center randomized clinical trial 'Impact of Ambulatory Care based on a Self-Management Program in Patients with COPD'. Seven university-affiliated hospitals from three major cities in the province of Quebec (Canada) participated in this 12 months follow-up trial from March 1998 to April 1999. A self-efficacy and knowledge evaluation was completed for each patient at 3 different time intervals (baseline, 4-month and 12-month). Individuals agreeing to take part in the study were randomized to either a usual care group or a group exposed to a comprehensive education program, using a computer-generated list of random numbers. Randomization was stratified by center and in blocks of six. Patients were assigned to the self-management program (intervention group) or to usual care. Neither patients nor health professionals were aware of the assignment until after randomization. Although double-blind design was impossible, an independent blinded evaluator was responsible for the evaluation process in each centre.

Patients in both usual care and intervention groups continued to be managed by their respective specialist or general practitioner, and received health care in the universal health program offered by the provincial government.

In addition to usual care, the intervention group patients received a disease specific self-management program (Living Well with COPD®) consisting of approximately 1 hour of weekly home teaching lasting 7 to 8 weeks. The program was delivered by experienced and trained health professionals who acted as case-managers in collaboration with the treating physicians. Patients in the intervention group were also followed by weekly telephone calls for 8 weeks, then monthly calls for the remainder of the study. The health professional was available by telephone for advice and treatment supervision.

Education Program

The teaching material consisted of a flipchart designed for health educators, 7 skill-oriented patient workbooks detailing management of all facets of disease, inhalation technique sheets and a plan of action. The education program was developed according to a review of the evidence-based literature, medical expert opinion as well as the opinion of patients and their families. Recommended revisions following pilot testing in 16 patients and 5 health professionals were incorporated into the final version.

Study Population

All patients who were admitted to the hospital for acute exacerbation of COPD within the past year prior to study entry were screened. Only patients

aged 50 years old and older with stable COPD symptoms were eligible. These patients had to be currently or previously smoking with a smoking history of at least 10 pack-year. Their forced expiratory volume in one second (FEV_1) post-bronchodilator had to be between 25 and 70 percent of the predicted normal value (6). Eligible patients could not have a previous diagnosis of asthma, left congestive heart failure, any terminal disease, dementia or any uncontrolled psychiatric illness. And finally eligible patients could not have taken part of a respiratory rehabilitation program in the past year, nor stayed or planned to stay in a long-term-care facility. The final recruitment of this study consisted of 191 elderly COPD out patients. By the final follow-up period (12 months), data were available on 160 subjects, or 84% of the sample.

Measurement of Study Variables

Knowledge Measurement. The present study used the Pulmonary Rehabilitation Health Knowledge Test was used to assess patient COPD knowledge (9). The knowledge questionnaire is a self-administered multiple-choice test consisting of 40 questions. It was constructed by following the item construction procedures given by Hopp et al and covers the areas identified as common to rehabilitation programs. Bourbeau et al. did a systematic translation of the questionnaire into French Canadian, however no validation of the French version has been done.

The questionnaire covers the content areas identified as common to rehabilitation programs. Item categories include: Activities of Daily Living, Anatomy and Physiology, COPD definitions, Diet and Nutrition, Emergency Care/Panic Control, Exercise, Keeping Airways Opens, Medicines, Mental Health, Pathophysiology, Sex education, Sleeping, Stress and Relaxation, Support Groups, and Tests. Knowledge was measured as a percentage of correct answers on a test divided by the total number of questions. Patients could have a total score of 0 to a perfect score of 40.

The questionnaire has been developed and validated in 27 rehabilitation programs. The results from these programs demonstrated an improvement from pre- and post- test scores ($F(2,57)=9.99$, $p = 0.003$). The final form of the test has high internal consistency (Cronbach's alpha = 0.86).

Self-efficacy Measurement. Patient self-efficacy has been assessed widely to help health care personnel implement specific treatment interventions designed to increase the patient's self-efficacy in specific situations, thereby leading to an increase in activity. The COPD self-efficacy scale (CSES) was used to assess patient self-efficacy in this study (1). Validity of the questionnaire has been assumed on the basis of the apparent validity of Bandura's the self-efficacy theory (7). The CSES is a 34-item self-administered questionnaire. In this study, items were scored on a 5-point Likert scale, with 1 representing "very confident" and 5 representing "not at all confident" in managing or avoiding

breathing difficulty in a specific situation. The items can be divided into 5 domains: negative affect, emotional arousal, physical exertion, weather or environment, and behavioural risk factors. Total and domain scores were calculated by dividing the summed responses by the number of items.

The CSES has shown evidence of test-retest reliability (r=0.77) and internal consistency (Cronbach's alpha=0.95). There is preliminary evidence of responsiveness to change following pulmonary rehabilitation (8). A Canadian French version has been developed and used successfully in a large randomized clinical trial. However, no validation of the French version has been done.

Statistical Analysis

Two main stages of analysis were undertaken. Firstly, two-sample unpaired t-tests were used to examine the differences in mean knowledge score between patients of the intervention and the comparison group at baseline, at 4 months and at 12 months. Similar tests were done to detect the differences in means of total self-efficacy scores, as well as differences in the individual subscales in the CSES. In order to test for significant improvement of knowledge and self-efficacy over time, paired t tests were performed in the pooled population.

Secondly, the association between self-efficacy and knowledge were explored using longitudinal data. In this analysis, demographics – including age, gender, marital status, smoking status, and educational level - were used as independent variables in each regression. The value of knowledge in predicting patient self-efficacy was assessed in a logistic linear analysis. Knowledge score change and demographic information were used to predict self-efficacy maintenance and improvement at 4-month, and 12-month follow-up. A simple logistic regression model was run for self-efficacy improvement at each follow-up visit.

The outcome measure of this study was self-efficacy improvement. Self-efficacy was dichotomized in terms of whether patients' self-efficacy score worsened or improved from before and after a 4-month period and a 12-month period, from April 1997 to April 1998. Given that no formal definition of improvement on the CSES has been specified in the current literature, and that COPD conditions gets worse over time, a significant improvement was defined as maintenance or any improvement in self-efficacy score. This also increased the number of cases, thereby improving the power of the analyses.

Since some questions in the CSES were not applicable to all patients, a relative score was measured by taking the total self-efficacy score and dividing it by the number of questions answered to obtain a mean score. The lower the score, the more confident the person was in their ability to manage or avoid

breathing difficulty in the situation presented. The five individual CSES components were scored by dividing the total subscale score by the number of items answered under that subscale.

This study examined the association between self-efficacy improvement and knowledge change of patients from baseline to the subsequent visits. Demographic characteristics, such as age, gender, marital status, smoking status and education level, were also assessed in this study. Baseline FEV_1 and dyspnea measures were included in the statistical analyses since they are indicators of COPD severity. Baseline self-efficacy and knowledge scores were also included as patients' baseline status is associated with the potential knowledge and self-efficacy changes.

Using a priori knowledge, several confounders were considered. The intervention was considered as a strong confounder since its aim was to increase patients' knowledge. Therefore the knowledge measure was an intermediary variable between the intervention and self-efficacy. A person's age, education level and baseline knowledge score were also considered confounders since they all might influence an individual's ability to increase their knowledge results. Other possible confounders are FEV_1 and dyspnea score. These indicators of disease severity could influence a person's baseline self-efficacy score.

Results

The baseline characteristics of the study population are given in Table 1. On average, the patients scored 15.3 out of a possible 40 (38.2%) on the knowledge test and had a relative mean self-efficacy score of 3 at baseline. By the second visit, 106 and 111 individuals improved their knowledge and self-efficacy score respectively. Twenty-five individuals improved their self-efficacy score by 1 point. In the final visit, 111 patients increased their knowledge scores and 92 individuals improved their self-efficacy score. Only 9 individuals saw a 1-point self-efficacy improvement. The largest individual improvement of 2.6 points was observed at the 4-month visit. The largest decrease in self-efficacy of 2.8 occurred at 12 months.

Table 2 shows that the intervention did have a significant impact on patient knowledge score at all follow-up visits. Paired t-test analyses yielded similar significant differences in knowledge score results between pre- and post-program at 4 months and 12 months.

The results of the unpaired *t* test analysis, seen in Table 3A, indicate no significant differences in total and subscale self-efficacy scores between control and intervention group at any of the visits in the trial. However, when the subjects' scores were compared before and after intervention, significant differences in subscale and total mean CSES scores were detected in the pooled

study population (Table 3B). Physical exertion showed the most significant difference between all of the CSES subscales. No differences were detected in the CSES scores at 12-month.

Descriptive statistics of the study population at baseline when stratified by self-efficacy improvement and by intervention group are summarized in table 4. The baseline characteristics of the patients in the two groups were similar across several socio-demographic, clinical and functional variables. The differences in population characteristics were more prominent at the 4-month visit. There were 17 % more people with a grade 5 dyspnea severity and 7.3 % more men in the patients group whose self-efficacy remained the same or improved. The two groups also differed in their living status and educational level. There were 10.8% and 8.3% more individuals living alone and having a lower than grade 12 education respectively in the group whose self-efficacy score worsened.

In a crude analysis, dyspnea, when dichotomized to high dyspnea level (level 5) and low dyspnea level (level 1-4), was found to be a confounder of self-efficacy improvement (OR=2, 95%CI=(1,4)) and knowledge change at visit 2 (OR=0.5, 95%CI = (0.3,0.9). Self-efficacy improvement at both the 4-month and 12-month visit was highly associated with individuals' baseline self-efficacy score. Individuals' FEV_1 results were correlated with baseline self-efficacy score. However, no other variable under investigation was associated with self-efficacy improvement. Neither knowledge change nor the intervention was associated

with self-efficacy improvement, but confounding may be present to mask their effects.

Logistic regression analyses revealed that knowledge change was not associated to self-efficacy improvement (Table 5). Only baseline self-efficacy score was a significant predictor of the short and long term log odds of self-efficacy improvement. A unit increase in baseline self-efficacy score doubled the odds of improvement in self-efficacy. None of the demographic variables, nor indicators of COPD severity were significant predictors of the study outcome. Despite evidence of association in the crude analysis, dyspnea was not a significant predictor in the logistic model.

