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Review paper

Self-management and behaviour modification in COPD

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Abstract

There is new evidence from recent studies that disease-specific self-management improves health status and reduces hospital admissions in COPD patients. It is critical to implement health education programs in the continuum of care aimed at behaviour modification. Studies in COPD have shown that self-management increases knowledge and skills the patients require to treat their own illness. It is also essential to be more effective in improving patients' confidence in their ability to follow a self-care regimen, for example, by augmenting self-efficacy. Self-efficacy plays a part in determining which activities or situations an individual will perform or avoid. Results from a recent qualitative study suggested that a continuum self-management program helps COPD patients to perform given self-health behaviours. COPD patients have perceived barriers and factors (disease-related skills), which will hinder or facilitate lifestyle modification. To be successful, self-management does require a multifaceted approach that incorporates not only teaching various disease contents but also implementing strategies to change behaviour in patients. Further research is needed to develop strategies on how to intervene and facilitate behaviour modification in chronic disease and as such the relevance for the implementation of self-management programs in COPD.

Keywords: COPD; Self-management; Behaviour

1. Introduction

Self-management applies to any formalised patient education program aimed at teaching skills needed to carry out specific medical regimens specific to the disease and guide health behaviour change for patients to control their disease and improve their well-being.

Although the number of published trials on self-management in COPD is limited, there is now evidence to suggest that it can improve health status [1–4], reduce emergency visits [4,5] and hospitalisations [4]. On the basis of the positive effect of self-management in COPD, self-management should assume a greater role in the continuum of COPD care.

To date, the benefits of self-management have been measured by changes in health status and the use of health services. To attain improvements in health status and reduce the use of health services in COPD patients, it is critical to implement health education programs in the continuum of care [4] aimed at behaviour modification. Behaviour modification implies the appropriate use of many disease-related skills such as inhalation techniques, self-use of a prescription as part of an action plan when the patient has an exacerbation, lifestyle behaviours such as smoking cessation, regular exercise, diet and sleep habits. Self-management can be described as a set of skilled behaviours and refers to the various tasks that a person carries out for management of their condition. Teaching of self-management skills is not enough to bring about change in behaviour; the patient should learn to integrate these skills in his everyday life. As these skills are performed with success in various situations, the person develops a sense of self-efficacy which is the confidence an individual has in response to specific actions and his or her ability to perform these actions [6]. Self-efficacy will play a part in determining which activities or situations a person will perform or avoid. We can argue that the effects of a self-management program on health status and health care utilisation results from behaviour change, which in turn is caused by enhancement of both self-efficacy, knowledge and skill. Although this is a rather complex causal chain, Fig. 1 depicts a simple illustration of this model.

This article presents and discusses self-management in COPD and assessing patients' knowledge, disease-related skill, self-efficacy, and behaviour modification. New study

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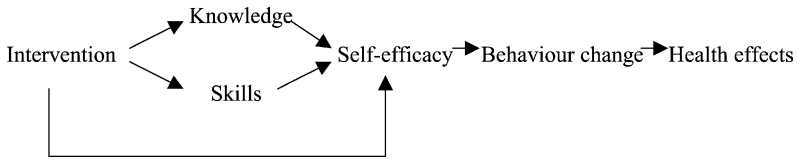

Fig. 1. Causal model of behaviour change.

results are presented in support of self-management and behaviour modification in COPD patients.

2. Acquisition of knowledge

Table 1 presents the results of COPD studies that have assessed self-management program and patients' knowledge. A number of approaches have been used to evaluate an individual's disease knowledge. The most common method of disease knowledge assessment is with the administration of questionnaires. The Pulmonary Rehabilitation Health Knowledge Test is the only published validated questionnaire that assesses COPD patient's knowledge. This questionnaire is a self-administered multiple-choice test consisting of 40 questions covering the component areas identified as relevant to rehabilitation programs. Table 1 shows that two studies used the Pulmonary Rehabilitation Health Knowledge Test, while the other two studies developed their own questionnaire. In these [4] studies, patients involved in self-management programs acquired new knowledge [7–10]. None of the studies assessed the relationship between enhancement of knowledge and behaviour changes. Despite an improvement in patients' knowledge, only one study [4] reported an additional improvement in health status and a reduction in the use of health service.

In a meta-analysis including 30 experimental studies of chronic disease, Mazzuca [11] showed evidence that efforts to improve health by improving knowledge alone were rarely successful while behavioural-oriented programs (regimen-oriented) were consistently more successful at improving the clinical course of chronic disease. People may memorize information well, but are not necessarily able to put the information into use. Among the more successful interventions were regular contact with the same health care professional, control over stimuli and rewards for progress, establishment of a system for aiding the memory and self-care rituals [11].