Discussion

The intervention was very successful at increasing patients' disease knowledge. Significant differences were observed between the intervention and control group at all follow-up visits. The intervention group consistently scored better on the knowledge test than the control group. The present study shows that there were no differences in self-efficacy detected between the intervention program and the usual care rehabilitation program at any of the visits. The intervention program under investigation had no statistical effect on the subscale or total patients' self-efficacy score. The length of time a patient is exposed to the intervention does not show any changes in self-efficacy. This suggests that patients were unable to apply the skills that they learned from the program's

education material. The program may not address all 4 processes described by Bandura (7) necessary to produce a change in self-efficacy beliefs. Experienced health professionals were provided to help interpret the patient's actual experiences and give verbal persuasion, but the program could not provide sources of vicarious experiences nor did it address patients' physiological states. It is important to note that this does not necessarily mean that the program was not effective in teaching self-management skills. It is possible that the self-efficacy tools may not be adequate to measure the translation of knowledge into the gaining of self-regulatory skills and into behaviour changes.

However, when the population was pooled regardless of intervention group, differences in self-efficacy scores were observed at 4 months. Scores on the CSES scale significantly improved after the completion of 4 months into the pulmonary rehabilitation program. Improvement in CSES score indicates that participation in the program or usual care for 4 months may increase participants' confidence in their ability to manage or avoid breathing difficulty while engaging in certain activities. However, no improvement in CSES scale was observed 12 month after program completion. These observations are in accord with the current literature published by Smeets (10) and Rothman (11), which state that rehabilitation programs are more successful at changing patient's self-efficacy in the short term than in maintaining it for the long term. The effects of rehabilitation programs may lessen due to patients no longer adhering to the rehabilitation programs. After one year, patients may be desensitized to the

programs or their disease conditions may worsen and cause a decrease in self-efficacy.

The study findings also show that, in elderly outpatients, COPD knowledge change was not related to self-efficacy improvement. These findings seems to support the conclusions made by Howland et al that education programs may improve patients' knowledge of disease, but may not produce a significant change in health status or behaviour (4). However, these findings are not in accord with suggestions made by Gibson (13) and Smeets (10) that increased knowledge of the disease from a rehabilitation program can have a positive effect on self-management of the patients and thereby also improve patients' behaviour and self-efficacy. These findings are consistent with the reports published by Hopp (9) and support the notion that self-efficacy must be assessed independently of knowledge in rehabilitation programs (12).

It was also observed that none of the demographic characteristics had any impact on the ability of individuals to improve self-efficacy scores. All individuals in this study, regardless of age, gender, education level, marital status, and smoking status had the same likelihood of improving their self-efficacy score. Similarly, the same results were observed with the indicators of COPD severity. Baseline measurements of dyspnea and FEV_1 could not predict self-efficacy improvement.

These findings may be due to a few different reasons. The randomization of the study participants in the trial may have produced a population too similar to detect any effect of demographic variables on self-efficacy improvement. Another possible reason may be the variables themselves. Marital status was used as a proxy for individuals having physical and moral support from someone close to them. However a person's marital status does not consider the support of anyone other than his or her mate. A better predictor of self-efficacy could be any live-in support rather then marital status. Dyspnea and FEV_1 results may have changed during the one- year study period and could have an impact on a patient's self-efficacy. Situations may arise where patient's conditions worsen from the start of the study period and therefore decrease their self-efficacy score. Therefore, to find a relevant correlation, it would be useful to measure patient's dyspnea and FEV_1 results at every patient visit as opposed to only measuring baseline results.

Of all the variables under investigation, only patients' baseline self-efficacy score was associated with improvement in self-efficacy. The results of this study indicate that individuals with initially low self-efficacy stand to benefit the most from COPD rehabilitation programs. People who had a high self-efficacy at baseline are less likely to increase their self-efficacy than people with low self-efficacy, since there is less room for improvement. These findings were consistent in both the short and long term. The improvement in self-efficacy was observed regardless of the intervention program. This finding is important as it

suggests that all COPD patients may not have the same potential for improving psychological variables or alternatively that some COPD patients may need other forms of psychological intervention to acquire self-management skills. Future studies may want to focus on patients with low self-efficacy in order to facilitate the detection of any effects of study characteristics.

Strength and Limitations of the Study

The actual study presents several strengths. Firstly, the presence of comparison groups in this clinical trial allowed for conclusions to be drawn about the effectiveness of rehabilitation program. Secondly, the prospective nature of the study ensured that all the relevant patient characteristics were similar in all groups under investigation. This study showed in table 1 that the two populations are similar across several demographic and disease-related factors. During recruitment, of the eligible 469 subjects, 218 patients agreed to participate in the trial. The study participants and the refusals were comparable on age, gender and COPD severity according to the flow rate (14). Thirdly, the random stratification of the study participants in this trial makes it unlikely that there are any biases due to confounding. No relationships between the effects of two or more causal factors were found in the variables under investigation.

There were also possible limitations in this study. The first had to do with the instrument used to assess self-efficacy. As with all previous studies using the CSES questionnaire, it is important to remember that the reliability and

validity of the CSES has not yet been established (1). This task is difficult since there are no other health status instrument or physiologic measure that one can use to support the construct validity of the CSES (15). Therefore, it was not known if the 5-point Likert scale of the CSES questionnaire was sensitive enough to detect any significant changes of self-efficacy in a large number of patients. The lack of information on the CSES also makes it difficult to determine what constitutes a significant clinical change or improvement in self-efficacy. The second possible limitation of this study was the compatibility of the knowledge test and the CSES questionnaire. The two instruments were not designed to necessarily relate with one another. The self-efficacy behaviours in the CSES may be different than the knowledge patients have gained. Therefore, the knowledge measurements may not be relevant to the self-efficacy behaviours addressed in the CSES. For example, a patient may learn about the physiology of the lung, but this will not affect the confidence they have in their ability to cope with their breathing difficulty when they walk up a flight of stairs. However, the wide range of subjects that are covered in both tests lessened this concern. The third possible limitation was that the trial was not designed specifically for the purpose of this study; therefore important factors were not available to be included in this study. Although knowledge may increase, other factors may affect self-efficacy negatively and therefore mask the effect of knowledge. Factors, such as depression and live-in support, may have provided insight on the mechanism in which knowledge interacts with self-efficacy. For example, one may increase their disease knowledge, but feel too depressed or anxious to

apply them. Finally, consideration must be given to potential sources of information bias. Since patients were not blinded to the program to which they were randomized, it is possible that the reported self-efficacy CSES score is inflated due to the expected benefit of the intervention program. This is unlikely, however, since no difference was observed between the comparison groups.

Conclusions and Implications of the Study Findings

In summary, the study has shown that, in a elderly COPD outpatient population, (1) there were significant differences between comparison groups in the rehabilitation program in knowledge scores but not in self-efficacy scores; (2) there were significant differences in pre- and post-program self-efficacy scores over 4 months; (3) knowledge change was not related to self-efficacy improvement; (4) patient demographic characteristics are not associated with self-efficacy improvement; (5) baseline self-efficacy was associated with self-efficacy improvement.

Given these findings, conclusions can be drawn that the intervention program was effective in increasing patient COPD knowledge, but not in increasing patient self-efficacy. This conclusion suggests that future programs must be flexible and tailored to the progress of the individual patient to ensure the maintenance and improvement of any self-efficacy change. This study also concludes that knowledge and self-efficacy was not associated with one another. Although further research is required, this indicates that both factors should be

assessed separately in COPD rehabilitation. Future research should focus on the mechanism by which knowledge and self-efficacy interacts and concentrate on studying individuals with initial low self-efficacy. The inclusion of behaviour measures would be useful to verify that activities were performed successfully and how this feedback interacts with knowledge and self-efficacy.

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References

1. Wigal JK, Creer TL, Kotses H. The COPD Self-Efficacy scale. Chest 1991; 99: 1193-96.

2. GuyattGH, TownsendM, Berman LB, Pugsley SO. Quality of life in patients with chronic airflow limitation. Br J Dis Chest 1987; 81: 45-54.

3. McSweeny AJ, Heaton RK, Grant I, Cugell D, Solliday N. COPD: Socioemotional adjustment and life quality. Chest 1980; 77 (suppl 2): 309-311.

4. Howland J, Nelson EC, Barlow PB. Chronic Obstructive Airway Disease: Impact of Health Education. Chest 1986; 90: 233-238.

5. Neish CM, Hopp JW. The role of education in pulmonary rehabilitation. J Cardiopulm Rehabil 1988; 11: 439-41.

6. Knudson RJ, Lebowitz MD, Holberg CJ, Burrows B. Changes in the normal maximal expiratory flow-volume curve with growth and aging. Am Rev Respir Dis 1983; 127:725-34.

7. Bandura A. Self-Efficacy: the Exercise of Control. New York, Freeman, 1997.

8. Scherer YK, Shimmel S. Using Self-Efficacy Theory to Educate Patients with Chronic Obstructive Pulmonary Disease. Rehabil Nurs. 1996 Sep-Oct;21(5):262-6.

9. Hopp JW, Lee JW, Hills R. Development and validation of a pulmonary rehabilitation knowledge test. J Cardiopulm Rehab 1989; 7: 273-8.

10. Smeets F. Patient Education and Quality of Life. Eur Respir Rev 1997; 7: 42, 85-87.

11. Rothman AJ. Toward a Theory-Based Analysis of Behavioral Maintenance. Health Psychology 2000; 19(1):64-69.

12. Lareau SC, ZuWallack R. Pulmonary Rehabilitation. Am J Resp & Crit. Care Med, May 1999; 159 (5):1666-1682.

13. Gibson PG, Coughlan J, Wilson AJ, Hensley MJ, Abramson M, Bauman A, Walters EH. Limited (information only) patient education programs for adults with asthma. Cochrane Database Syst Rev 2000; (2): CD001005.

14. Bolton MB, Tilley BC, Kuder J, Reeeves T, Schultz LR. The cost and effectiveness of an education program for adults who have asthma. J Gen Intern Med 1991;6:401-407.

15. Lacasse Y, Wong E, Guyatt G, Goldstein RS. Health Status Measurement Instrument in Chronic Obstructive Pulmonary Disease. Can Respir J 1997; 4:152-64.