3. Enhancements of self-efficacy

3.1. Mechanism underlying self-efficacy

There is sufficient empirical evidence to support the notion that behavioural performance and patient's belief in their ability to perform in varied situations and disease states are linked by self-efficacy. In 1977, Bandura [12] coined the

Table 1
Overview of the results of COPD studies with self-management program and assessment of the patients knowledge

Reference	Self-management program	Knowledge assessment		
		Type of questionnaire	Knowledge change[a]	Other outcome change[a]
[9]	Focus on problems in daily activities and signs of exacerbation	Questionnaire developed for the study	COPD (↑) Medicines (↑)	Health status (=) Hospital admissions (=)
[7]	Multicomponent educational program	Pulmonary Rehabilitation Health Knowledge (40 items) [26]	Overall (↑)[b]	Health status (=) Anxiety and depression (=)
[8]	Pharmaceutical care services	Questionnaire developed for the study (14 items)	COPD (=) Smoking (↑) Devices (↑) Bronchodilators (↑) Steroids (=)	Health status (=) Hospital admissions (=) Health providers (↓) Patient satisfaction (↑)
[10]	Multicomponent educational program	Pulmonary Rehabilitation Health Knowledge (40 items) [26]	Overall (↑)[b]	Health status (↑)[c] Hospital admissions (↓)[c] Emergency visits (↓)[c]

(↑) Increase; (↓) decrease; (=) no change in the intervention group as compared to the control group.
[a] Intervention group vs. control group.
[b] Knowledge changes not presented with respect to the specific items.
[c] Results of the study by Bourbeau et al. [4].

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 has advised that the scale of perceived self-efficacy should be tailored to the particular function of interest.

It is believed that self-efficacy, when applied to the self-management of complex chronic disease health care regimens, must account for initial and ongoing phases of a multitask self-management regimen. Complex regimens involve multiple tasks each with its own efficacy belief and expectation. Initially a general sense of personal efficacy, as well as belief in a positive outcome to the new challenge, may determine adoption, effort and persistence in the face of perceived barriers. However, task-specific efficacy beliefs are often initially low and increase as the patient persists and masters the various new skills and behaviour modifications. Patients with strong efficacy beliefs are able to withstand failures associated with mastering a complex task and are more likely to persist in their efforts with difficult tasks [6]. Bandura indicated that efficacy expectations will change over time [13]; there is a continuum from general to specific [14] or an interaction between general and specific perceived efficacy.

In a chronic disease such as COPD, it is important to work at improving confidence in patient's ability to follow a self-care regimen by increasing self-efficacy. Advanced age, as it applies to many COPD patients, should not be seen as a limitation in patient's perceived ability or personal efficacy beliefs. Ferrini et al. [15] has showed that increasing age did not diminish the relationship between health beliefs and health behaviour. As in young people, elderly people with positive beliefs were more likely to report positive changes in health behaviours.

A belief in the outcome expectations of the self-care regimen is a powerful motivator for the patient. Personal efficacy is also influenced by somatic indicators, such as physiological, physical and affective states [16]. It is not unusual to see patients who do not complete the course, or are unable to continue with recommended lifestyle changes, despite the intention to do so. Bandura has suggested that patients give up trying for two reasons: (1) they doubt their ability to carry out the task required of them (efficacy-based futility); or (2) they believe that they cannot influence the outcome regardless of their ability (outcome-based futility) [6].

3.2. The role of self-efficacy in COPD

Investigation is limited in the area of COPD regarding the relationship between self-management and self-efficacy, and specific behaviour modification. Scherer and Schmieder [17] assessed in an uncontrolled study the effect of attendance at a pulmonary rehabilitation program on self-efficacy expectations in patients with COPD. Twenty-nine self-selected patients participated in the study. Self-efficacy was assessed using the COPD Self-Efficacy Scale (CSES) developed by Wigal et al. [18], a 34-item self-administered questionnaire, divided into five domains: negative affect, emotional arousal, physical exertion, weather or environment, and behavioural risk factors. Validity of this questionnaire was assumed based on the apparent validity of Bandura' self-efficacy theory [19]. The patients who agreed to participate in the study completed the CSES. The goals of the patients and the areas where they lacked confidence in their ability to manage, or avoided, breathing difficulty was reviewed by the coordinator of the program to optimize goal attainment and efficacy expectations. There was a significant difference between pre-program and one-month post-program as well as six-month post-program total scores on the CSES. There were also significant improvements on each of the five subscales. Because there was no control group, it is not possible in this study to attribute the results unequivocally to the program alone.