6. Discussions and Conclusions

6.1. Discussion

6.1.1. Overview of study results

The present study indicated that the intervention did have a significant impact on patient knowledge score at all visits (Table 2). Paired t-test analyses yielded similar significant differences in knowledge score results between pre- and post-program at 4 month and 12 month. There were no significant differences in total and subscale self-efficacy scores between the comparison groups at any of the four visits in the trial (Table 3A). However, when the subjects' scores were compared before and after intervention, significant differences in subscale and total mean CSES scores were detected in the pooled study population (Table 3B). Physical exertion showed the most significant difference of all the CSES subscales. No differences were detected in the CSES scores at 12 months.

The findings also showed that there was no association between knowledge change and self-efficacy improvement (Table 5). Logistic regression analyses revealed that only baseline self-efficacy score was a significant predictor of the short- and long-term log odds of self-efficacy improvement. A unit increase in baseline self-efficacy score doubled the odds of improvement in

self-efficacy. None of the patient demographic characteristics, including indicators of COPD severity, were significant predictors of the study outcome.

6.1.1.1. The effectiveness of the intervention on knowledge and self-efficacy

The rehabilitation program had two main objectives: 1) to provide patient education about COPD; 2) to teach patients self-management skills. The main findings of this study indicate that the program was effective with it's first objective. The rehabilitation program was very successful at increasing patients' disease knowledge. Significant differences were observed between the intervention and control group at all follow-up visits. The intervention group consistently scored better on the knowledge test than the control group. Conversely, the second objective of the program was not supported by this study. Since no difference in self-efficacy was detected between the intervention program and the usual care rehabilitation program at any of the visits, there is no evidence that the program was effective in teaching patients self-regulatory skills. The intervention program under investigation had no statistical effect on the subscale or total patients' self-efficacy score. The length of time a patient is exposed to the intervention does not show any changes in self-efficacy. This suggests that patients were unable to apply the skills that they learned from the program's education material. The program may not address all 4 processes described by Bandura (21) necessary to produce a change in self-efficacy beliefs. Experienced health professionals were provided to help interpret the

patient's actual experiences and give verbal persuasion, but the program could not provide sources of vicarious experiences nor did it address patients' physiological states. It is important to note that this does not necessarily mean that the program was not effective in teaching self-management skills. It is possible that the self-efficacy tools may not be adequate to measure the translation of knowledge into the gaining of self-regulatory skills and behaviour changes.

The study did show that, when the population was pooled regardless of intervention group, differences in scores were observed at 4-months. Scores on the CSES scale significantly improved after the completion of 4 months into the pulmonary rehabilitation program. Improvement in CSES score indicates that participation in the program or usual care for 4 months may increase participants' confidence in their ability to manage or avoid breathing difficulty while engaging in certain activities. However, no improvement in CSES scale was observed 12 month after program completion. These observations are in accord with current literature published by Smeets (22) and Rothman (36), which state that rehabilitation programs are more successful at changing patient's self-efficacy in the short term than in maintaining it for the long term. The effects of rehabilitation programs may lessen due to patients no longer adhering to the rehabilitation programs. After one year, patients may be desensitized to the programs or their disease conditions may worsen and cause a decrease in self-efficacy.

6.1.1.2. Influence of knowledge change on self-efficacy improvement

The study findings also show that, in elderly outpatients, COPD knowledge change was not related to self-efficacy improvement. No other studies have sought to directly examine the relationship between knowledge and self-efficacy. There are mixed opinions on this topic in current literature. These findings seems to support the conclusions made by Howland et al that education programs may improve patients' knowledge of disease, but may not produce a significant change in health status or behaviour (9). However, these results are in not accord with suggestions made by Gibson (23) and Smeets (22) that increased knowledge of the disease from a rehabilitation program can have a positive affect on self-management of the patients and thereby also improve patients' behaviour and self-efficacy. These findings are consistent with the reports published by Hopp (27) and support the notion that self-efficacy must be assessed independently of knowledge in rehabilitation programs (37, 38).

6.1.1.3. Effect of patient demographic characteristics on self-efficacy improvement

None of the demographic characteristics had any impact on the ability of individuals to improve self-efficacy scores. All individuals in this study, regardless of age, gender, education level, marital status, and smoking status had the same likelihood of improving their self-efficacy score. Similarly, the

same results were observed with the indicators of COPD severity. Baseline measurements of dyspnea and FEV_1 could not predict self-efficacy improvement.

These findings may be due to a few different reasons. The randomization of the study participants in the trial may have produced a study population too similar to detect any effect of demographic variables on self-efficacy improvement. Another possible reason is the variables themselves. Marital status was used as a proxy for individuals having physical and moral support from someone close to them. However a person's marital status does not consider the support of anyone other than his or her mate. A better predictor of self-efficacy could be any live-in support rather then marital status. Dyspnea and FEV_1 results may have changed during the one- year study period and could have an impact on a patient's self-efficacy. Situations may arise where patient's conditions worsen from the start of the study period and therefore decrease their self-efficacy score. Therefore, to find a relevant correlation, it would be useful to measure patient's dyspnea and FEV_1 results at every patient visit as opposed to only measuring baseline results.

6.1.1.4. Effect of Patient's Baseline Self-efficacy on Self-efficacy Improvement

Of all the variables under investigation, only patients' baseline self-efficacy score was associated with improvement in self-efficacy. The results of this study indicate that individuals with initial low self-efficacy stand to benefit the most from

COPD rehabilitation programs. People who had a high self-efficacy at baseline are less likely to increase their self-efficacy than people with low self-efficacy, since there is less room for improvement. These findings were consistent in both the short and long term. The improvement in self-efficacy was observed regardless of the intervention program. This finding is important as it suggests that all COPD patients may not have the same potential for improving psychological variables or alternatively that some COPD patients may need other forms of psychological intervention to acquire self-management skills. Future studies may want to focus on patients with low self-efficacy in order to facilitate the detection of any effects of study characteristics.

6.1.2. Potential Sources of Bias in the Present Study

Consideration must be given to potential sources of bias that may lead to a deviation in inferences made in the present study. The study is concerned with three biases: selection bias, information bias and confounding bias.

6.1.2.1. Selection Bias

Errors in inferences may occur due to systematic differences in characteristics between the COPD patients selected for the study and those who are not. For example, such differences can occur if subjects are limited to volunteers, or hospital cases, excluding those that are not sick enough to require

hospital care or those that live too far away to visit the hospital. In this case of this study, strict inclusion criteria were put into place to specify a select COPD population. Outpatients were recruited at 7 different hospital centers across the province of Quebec to ensure that the study participants are representative of the entire study population. The prospective nature of the study made sure that all the relevant patient characteristics were similar in all groups under investigation. This study showed in the descriptive analysis (Table 1) that the two populations are similar across several demographic and disease-related factors. During recruitment, of the eligible 469 subjects, 218 patients agreed to participate in the trial. The study participants and the refusals were comparable on age, gender and COPD severity according to the flow rate.

6.1.2.2. Information Bias

Information bias may have occurred if there is a flaw in measuring patient knowledge or self-efficacy. This could result in different information accuracy between comparison groups. Since patients were not blinded to the program to which they were randomized, it is possible that the reported self-efficacy CSES score is inflated due to the expected benefit of the intervention program. This is unlikely, however, since no difference was observed between the comparison groups.

Knowledge scores did increase over time, which signifies that patients did learn about COPD, and increase their knowledge. However, it is possible that after repeatedly taking the knowledge test, patients may have learned the answer patterns of the test and, therefore, causing an inflation in the actual patient COPD knowledge assessments. Since all patients are equally likely learn the pattern of the test, the error is non-differential and does not impact the findings of this study.

6.1.2.3. Confounding Bias

The random sampling of the study participants into this trial makes it unlikely that there are any biases due to confounding. No relationships between two or more causal factors were found in the variables under investigation.

6.1.3. Possible Limitations of the Current Study

There were three main possible limitations in this study. The first had to do with the instrument used to assess self-efficacy. As with all previous studies using the CSES questionnaire, it is important to remember that the reliability and validity of the CSES has not yet been established (5). This task is difficult since there are no other health status instrument or physiologic measure that one can use to support the construct validity of the CSES (8). Therefore, it was not known if the 5-point Likert scale of the CSES questionnaire was sensitive enough to detect any significant changes of self-efficacy in a large number of patients.

The lack of information on the CSES also makes it difficult to determine what constitutes a significant clinical change or improvement in self-efficacy. Does the change of half a point relate to a significant clinical change in the patients? And if so, is this clinical change the same as a one-point change on the scale? At the time of this study, there were no answers to these questions.

The second possible limitation of this study was the compatibility of the knowledge test and the CSES questionnaire. The two instruments were not designed to necessarily relate with one another. The self-efficacy behaviours in the CSES may be different than the knowledge patients have gained. Therefore, the knowledge measurements may not be relevant to the self-efficacy behaviours addressed in the CSES. For example, a patient may learn about the physiology of the lung, but this will not affect the confidence they have in their ability to cope with their breathing difficulty when they walk up a flight of stairs. However, the wide range of subjects that are covered in both tests lessened this concerns.

The third possible limitation was that the trial was not designed specifically for the purpose of this study; therefore important factors were not available to be included in the study. Although knowledge may increase, other factors may affect self-efficacy negatively and therefore mask the effect of knowledge. Factors, such as depression and live-in support, may have provided insight on the mechanism in which knowledge interacts with self-efficacy. For example,

one may increase their disease knowledge, but feel too depressed or anxious to apply them.

6.1.4. Study Contributions and Future Research Direction

6.1.4.1. Study Contributions

The present study has facilitated a clearer understanding of both the concepts of knowledge and self-efficacy and their relevance to health education research and practices. Four findings have particularly meaningful implications on health education research. Firstly, the findings revealed that, in the cases of COPD, added care in rehabilitation programs could successfully increase patient's disease knowledge, but not self-efficacy. Self-efficacy can improve over the short term with standard care, however the effects of the programs were lost after 1 year. This may mean that a new or separate strategy should be designed to ensure the maintenance and improvement of the self-efficacy change. Secondly, this study found that knowledge and self-efficacy were not associated with one another. Knowledge and self-efficacy have been shown to be important components of patient self-management and therefore are of interest to pulmonary rehabilitation. Although further research is required, this could indicate that both factors should be assessed separately in COPD rehabilitation. Thirdly, the study demonstrated that there was an association between patient baseline self-efficacy and self-efficacy improvement. COPD rehabilitation practices can use this information to better allocate their time in

concentrating their efforts on individuals with initial low self-efficacy who stand to benefit the most from such programs. Lastly, it was shown that patient demographic characteristics do not predict self-efficacy maintenance or improvement. This is interesting to COPD rehabilitation education since all patients are equally likely to change their self-efficacy regardless of their age, gender, education level, smoking status or marital status.

6.1.4.2. Future Research Direction

Future research should aim to explore the relationship between knowledge and self-efficacy and their impact on health behaviour changes. The mechanism of interaction between knowledge and self-efficacy needs to be explicitly understood in order to help care providers further shape and refine self-management programs. Cohort studies should be designed to examine the extent at which knowledge and self-efficacy influence changes in behaviours concerning medication use, physician visits and exercise. The inclusion of behaviour measures would be useful to verify that activities were performed successfully and how this feedback interacts with knowledge and self-efficacy. It would also be beneficial for future studies to incorporate psychological and social factors strongly associated with self-efficacy. Factors, such as depression and live-in support, may provide insight on the mechanism in which knowledge interacts with self-efficacy.

All present research using the CSES is limited in that the reliability and validity of the questionnaire has not yet been established (5). No correlation with any other health status instrument or physiologic measure has supported the construct validity of the CSES (8). Further psychometric testing is required to evaluate responsiveness, as well as construct and criterion validity and the minimal clinical importance difference.

6.2. Conclusions

In summary, the study has shown that, in an elderly COPD outpatient population, (1) there were significant differences between comparison groups in the rehabilitation program in knowledge scores but not in self-efficacy scores; (2) there were significant differences in pre- and post-program self-efficacy scores over 4 months; (3) relative knowledge change was not related to self-efficacy improvement; (4) patient demographic characteristics are not associated with self-efficacy improvement; (5) baseline self-efficacy was associated with self-efficacy improvement. The findings of this study provide further insight in health education research and practices. These conclusions suggest that knowledge and self-efficacy should be measured separately in COPD rehabilitation programs. These programs must be flexible and tailored to the progress of the patients to ensure the maintenance and improvement of any self-efficacy change.

References

1. Ferguson GT, Cherniack RM. Management of Chronic Obstructive Pulmonary Disease. N Engl J Med 1993; 328 (14): 1017-22.

2. Lacasse Y, Guyatt GH, Goldstein RS. The Component of a Respiratory Rehabilitation Program: A Systemic Overview. Chest 197; 111: 1077-88.

3. Murray CJL, Lopez AD, editors. The Global Burden of Disease: A Comprehensive Assessment of Mortality from Diseases, Injuries and Risk Factors in 1990 and projected to 2020. Cambridge, MA: Harvard University, Press; 1996.

4. Celli BR. Standards for diagnosis and care of patients with COPD. Am J Respir Crit Care Med 1995; 152: S77-S120.

5. Wigal JK, Creer TL, Kotses H. The COPD Self-Efficacy scale. Chest 1991; 99: 1193-96.

6. Guyatt GH, Townsend M, Berman LB, Pugsley SO. Quality of life in patients with chronic airflow limitation. Br J Dis Chest 1987; 81: 45-54.

7. McSweeny AJ, Heaton RK, Grant I, Cugell D, Solliday N. COPD: Socioemotional adjustment and life quality. Chest 1980; 77 (suppl 2): 309-311.

8. Lacasse Y, Wong E, Guyatt G, Goldstein RS. Health Status Measurement Instrument in Chronic Obstructive Pulmonary Disease. Can Respir J 1997; 4:152-64.

9. Howland J, Nelson EC, Barlow PB. Chronic Obstructive Airway Disease: Impact of Health Education. Chest 1986; 90: 233-238.

10. Neish CM, Hopp JW. The role of education in pulmonary rehabilitation. J Cardiopulm Rehabil 1988; 11: 439-41.

11. Worth H. Self management in COPD: one step beyond. Patient Educ Couns 1997 Dec; 32(1 Suppl): S105-9.

12. Vesbo J, Sorensen T, Lange P, Brix A, Torre P, Viskum. Long-term effect of inhaled budesonide in mild and moderate chronic obstructive pulmonary disease: A randomized controlled trial. Lancet 1999; 353:1819-23.

13. Pauwels RA, Lofdahl C-G, Laitinen LA, Schouten JP, Postma DS, Pride NB, Ohlsson SV. Long-term treatment with inhaled budesonide in persons with mild chronic obstructive pulmonary disease who continue smoking. N Engl J Med 1999; 340:1948-53.

14. Burge PS, Caverley PM, Jones PW, Spencer S, Andersen JA, Maslen TK. Randomized, double blind, placebo controlled study of fluticasone propitionate in patients with moderate to severe chronic obstructive pulmonary disease. The ISOLDE trial. BMJ 2000; 320(7245):1297-303.

15. The Lung Health Study Research Group. Effect of inhaled triamcnolone on the decline in pulmonary function in chronic obstructive pulmonary disease. N Engl J Med 2000; 343:1902-09.

16. Ries AL. Position paper of the American Association of Cardiovascular and Pulmonary Rehabilitation: Scientific basis of pulmonary rehabilitation. J Cardiopulm Rehabilitation 1990; 10: 418-41.

17. Ries AL, What pulmonary Rehabilitation can do for your patients, J resp Dis 1995; 16: 685 - 704.

18. Dolce JJ, Crisp C, Manzola B, Richards JM, Hardin JM, Bailey WC. Medication adherence patterns in COPD. Chest 1991; 99: 837-47.

19. Macdonald RJ. Suggestions for establishment of pulmonary rehabilitation programs. Respiratory Care 1981; 26:966-977.

20. Davido J. Pulmonary Rehabilitation: Nursing Clinics of North America. 1981; 16:275-283.

21. Bandura A. Self-Efficacy: the Exercise of Control. New York, Freeman, 1997.

22. Smeets F. Patient Education and Quality of Life. Eur Respir Rev 1997; 7: 42, 85-87.

23. Gibson PG, Coughlan J, Wilson AJ, Hensley MJ, Abramson M, Bauman A, Walters EH. Limited (information only) patient education programs for adults with asthma. Cochrane Database Syst Rev 2000; (2): CD001005.

24. Maiman LA, Green LW, Gibson G, MacKenzie EJ. Education for Self-Treatment by Adult Asthmatics. JAMA 1979; 241: 1919-1922.

25. Bolton MB, Tilley BC, Kuder J, Reeeves T, Schultz LR. The cost and effectiveness of an education program for adults who have asthma. J Gen Intern Med 1991;6:401-407.

26. Bauman A, Browne G. The role of education in adult asthma management. Patient Management 1987;June:94-103.

27. Hopp JW, Lee JW, Hills R. Development and validation of a pulmonary rehabilitation knowledge test. J Cardiopulm Rehab 1989; 7: 273-8.

28. Wigal JK, Creer TL, Kotses H. The COPD Self-Efficacy scale. Chest 1991; 99: 1193-96.

29. Steward KJ, Kelemeen MH. Relationships between self-efficacy and mood before and after exercise training, J Cardiopulm Rehab 1994; 14: 35-42.

30. Strecher VJ, DeVellis BM, Becker MH, Rosenstock IM: The role of self-efficacy in achieving health behaviour change. Health Educ Q 13: 73-91, 1986.

31. Bandura A. Self-Efficacy: the Exercise of Control. New York, Freeman, 1997, p. 122-161.

32. Bandura A. Self-Efficacy: the Exercise of Control. New York, Freeman, 1997, p. 36-50.

33. Tobin DL, Wigal JK, Winder JA, Holroyd KA, Creer TL. The Asthma Self-Efficacy Scale. Ann Allergy 1987 Oct; 59 (4): 273-7.

34. Devine EC, Pearcy J. Meta-analysis of the effects of psychoeducational care in adults with chronic obstructive pulmonary disease. Patient Educ Couns. 1996 Nov;29(2):167-78.

35. Scherer YK, Shimmel S. Using Self-Efficacy Theory to Educate Patients with Chronic Obstructive Pulmonary Disease. Rehabil Nurs. 1996 Sep-Oct;21(5):262-6.

36. Rothman AJ. Toward a Theory-Based Analysis of Behavioral Maintenance. Health Psychology 2000; 19(1):64-69.

37. Lareau SC, ZuWallack R. Pulmonary Rehabilitation. Am J Resp & Crit. Care Med Vol 159 (5) May 1999, pp 1666-1682.

38. Day JL, Diabetic patient education: Determinants of success. Diabetes Metab Res Rev. Sept-Oct 2000; 16 Suppl 1:S70-4.

39. Scherer YK, Schmieder LE, Shimmel S. The effects of education alone and in combination with pulmonary rehabilitation on self-efficacy in patients with COPD. Rehabil Nurs 1998 Mar-Apr;23(2):71-7.

40. Scherer YK, Schmieder LE. The effect of a pulmonary rehabilitation program on self-efficacy, perception of dyspnea, and physical endurance. Heart Lung 1997 Jan-Feb;26(1):15-22.

41. Cherniak. N. S. Chronic Obstructive Pulmonary Disease. Philadelphia: W. B. Saunders, 1991.

42. Editorial, Inhaled Corticosteriod are not Beneficial in COPD. Am J Respir Crit Care Med 2000 vol. 161: 341-344.

43. Editorial, Inhaled Corticosteriod are Beneficial in COPD. Am J Respir Crit Care Med 2000 vol. 161: 341-344.

Glossary of terms

Chronic Obstructive Pulmonary Disease (COPD): Chronic Obstructive Pulmonary Disease is a near irreversible disease of the lungs, characterized by airflow limitation. It is an umbrella term that refers to a mixture of chronic lung disorders, which include chronic bronchitis and emphysema.

Chronic Bronchitis: Chronic bronchitis occurs when the airways in the lungs have become narrow and partly clogged with mucus. It is diagnosed by the presence of cough and sputum for more than three months for two consecutive years.