Atkins et al. [20] in a randomised clinical trial assessed three groups with experimental conditions designed to increase compliance with an exercise prescription (behaviour modification, cognitive-behaviour modification or cognitive modification) compared against an attention control and a no-treatment control group. Seventy-six patients with moderate to severe COPD participated in the study. Self-efficacy was assessed for each patient using an instrument adapted from studies by Bandura. The value of the interventions were assessed using a variety of outcomes measure. After three months, the three treatment groups showed significant increases in exercise tolerance in comparison to the two control groups. In addition, significant differences were showed for changes in health status and self-efficacy judgements. The results of this study suggest that cognitive and behavioural strategies as part of self-management programs would be useful for motivating and maintaining compliance to a regular walking program among moderate to severe COPD patients. In other studies as well, the degree of self-efficacy has been a significant factor in predicting the use of the treadmill, walking performance [21], and success in pulmonary rehabilitation [22] in people with COPD. Self-efficacy plays an important part in determining which activities or situations an individual will perform or avoid.

3.3. How self-efficacy expectations may be effectively increased?

The important question is how self-efficacy expectations of patients with chronic disease such as COPD may be effectively increased. Various strategies can be used by the health professional to enhance patient's self-efficacy and can be summarised with the following:

(1) practice;
(2) feedback;
(3) reattribution of the perceived causes of failure when the patient has negative experiences;
(4) sharing experience (role model).

Behavioral skills need to be practised by the patients during the program as much as possible. For those patients who are seen at home, take the opportunity to practice them in their environment. You have to coach the patient. For example, when patients call you when they use their action plan, we do not tell them what to do, we get them to think through their problem, solve and make a decision. Since COPD is a deteriorating long-term illness, patient may also need some readjustment; as the patient passes on to another phase of his illness, he has to readapt.

Patients need to get feedback on their behavioural performance. Each visit or telephone contact becomes an opportunity for the patient to get feedback and to learn to deal more effectively. Patients need reassurance and re-enforcement of appropriate behavior. Somatic indicators such as physiological, physical or affective states can be used not only to indicate the improvement of the patient's health state but also to influence the patient's efficacy beliefs about actions taken and outcome expectations for future actions. For example, for those patients going through an exercise training program, improvement of exercise capacity using an exercise test in laboratory or a field test can be used as a positive feedback (biofeedback).

Prior (negative) experiences of patients in carrying out the behaviours need to be addressed; patients who have experienced failures in the past may need to reattribute the perceived causes of this failure ("I was not adequately prepared then, but now I know exactly how to . . . "). Patients who have (successfully) completed the program in the past and who are willing to share their positive experiences with new patients (in a group setting) can provide a strong modelling effect: learning from a peer that succeed in changing the behaviour(s) is indeed possible will enhance their own self-efficacy expectations. Groups can be useful in helping patients learn vicariously through a sharing of experiences, reinforce learning, change self-image and discourage passivity.

COPD, like other chronic diseases, is also managed within the family context. Patients may feel misunderstood and diminished. Often it is beneficial to have the spouse and family to take on the task of helping the patient, to take on self-monitoring skills, give positive reinforcement. As health professionals involved in COPD patient care, we should tailor the information offered in an education program so that patients with a chronic disease are able to develop and strengthen their sense of self-efficacy with experience mastery. Patients who accept challenges and are able to persist will not need as much support as those who are not able to accept the necessity for change.

4. Self-management and behaviour modification

Self-management requires the knowledge and skills needed to devise, evaluate and implement one's own individual plan for health behaviour changes. Until now, studies are available in which self-management programs have been shown to influence health status in COPD patients [1–4]. Few studies, however, have examined the specific behavioural changes in these patients that contribute to the health effects. In order to design more effective programs, we need to know: (1) which behaviours with respect to self-management or lifestyle improves health status; and (2) which program components are successful in influencing these behaviours. A thorough evaluation of behavioural changes is important in self-management applied to COPD to achieve changes in lifestyle, acquisition of new skills, and as well to determine what factors the patients perceive as facilitating or hindering lifestyle modification.

We took advantage of a multicentre randomised clinical trial that was originally carried out to evaluate the effect of a continuum of self-management to COPD, on health status and the use of hospital services [4]. As part of the clinical trial, patient management skills were evaluated with respect to inhaler and breathing techniques [23]. In addition, a qualitative study [24] was linked to the clinical trial to assess lifestyle modifications, documenting the participants' experiences and the strategies, which do, or do not facilitate these changes.