CSES: COPD Self-efficacy Scale.

Dyspnea: Labored or difficult breathing.

Emphysema: Emphysema occurs when some of the air sacs deep in the lungs have been damaged. It is characterized by an enlargement and destruction of the alveoli in the lungs, which causes the surrounding airways to collapse.

Exacerbation: An exacerbation is defined in this study as any deterioration of respiratory condition requiring increased bronchodilators for 3 days or more, new onset of antibiotic use and/or new onset or increased dose of systemic corticosteriods.

FEV: Forced Expiratory Volume.

Knowledge: Knowledge in this study refers to patient's knowledge of COPD.

Outcome expectation: A belief that specific consequences will follow performance of behaviour.

Pulmonary Rehabilitation: A preventative health-care program usually provided by a team of health professionals to help patients cope physically, psychologically, and socially with pulmonary disease.

Self-efficacy: A person's belief regarding whether or not they feel they can successfully execute particular behaviours in order to produce certain outcomes.

Self-efficacy improvement: A significant improvement was defined as maintenance in self-efficacy score or any decrease in self-efficacy score (a decrease in self-efficacy indicates a better CSES score).

Tables

Table 1. BASELINE CHARACTERISTICS OF THE COPD STUDY POPULATION

Characteristic	Study population (n-191)	Self-management group (n=96)	Usual care group (n=95)
Age (yr)	69.5 ± 6.9	69.4 ± 6.5	69.6 ± 7.4
Female, gender	82 (57%)	50 (52%)	56 (59%)
Scholarity, grade 12 or less	170 (89%)	79 (82%)	73 (77%)
Living Alone	86 (45%)	46 (42%)	40 (48%)
Post bronchodilators FEV1 (L)	0.99 ± 0.32	1.00 ± 0.33	0.98 ± 0.31
Dyspnea, ATS-DLD-78, grade 5	91 (47%)	44 (45%)	47 (50%)
Smoking Status (non-smoker)	142 (74%)	72 (75%)	70 (73%)
Baseline knowledge*	15.3 ± 6.44	14.91 ± 5.87	15.35 ± 6.98
Baseline self-efficacy**	3.06 ± 0.8	3.09 ± 0.86	3.03 ± 0.75

Values are means ± standard deviation unless N (%) is indicated
*Knowledge score based on Pulmonary Education Health Knowledge Test
**Self-efficacy was scored using the COPD Self-efficacy Scale on a 5-point Likert scale, with 1 representing "very confident" and 5 representing "not at all confident" in managing or avoiding breathing difficulty in a specific situation.

Table 2A. KNOWLEDGE ASSESSMENT IN THE COPD STUDY POPULATION OVER THE FOLLOW-UP YEAR

	Self-management group (n=85)	Usual care group (n=75)	p-value
Baseline	14.91 ± 5.87	15.35 ± 6.98	0.637
4-Month	20.76 ± 7	14.68 ± 7.01	<0.001
12-Month	19.97 ± 6.79	16.91 ± 6.75	0.005

Values are means +/- standard deviation
Number of patients was consistent for all 3 assessment periods

Table 2B. PRE- AND POST-PROGRAM KNOWLEDGE ASSESSMENT IN THE COPD STUDY POPULATION OVER THE FOLLOW-UP YEAR

	Pre-program (n=191)	Post-program	P-value
4-Month (n=171)	15.32 ± 7.66	17.81 ± 6.34	<0.0001
12-Month (n=160)	15.22 ± 6.92	18.55 ± 6.66	<0.0001

Values are means +/- standard deviation

Table 3A. SELF-EFFICACY ASSESSMENT IN THE COPD STUDY POPULATION OVER THE FOLLOW-UP YEAR

COPD Self-Efficacy Scale	Self-Management Group	Usual Care group*
Baseline	**(n=85)**	**(n=75)**
Negative affect	2.95 ± 0.91	2.87 ± 0.81
Emotional arousal	2.85 ± 0.89	2.78 ± 0.83
Physical exertion	3.49 ± 1.04	3.57 ± 0.88
Weather or environment	3.23 ± 0.96	3.17 ± 0.81
Behavioural risk	3.04 ± 1.08	2.91 ± 0.89
Total score	3.09 ± 0.86	3.03 ± 0.75
4-Month	**(n=82)**	**(n=71)**
Negative affect	2.74 ± 0.88	2.63 ± 0.84
Emotional arousal	2.67 ± 0.89	2.54 ± 0.79
Physical exertion	3.03 ± 0.87	3.27 ± 0.96
Weather or environment	3 ± 0.91	2.93 ± 0.82
Behavioural risk	2.72 ± 0.96	2.69 ± 0.91
Total score	2.77 ± 0.83	2.84 ± 0.73
12-Month	**(n=85)**	**(n=75)**
Negative affect	2.83 ± 0.88	2.94 ± 0.85
Emotional arousal	2.75 ± 0.89	2.86 ± 0.85
Physical exertion	3.24 ± 1.01	3.46 ± 0.96
Weather or environment	3.11 ± 0.99	3.2 ± 0.87
Behavioural risk	2.9 ± 0.97	3 ± 0.94
Total score	2.93 ± 0.85	3.06 ± 0.81

Values are means +/- standard deviation

*Comparisons of groups using unpaired t-test are not significant, $p>0.05$.

Table 3B. PRE- AND POST-PROGRAM SELF-EFFICACY ASSESSMENT IN THE COPD STUDY POPULATION OVER THE FOLLOW-UP YEAR

COPD Self-Efficacy Scale	Pre-program	Post-program
4-Month*	**(n=160)**	**(n=153)**
Negative affect	2.91 ± 0.86	2.69 ± 0.86
Emotional arousal	2.82 ± 0.86	2.61 ± 0.84
Physical exertion	3.53 ± 0.96	3.14 ± 0.92
Weather or environment	3.21 ± 0.89	2.96 ± 0.86
Behavioural risk	2.98 ± 0.99	2.7 ± 0.93
Total score	2.81 ± 0.78	3.06 ± 0.79
12-Month**	**(n=160)**	**(n=160)**
Negative affect	2.91 ± 0.86	2.88 ± 0.86
Emotional arousal	2.82 ± 0.86	2.81 ± 0.87
Physical exertion	3.53 ± 0.96	3.34 ± 0.99
Weather or environment	3.21 ± 0.89	3.17 ± 0.94
Behavioural risk	2.97 ± 0.99	2.95 ± 0.96
Total score	2.99 ± 0.83	3.06 ± 0.79

Values are means +/- standard deviation

*Comparisons of 4-month pre- and post-program results using unpaired t-test are significant, $p<0.05$.

**Comparison of 12-month pre- and post-program results using unpaired t-test are not significant, $p>0.05$.

Table 4. COPD STUDY POPULATION CHARACTERISTICS ACCORDING TO SELF-EFFICACY IMPROVEMENT OVER THE FOLLOW-UP PERIOD

Characteristic relative to Self-efficacy improvement*	4-Month		12-Month	
	Worsened (N=49)	Improved (N=111)	Worsened (N=68)	Improved (N=92)
Age (yr)	69.9 ± 5.9	69.0 ± 7.2	70.2 ± 6.9	68.6 ± 6.8
Post bronchodilators FEV1 (L)	1.0 ± 0.3	0.99 ± 0.33	0.95 ± 0.27	1.0 ± 0.3
Baseline self-efficacy	2.75 ± 0.75	3.20 ± 0.78	2.81 ± 0.68	3.24 ± 0.82
Knowledge score** at Visit	16.5 ± 7.4	18.7 ± 7.8	17.9 ± 6.1	18.9 ± 7.4
Relative knowledge change	0.05 ± 0.15	0.07 ± 0.1	0.06 ± 0.1	0.09 ± 0.1
Smoking Status (non-smoker)	37 (75.5%)	81 (72.9%)	52 (76.4%)	66 (71.7%)
Intervention	28 (57.4%)	57 (51.4%)	33 (48.5%)	52 (56.5%)
Dyspnea, ATS-DLD-78, grade 5	17 (34.7%)	58 (52.3%)	34 (50.0%)	41 (44.6%)
Female Sex	30 (61.2%)	61 (54.9%)	36 (52.9%)	55 (59.8%)
Living Alone (living spouse)*	32 (65.3%)	60 (54.5%)	36 (52.9%)	56 (60.9%)
Education < grade 12	46 (93.9%)	95 (85.6%)	59 (86.8%)	82 (89.1%)

Values are means ± standard deviation unless N (%) is indicated

* Improvement = Improvement in self-efficacy score or remained the same.

** Knowledge score based on Pulmonary Education Health Knowledge Test

Table 5. MULTIVARIATE LOGISTIC REQRESSION MODEL FOR SELF-EFFICACY IMPROVEMENT IN THE STUDY POPULATION OVER 1 YEAR FOLLOW-UP

Factor	Estimate	Odds Ratio	95% CI
4-Month Visit			
Knowledge at 4-month	0.0376	1.04	(0.99, 1.08)
Knowledge change at 4-month	0.1381	1.15	(0.73, 1.81)
Baseline knowledge	0.0254	1.03	(0.98, 1.08)
Baseline self-efficacy	0.7478	2.11	(1.34, 3.32)
Age	-0.0212	0.98	(0.93, 1.03)
Age (dichotomized)	-0.1278	0.88	(0.45, 1.70)
Post bronchodilators FEV1 (L)	-0.189	0.83	(0.29, 2.33)
Centre	0.1034	1.11	(0.93, 1.32)
Dyspnea, ATS-DLD-78	0.2048	1.23	(0.92, 1.64)
Dyspnea (dichotomized)	0.671	1.96	(0.99, 3.87)
Marital status	-0.3616	0.70	(0.35, 1.38)
Gender	-0.2639	0.77	(0.39, 1.50)
Scholarity	0.3742	1.45	(0.99, 2.14)
Intervention	-0.2107	0.81	(0.42, 1.57)
Factor	**Estimate**	**Odds Ratio**	**95%CI**
12-Month Visit			
Knowledge at 12-month	0.0208	1.02	(0.98, 1.07)
Knowledge change at 12-month	-0.1456	0.86	(0.65, 1.15)
Baseline knowledge	-0.0111	0.99	(0.94, 1.04)
Baseline self-efficacy	0.7248	2.06	(1.36, 3.14)
Age	-0.0346	0.97	(0.92, 1.01)
Age (dichotomized)	-0.1929	0.83	(0.45, 1.52)
Post bronchodilators FEV1 (L)	0.7007	2.02	(0.75, 5.41)
Centre	0.0642	1.07	(0.91, 1.24)
Dyspnea, ATS-DLD-78	0.0122	1.01	(0.77, 1.33)
Dyspnea (dichotomized)	-0.2183	0.80	(0.44, 1.48)
Marital status	0.324	1.38	(0.75, 2.56)
Gender	0.2786	1.32	(0.72, 2.44)
Scholarity	0.016	1.02	(0.74, 1.40)
Intervention	0.3212	1.38	(0.75, 2.54)

Appendices

Appendix A: Pulmonary Education Health Knowledge Test

Appendix A: Pulmonary Education Health Knowledge Test

Patient Id number	Patient initials	Date of visit	Visit number
Cns1	Cns2	Cns3 dd mmm yy	Cns4

PULMONARY EDUCATION HEALTH KNOWLEDGE TEST

Cns5 **Start time administering questionnaire** hh : mm

Read the following questions to the patients and write the answer in the box.

A. Activities of Daily Living

Cns6 [1] Which grooming technique is the best for a person with lung disease? [ ]

1. Use aerosol hairspray and deodorant regularly
2. Sit down to shave or put on makeup
3. Wash hair in the sink
4. Stand while using razor or brush

Cns7 [2] Joe occasionally becomes short of breath when taking a shower. What could he do to prevent this? [ ]

1. Use hot water so the steam could open his airways
2. Hurry to finish the shower as quickly as possible
3. Have someone else wash his back
4. Put a stool in the shower so he could sit down

Cns8 [3] Which of the following is the **best** technique to use when getting dressed? [ ]

1. Move rapidly to finish in a short period of time
2. Sit down to get dressed
3. Stand while getting dressed
4. Dress upper body first

Cns9 [4] What should a person with lung disease do when reaching up to get an item out of the cupboard? [ ]

1. Inhale through his nose
2. Hold his breath
3. Exhale through pursed lips
4. Ask for help

B. Anatomy and Physiology

Cns10 [5] Which part of the lungs is responsible for helping to move mucus up and out of the bronchial tubes?

1. The alveoli
2. The cilia
3. The goblet cells
4. The glottis

Cns11 | 6 | In which part of the lung are oxygen and carbon dioxide exchanged?

1. Alveoli
2. Bronchial tube
3. Pleura
4. Trachea

Cns12 | 7 | Which of the following statements **best** describes the diaphragm?

1. Small muscles between the ribs that help the ribs expand
2. Medium size sac that surrounds and protects the heart
3. Large membrane that completely surrounds each lung
4. Large dome-shaped muscle that forms the floor of the chest cavity

C. COPD Definitions

Cns13 | 8 | What is the one thing that the group of diseases called "COPD" have in common?

1. Difficulty in expelling air from the lungs
2. Increased production of sputum
3. Inability to get air into the lungs
4. Necessity for using supplemental oxygen

Cns14 | 9 | Which of the following is a common symptom of chronic bronchitis?

1. Decreased sinus drainage
2. Increased sputum production
3. Shortness of breath at rest
4. Wheezing on breathing out

Cns15 | 10 | What part of the lungs are damaged by emphysema?

1. Air sacs
2. Pleura
3. Capillaries
4. Trachea

D. Diet and Nutrition

Cns16 | 11 | If eating causes you to be short of breath, what can you do?

1. Eat smaller meals more frequently
2. Chew your food quickly
3. Remove your oxygen while eating
4. Drink two glasses of fluid during each meal

Cns17 | 12 | Why is fluid intake important to patients with lung disease?

1. It increases the appetite
2. It decreases the appetite
3. It thins secretions
4. It thickens secretions

E. Emergency Care/Panic Control

Cns18 | 13 | Why is the technique of pursed lip breathing effective in a panic situation?

1. It speeds up exhalation of air
2. It keeps airways open better
3. It makes supplemental oxygen unnecessary
4. It removes debris in the airways

Cns19 | 14 | If you become short of breath and begin to panic, what should you do first?

1. Lie down and relax
2. Run for help
3. Begin pursed lip breathing
4. Call your doctor for medicine

F. Exercise

Cns20 | 15 | Should you use an inhaled bronchodilator before exercising?

1. No, because it will make you more shaky
2. No, because it won't make any difference
3. Yes, it will make you feel stronger
4. Yes, it will help prevent getting short of breath

Cns21 | 16 | When building up endurance in a walking program, how fast should you increase the distance you walk?

1. Walk with a friend and change distance as the friend does
2. Don't try to increase the distance, just increase the speed
3. Increase the distance very gradually each week
4. Double the distance walked each successive week

Cns22 | 17 | Reasonable physical activity tends to have which of the following effects?

1. Decrease your ability to exercise
2. Increase your personal independence
3. Increase your shortness of breath
4. Decrease your muscle tone

Cns23 | 18 | It is recommended that you exercise during which breathing phase?

1. Inhalation (breathing in)
2. Exhalation (breathing out)
3. Whichever you prefer
4. Part inhaling, part exhaling

G. Keeping respiratory passages open

Cns24 | 19. | What is the purpose of pursed lip breathing?

1. To increase amount of air inhaled through the mouth
2. To keep smaller airways open during exhalation
3. To increase the rate of breathing
4. To hold air in the air sacs

Cns25 | 20 | In which position can a controlled breathing pattern be done?

1. Lying down only
2. Lying down or sitting
3. Lying down, sitting or standing
4. Lying down, sitting, standing or walking

Cns26 | 21 | Why is diaphragmatic breathing preferred over chest muscle breathing?

1. It uses less energy
2. It is good for digestion
3. It exercises the stomach muscles
4. It requires less concentration

Cns27 | 22 | Which breathing rhythm is the most recommended?

1. Inhale and exhale for equal amounts of time
2. Inhale twice as long as you exhale
3. Exhale twice as long as you inhale
4. Whatever rhythm is natural for you

Cns28 | 23 | How can you tell if you are doing diaphragmatic breathing correctly?

1. When you breathe IN the chest will rise
2. When you breathe OUT the chest will rise
3. When you breathe IN the stomach will rise
4. When you breathe OUT the stomach will rise

Cns29 | 24 | Why is pursed lip breathing recommended?

1. It allows air to move out of the airways
2. It reduces airway collapse and air trapping
3. It increases the rate of breathing
4. It strengthens the chest muscles

H. Medicines

Cns30 | 25 | Which of the following is the best safety rule to follow when taking your medicines?

1. Use antacids with all your medicines
2. Swallow all your medicines at one time
3. If one pill works well, two will work better
4. Take medicines as the doctor prescribes

Cns31 | 26 | Which of the following is one of the benefits of steroid medicines to a person with lung disease?

1. Steroids thin mucus
2. Steroids decrease airway swelling
3. Steroids fight infection
4. Steroids increase airway spasms

Cns32 | 27 | In which of the following situations are bronchodilators most effective?

1. At the height of a wheezing attack
2. After doing heavy activity
3. Immediately following postural drainage
4. On a routine daily schedule

I. Mental Health

Cns33 | 28. | Which of the following best illustrates assertiveness?

1. "If you had a breathing problem like I do..."
2. "If you only know how sick I am..."
3. "If you could call me back later..."
4. "If you had emphysema..."

Cns34 | 29 | Which of the following is most important to ensure the success of a rehabilitation program? ☐

1. The cost of the program
2. The patient's motivation
3. The doctor's recommendation
4. The quality of the teaching

J. Pathophysiology

Cns35 | 30 | Swollen airway linings, an increase in mucus, and a chronic cough are usual symptoms of which disease? ☐

1. Asthma
2. Bronchitis
3. Fibrosis
4. Emphysema

K. Sex

Cns36 | 31 | What would a healthy response be if you fear failure during your sexual activity? ☐

1. Stop, relax, start again when calm
2. Refrain from discussing sex
3. Avoid attempting sexual activity
4. Apologize to your partner for failing

Cns37 | 32 | When planning sexual activity, it is often helpful to: ☐

1. Avoid discussing sexual feelings
2. Use a bronchodilator beforehand
3. Take a tranquilizer
4. Wait for your partner to begin

L. Sleeping

Cns38 | 33 | What should you do if your medicines prevent you from falling asleep at night? ☐

1. Do not take your last dose
2. Avoid scheduling your medicines at your bedtime
3. Take your medicines if you wake up during the night
4. Take all your medicines in the morning

M. Stress and Relaxation

Cns39 | 34 | Which of the following symptoms might indicate you are feeling anxious? ☐

1. Rhythmic breathing
2. Trouble sleeping
3. Slow pulse
4. Dry skin

Cns40 | 35 | Which is the best example of someone practicing relaxation? ☐

1. Imagining a quiet scene
2. Watching TV
3. Sleeping
4. Playing golf

Cns41 | 36 | Which of the following is the most common physical reaction to tension? ☐

1. A decrease in the blood pressure
2. A decrease in the amount of oxygen needed
3. An increase in muscle relaxation
4. An increase in the respiration rate

Cns42 | 37 | Which of the following is most beneficial for relieving tension? ☐

1. Drink two strong cocktails
2. Smoke two or three cigarettes
3. Use relaxation techniques
4. Take tranquilizers

Cns43 | 38 | What is visual imagery? ☐

1. Tightening and relaxing all muscle in the body
2. Thinking of a word that is relaxing
3. Dreaming of a scene that is relaxing
4. Concentrating on a certain part of the body

N. Support Groups

Cns44 | 39 | Which of the following is true of support groups for lung disease patients? ☐

1. They are available by prescription only
2. They are provided only for the severely ill patient
3. They are available only in big cities
4. They can be found by checking the telephone directory

O. Tests

Cns45 | 40 | Which of the following symptoms tells your physician you might be suffering from chronic bronchitis?

1. Fever of 101°F (38.5° C) with changes in the colour of your sputum
2. Severe wheezing especially around allergens such as pollens and bad odours
3. Daily cough with sputum for at least three months a year for the past two years
4. Little coughing but difficulty in completely emptying the air from the lungs

Cns46 **End time administering questionnaire** | | | : | | |

hh mm

Appendix B: Test pour evaluer les connaissances des patients avec MPOC

Appendix B: Test pour evaluer les connaissances des patients avec MPOC

Numéro du patient	Initiales du patient	Date de la visite			Numéro de la visite
Cns1	Cns2	Cns3			Cns4
		jj	mmm	aa	

TEST POUR ÉVALUER LES CONNAISSANCES DES PATIENTS AVEC MPOC

Cns5 **Heure du début de l'administration du questionnaire** ☐☐ : ☐☐
hh mm

Lire les questions aux patients et inscrire dans la case le chiffre correspondant à leur réponse.

A. Activités de la vie quotidienne

Cns6 [1] Quelle est la meilleure technique qu'une personne souffrant de maladie respiratoire devrait utiliser pour faire sa toilette? ☐

1. Utiliser régulièrement un fixatif et un désodorisant en aérosol
2. S'asseoir pour se raser ou se maquiller
3. Se laver les cheveux dans le lavabo
4. Se raser ou se brosser les cheveux debout

Cns7 [2] Il arrive parfois à Joseph de manquer de souffle lorsqu'il prend sa douche. Que peut-il faire pour prévenir cette situation? ☐

1. Utiliser de l'eau chaude pour que la vapeur ouvre ses voies respiratoires
2. Se hâter pour terminer sa douche le plus rapidement possible
3. Demander à quelqu'un de lui laver le dos
4. Mettre un tabouret dans la douche afin de pouvoir s'y asseoir

Cns8 [3] Parmi les techniques suivantes, quelle est **la meilleure** à utiliser pour se vêtir? ☐

1. Se dépêcher pour terminer dans un court délai
2. S'asseoir pour se vêtir
3. Demeurer debout pour se vêtir
4. Se vêtir en commencant par le haut

Cns9 [4] Que devrait faire une personne souffrant de maladie respiratoire, lorsqu'elle doit atteindre un objet dans l'armoire? ☐

1. Inspirer par le nez
2. Retenir son souffle
3. Expirer en tenant les lèvres pincées
4. Demande de l'aide

B. Anatomie et physiologie

Cns10 [5] Quelle partie des poumons aide à remonter le mucus et à l'expulser des bronches? ☐

1. Les alvéoles
2. Les cils
3. Les cellules à goblet
4. La glotte

Cns11 [6] Dans quelle partie du poumon se fait l'échange de l'oxygène et du gaz carbonique? ☐

1. Les alvéoles
2. Les bronches
3. La plèvre
4. La trachée

Cns12 [7] Quel énoncé suivant décrit le **mieux** le diaphragme? ☐

1. De petits muscles entre les côtes qui aident les côtés à prendre de l'expansion
2. Un sac de taille moyenne qui entoure et protège le coeur
3. Une large membrane qui entoure complètement chaque poumon
4. Un grand muscle en forme de dome qui forme le fond de la cavité thoracique

C. Définitions de la MPOC

Cns13 [8] Quel caractère unique ont en commun les maladies respiratoires nommées "MPOC" ? ☐

1. La difficulté d'expulser l'air des poumons
2. Une production accrue d'expectorations
3. L'incapacité de faire entrer l'air dans les poumons
4. La nécessité d'avoir recours à un supplément d'oxygène

Cns14 [9] Lequel des éléments suivants est un symptôme courant de la bronchite chronique? ☐

1. Écoulement sinusal réduit
2. Production accrue d'expectorations
3. Essoufflement au repos
4. Expiration sibilante "wheezing"

Cns15 [10] Quelle partie des poumons est endommagée par l'emphysème? ☐

1. Les sacs alvéolaires
2. La plèvre
3. Les capillaires
4. La trachée

D. Régime alimentaire et nutrition

Cns16 [11] Que pouvez-vous faire si manger vous cause de l'essoufflement? ☐

1. Prendre des petits repas plus fréquemment
2. Mâcher votre nouriture rapidement
3. Enlever votre oxygène pendant que vous mangez
4. Boire deux verres de liquide à chaque repas

Cns17 [12] Pourquoi la prise de liquide est-elle importante pour les personnes qui souffrent de maladie respiratoire? ☐

1. Elle augmente l'appétit
2. Elle diminue l'appétit
3. Elle liquifie les sécrétions
4. Elle épaissit les sécrétions

E. Soins d'urgence /Contrôle de la panique

Cns18 [13] Pourquoi la technique de la respiration à lèvres pincées est-elle efficace en situation de panique? ☐

1. Elle accélère l'expiration de l'air
2. Elle maintient une meilleure ouverture des voies respiratoires
3. Elle rend inutile le recours à un supplément d'oxygène
4. Elle retire des débris qui obstruent les voies respiratoires

Cns19 14 Si vous devenez essoufflé(e) et commencez à paniquer, que devriez-vous faire avant tout?

1. Vous allonger et relaxer
2. Courir chercher de l'aide
3. Commencer à respirer à lèvres pincées
4. Appeler votre médecin, afin d'obtenir des médicaments

F. Exercice

Cns20 15 Devriez-vous utiliser un bronchodilatateur avant de commencer à faire de l'exercice?

1. Non, car cela vous rendra plus tremblant
2. Non, car cela ne fera aucune différence
3. Oui, cela vous donnera la sensation d'être plus fort
4. Oui, cela vous aidera à prévenir l'essoufflement

Cns21 16 Lorsque vous essayez d'augmenter votre endurance au moyen d'un programme de marche, à quel rythme devriez-vous allonger la distance de marche?

1. Marcher avec un(e) ami(e) et changer la distance en même temps que lui ou elle
2. Ne pas tenter d'allonger la distance, seulement augmenter la vitesse
3. Accroître la distance très graduellement chaque semaine
4. Doubler la distance parcourue chaque semaine

Cns22 17 Une activité physique raisonnable a généralement quel effet?

1. Diminuer votre capacité de faire de l'exercice
2. Augmenter votre indépendance personnelle
3. Augmenter votre essoufflement
4. Diminuer votre tonus musculaire

Cns23 18 Pendant quelle phase de la respiration est-il recommandé de faire de l'exercise?

1. Inspiration (entrer l'air)
2. Expiration (sortir l'air)
3. Celle que vous préférez
4. En partie en inspirant, en partie en expirant

G. Maintenir les voies respiratoires ouvertes

Cns24 19 Quel est l'objectif de la respiration à lèvres pincées?

1. Augmenter la quantité d'air inspirée par la bouche
2. Garder les petites voies respiratoires ouvertes pendant l'expiration
3. Augmenter la fréquence de la respiration
4. Retenir l'air dans les sacs alvéolaires

Cns25 20 Dans quelle position peut-on contrôler la façon de respirer?

1. Allongée seulement
2. Allongée ou assise
3. Allongée, assise ou debout
4. Allongée, assise, debout, ou en marchant

Cns26 21 Pourquoi la respiration diaphragmatique est-elle préférable à la respiration des muscles de la cage thoracique?

1. Elle requiert moins d'énergie
2. Elle favorise la digestion
3. Elle fait travailler les muscles abdominaux
4. Elle exige moins de concentration

Cns27 22 Quel est le rythme respiratoire le plus recommandé?

1. Inspiration et expiration de même durée
2. Inspiration deux fois plus longue que l'expiration
3. Expiration deux fois plus longue que l'inspiration
4. Suivre son rythme naturel

Cns28 23 Comment savez-vous si vous faites correctement la respiration diaphragmatique?

1. Lorsque vous INSPIREZ, la poitrine se gonfle
2. Lorsque vous EXPIREZ, la poitrine se gonfle
3. Lorsque vous INSPIREZ, l'abdomen se gonfle
4. Lorsque vous EXPIREZ, l'abdomen se gonfle

Cns29 24 Pourquoi la respiration à lèvres pincées est-elle recommandée?

1. Cela permet à l'air de sortir des voies respiratoires
2. Elle réduit l'affaissement des voies respiratoires et la rétention d'air
3. Elle augmente la fréquence de la respiration
4. Elle renforce les muscles de la cage thoracique

H. Médicaments

Cns30 25 Laquelle des règles de sécurité suivantes est la meilleure à suivre lorsque vous prenez vos médicaments?

1. Prendre des antiacides avec tous vos médicaments
2. Avaler tous vos médicaments en même temps
3. Si un comprimé donne de bons résultats, deux en donneront de meilleurs
4. Prendre ses médicaments tels que prescrits par le médecin

Cns31 26 Lequel des énoncés suivants est un avantage d'utiliser des cortistéroïdes pour une personne souffrant de maladie respiratoire?

1. Les stéroïdes liquifient le mucus
2. Les stéroïdes diminuent l'enflure des voies respiratoires
3. Les stéroïdes combattent l'infection
4. Les stéroïdes augmentent les spasmes des voies respiratoires

Cns32 27 Dans laquelle des situations suivantes les bronchodilatateurs sont-ils les plus efficaces?

1. Au plus fort d'une crise de sifflement
2. Après une activité intense
3. Immédiatement après un drainage postural
4. Dans le cadre d'une utilisation quotidienne régulière

I. Statut Mental

Cns33 28 Lequel des énoncés suivants illustre le mieux l'affirmation de soi?

1. «Si vous aviez un problème respiratoire comme le mien...»
2. «Si vous saviez à quel point je suis malade...»
3. «Si vous pouviez me rappeler plus tard...»
4. «Si vous souffriez d'emphysème»

Cns34 29 Lequel des aspects suivants compte le plus pour assurer le succès d'un programme de réadaptation?

1. Le coût du programme
2. La motivation du patient
3. La recommandation du médecin
4. La qualité de l'enseignement

J. Pathophysiologie

Cns35 [30] L'enflure des parois des voies respiratoires, l'augmentation du mucus et une toux chronique sont des symptômes courants de quelle maladie? ☐

1. L'asthme
2. La bronchite
3. La fibrose
4. L'emphysème

K. Activité sexuelle

Cns36 [31] Quelle serait une bonne attitude saine à adopter si vous craignez un échec pendant vos relations sexuelles? ☐

1. Arrêter, se détendre et recommencer lorsqu'on a repris son calme
2. Se garder de parler d'activité sexuelle
3. Éviter de se lancer dans toute activité sexuelle
4. S'excuser auprès de son partenaire pour cet échec

Cns37 [32] Lorsque vous planifiez une activité sexuelle, il est souvent utile : ☐

1. D'éviter de parler de ses désirs sexuels
2. D'utiliser un bronchodilatateur au préalable
3. De prendre un tranquillisant
4. D'attendre que son partenaire commence

L. Sommeil

Cns38 [33] Que devriez-vous faire si vos médicaments vous empêchent de dormir la nuit? ☐

1. Ne pas prendre la dernière dose
2. Éviter d'avoir à prendre vos médicaments avant de vous coucher
3. Prendre vos médicaments si vous vous réveillez pendant la nuit
4. Prendre vos médicaments le matin

M. Stress et relaxation

Cns39 [34] Lequel des symptômes suivants peut indiquer que vous êtes anxieux(se)? ☐

1. Une respiration rythmique
2. Difficulté à trouver le sommeil
3. Pouls lent
4. Peau sèche

Cns40 [35] Quel est le meilleur exemple d'activité d'une personne qui pratique la relaxation? ☐

1. Imaginer une scène calme
2. Regarder la télévision
3. Dormir
4. Jouer au golf

Cns41 [36] Quelle est la réaction physique la plus courante à la tension? ☐

1. Diminution de la tension artérielle
2. Diminution de la quantité d'oxygène nécessaire
3. Augmentation de la relaxation musculaire
4. Augmentation de la fréquence respiratoire

Cns42 | 37 | Laquelle de ces activités est la plus susceptible d'éliminer les tensions? ☐

1. Boire deux bons cocktails
2. Fumer deux ou trois cigarettes
3. Utiliser des techniques de relaxation
4. Prendre des tranquillisants

Cns43 | 38 | Qu'est-ce que l'imagerie visuelle? ☐

1. Resserrement et relaxation de tous les muscles du corps
2. Penser à un mot relaxant
3. Rêver à une scène relaxante
4. Se concentrer sur une partie du corps

N Groupes de soutien

Cns44 | 39 | Lequel des énoncés suivants s'applique aux groupes de soutien des personnes souffrant de maladie respiratoire? ☐

1. Ils sont disponibles sur ordonnance seulement
2. Ils sont offerts uniquement aux malades gravement atteints
3. Ils n'existent que dans les grandes villes
4. On peut les trouver dans l'annuaire téléphonique

O. Analyses

Cns45 | 40 | Lequel des symptômes suivants indiquera à votre médecin que vous pourriez souffrir de bronchite chronique? ☐

1. Une fièvre de 101° F (38.5°C) avec changement de couleur des expectorations
2. Une respiration sibilante sévère "wheezing" , surtout en présence de substances allergènes, telles que les pollens et les mauvaises odeurs
3. Une toux quotidienne avec expectoration pendant au moins trois mois par année au cours des deux dernières années
4. Peu de toux, mais difficulté d'expulser complètement l'air des poumons

Cns46 **Heure de la fin de l'administration du questionnaire** ☐☐ : ☐☐

hh mm

Appendix C: COPD Self-Efficacy Scale

Appendix C: COPD Self-Efficacy Scale

Patient Id number	Patient initials	Date of visit	Visit number
Eff1 ☐☐☐☐	Eff2 ☐☐☐	Eff3 ☐☐ ☐☐☐ ☐☐ (dd mmm yy)	Eff4 ☐

THE COPD SELF-EFFICACY SCALE

Eff5 **Start time administering questionnaire** ☐☐:☐☐ (hhmm)

Read each numbered item below, and determine how confident you are that you could manage breathing difficulty in that situation. Use the following scale as a basis for your answers :

		Very confident	Pretty confident	Somewhat confident	Not very confident	Not at all confident
Eff6	1. When I become too tired.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff7	2. When there is humidity in the air.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff8	3. When I go into cold weather from a warm place.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff9	4. When I experience emotional stress or become upset.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff10	5. When I go up stairs too fast.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff11	6. When I try to deny that I have respiratory difficulties.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

		1	2	3	4	5
		Very confident	**Pretty confident**	**Somewhat confident**	**Not very confident**	**Not at all confident**
Eff12	7. When I am around cigarette smoke.	☐	☐	☐	☐	☐
Eff13	8. When I become angry.	☐	☐	☐	☐	☐
Eff14	9. When I exercise or physically exert myself.	☐	☐	☐	☐	☐
Eff15	10. When I feel distressed about my life.	☐	☐	☐	☐	☐
Eff16	11. When I feel sexually inadequate or impotent.	☐	☐	☐	☐	☐
Eff17	12. When I am frustrated.	☐	☐	☐	☐	☐
Eff18	13. When I lift heavy objects.	☐	☐	☐	☐	☐
Eff19	14. When I begin to feel that someone is out to get me.	☐	☐	☐	☐	☐
Eff20	15. When I yell or scream.	☐	☐	☐	☐	☐
Eff21	16. When I am lying in bed.	☐	☐	☐	☐	☐
Eff22	17. During very hot or very cold weather.	☐	☐	☐	☐	☐
Eff23	18. When I laugh a lot.	☐	☐	☐	☐	☐

Eff24	19. When I do not follow a proper diet.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
		Very confident	**Pretty confident**	**Somewhat confident**	**Not very confident**	**Not at all confident**
Eff25	20. When I feel helpless.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff26	21. When I drink alcoholic beverages.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff27	22. When I have an infection (throat, sinus, cold, flu, etc.).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff28	23. When I feel detached from everyone and everything.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff29	24. When I experience anxiety.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff30	25. When I am around pollution.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff31	26. When I overeat.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff32	27. When I feel down or depressed.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff33	28. When I breathe improperly.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff34	29. When I exercise in a room that is poorly ventilated.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff35	30. When I am afraid.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

		Very confident	Pretty confident	Somewhat confident	Not very confident	Not at all confident
Eff36	31. When I experience the loss of a valued object or a loved one.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff37	32. When there are problems in the home.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff38	33. When I feel incompetent.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff39	34. When I hurry or rush around.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

End time administering questionnaire ☐☐ : ☐☐
hh mm

Appendix D : ÉCHELLE D'AUTO-EFFICACITÉ DE LA MPOC

Appendix D : ÉCHELLE D'AUTO-EFFICACITÉ DE LA MPOC

Numéro du patient	Initiales du patient	Date de la visite	Numéro de la visite
Eff1 ☐☐☐☐	Eff2 ☐☐☐	Eff3 ☐☐ jj ☐☐☐ mmm ☐☐ aa	Eff4 ☐

ÉCHELLE D'AUTO-EFFICACITÉ DE LA MPOC

Eff5 **Heure du début de l'administration du questionnaire** ☐☐ hh : ☐☐ mm

Lisez chaque énoncé ci-dessous. **Déterminez la confiance que vous avez en vous-même pour maîtriser ou éviter la difficulté à respirer dans chacune des situations.** Utilisez l'échelle suivante pour répondre aux énoncés : Indiquez votre réponse pour chaque question par un crochet (√).

			Très confiant	Assez confiant	Plus ou moins confiant	Peu confiant	Pas confiant du tout
Eff6	1	Lorsque je deviens trop fatigué(e).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff7	2	Lorsqu'il y a de l'humidité dans l'air.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff8	3	Lorsque je vais d'un endroit chaud à un endroit froid.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff9	4	Lorsque je vis un stress émotionnel ou deviens contrarié(e).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff10	5	Lorsque je monte les escaliers trop vite.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff11	6	Lorsque j'essaie de nier que j'ai des difficultés respiratoires.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff12	7	Lorsqu'il y a de la fumée de cigarette autour de moi.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff13	8	Lorsque je me fâche.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

			Très confiant	Assez confiant	Plus ou moins confiant	Peu confiant	Pas confiant du tout
Eff14	9	Lorsque je fais de l'exercice ou que je me dépense physiquement.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff15	10	Lorsque je me sens affligé(e) par la vie.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff16	11	Lorsque je me sens sexuellement inadéquat(e) ou impuissant(e).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff17	12	Lorsque je suis frustré(e).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff18	13	Lorsque je soulève des objets lourds.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff19	14	Lorsque je sens que quelqu'un essaie de me prendre en défaut.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff20	15	Lorsque je hurle ou je crie.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff21	16	Lorsque je suis allongé(e) sur un lit.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff22	17	Lorsque la température est très chaude ou très froide.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff23	18	Lorsque je ris beaucoup.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff24	19	Lorsque je ne suis pas une diète appropriée.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff25	20	Lorsque je me sens désemparé(e).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff26	21	Lorsque je bois des boissons alcoolisées.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
Eff27	22	Lorsque j'ai une infection (gorge, sinus, rhume, grippe, etc.).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

			Très confiant	Assez confiant	Plus ou moins confiant	Peu confiant	Pas confiant du tout
Eff28	23	Lorsque je me sens détaché(e) des gens et des choses.	1	2	3	4	5
Eff29	24	Lorsque je suis anxieux(se).	1	2	3	4	5
Eff30	25	Lorsque je suis dans un environnement pollué.	1	2	3	4	5
Eff31	26	Lorsque je mange trop.	1	2	3	4	5
Eff32	27	Lorsque je me sens démoralisé(e) et déprimé(e).	1	2	3	4	5
Eff33	28	Lorsque je ne respire pas bien.	1	2	3	4	5
Eff34	29	Lorsque je fais de l'exercice dans une pièce mal ventilée.	1	2	3	4	5
Eff35	30	Lorsque j'ai peur.	1	2	3	4	5
Eff36	31	Lorsque je vis la perte d'un objet de valeur ou d'un être aimé.	1	2	3	4	5
Eff37	32	Lorsqu'il y a des problèmes à la maison.	1	2	3	4	5
Eff38	33	Lorsque je me sens incompétent(e).	1	2	3	4	5
Eff39	34	Lorsque je me dépêche ou me presse.	1	2	3	4	5

Eff40 **Heure de la fin de l'administration du questionnaire** [ ][ ] : [ ][ ]
hh mm