All patients who took part in the randomised clinical trial had advanced COPD with at least one hospitalization for exacerbation in the previous year. Patients were 50 years of age or older, smokers or ex-smokers with an FEV_1 post-bronchodilator of less than 75% of predicted value. Patients were assigned to a self-management program "Living well with COPD©" or to usual care. Randomisation allocated 96 patients to the intervention program, which lasted one year, and 95 patients to the usual care group. The trial was completed among 191 patients. The intervention consisted of a multifaceted comprehensive education program administered through weekly visits by a trained health professional over a two-month period, with monthly telephone follow-up. Teaching program included patient workbooks covering the following topics:

- *Module* 1: Basic information about COPD, breathing and coughing techniques, energy conservation during day-to-day activities, and relaxation exercises.
- *Module* 2: Preventing and controlling symptoms through inhalation techniques.
- *Module* 3: Understanding and using a plan of action for acute exacerbation.
- *Module* 4: Adopting a healthy lifestyle (smoking cessation, nutrition, sexuality, sleep habits, managing emotions).
- *Module* 5: Leisure activities and traveling.
- *Module* 6: A simple home exercise program.
- *Module* 7: Long-term home oxygen therapy when appropriate.

Patients were assessed after completion of the one-year trial.

4.1. Acquisition of new skills

Behaviour modification implies the appropriate use of many disease-related skills such as inhalation and breathing techniques. The self-management program "Living well with COPD©" included teaching which specifically covered inhaler and breathing techniques. Patients' skills specific to the appropriate use of inhalers and breathing techniques were assessed by direct observation at study completion in the self-management and the usual care groups. Table 2 shows the proportion of COPD patients using specific inhaler devices as well as breathing techniques, and the scores obtained for the demonstration of each of the technique used [23]. COPD patients did not appear to do better with respect to the use of inhaler devices (Metered Dose Inhaler (MDI), MDI with spacer and turbuhaler) in the self-management as compared to the usual care group, although the score in each group was already relatively high. MDI with spacer technique was overall more adequate than MDI alone. However, the data from Table 2 reveal large differences between groups with respect to breathing techniques. Breathing techniques were reported to be less commonly used in the usual care group than in the self-management group, and for those using it, the breathing techniques were used with less adequacy in the usual care group as compared to the self-management group.

4.2. Lifestyle changes, facilitating factors and barriers

Behaviour modification also implies the implementation of healthy and new lifestyle behaviours that are better adapted to the patient need. A qualitative study was conducted to explore this issue of implementing new lifestyle behaviours about which relatively little is known in disease-specific self-management program for COPD. A posteriori qualitative study [24] was then carried out at the end of the self-management clinical trial. An intentional sample [25] of 27 COPD patients (13 females and 14 males) was selected from the intervention group according to age, gender, level of education, area of living, language, quality of life scores, perceptions on life changes, presence of the caregiver, for sampling diversity. An interview guide of seven opened questions was developed for data collection. Semi-structured audiotape interviews were conducted at the patients' home one to three months after completion of the one-year study. A coding scheme for data analysis was developed. All the text units from each interview were coded by consensus by three people using the coding scheme. After the text units of each interview were marked up with codes, data entry was done into the NUD*IST (Non-numerical Unstructured Data Indexing, Searching, and Theorizing) computer program to move all the material with the same coding categories together.

Patient distribution according to specific characteristics was as follows: age, 3 (50–59 years), 10 (60–69 years), 14 (70–85 years); gender, 13 (F), 14 (M); education, 8 (primary), 17 (secondary), 2 (university); perception of life improvement by the professionals, 6 (little), 8 (moderate), 13 (very much); and presence of family support at home, 8.

Table 3 shows patients' reported changes in their lifestyle according to two major areas: physical condition and

Table 3
Lifestyle modifications experienced by COPD patients who received a disease-specific self-management program[a]

Lifestyle modification	COPD patients (%)
Physical condition	
Learn to breath	85
Maintain exercise	74
Walk	59
Use bicycle	44
Increase activities of daily living	74
Use relaxation techniques	63
Improve diet habits	52
Improve sleep habits	48
Psychosocial condition	
Feel more self-confident	59
Feel more secure	52
Accept better their disease	52
Feel more support	48
Feel less panic	37
Feel less anxious	26

[a] [24].

Table 2
Self-management program in COPD and patients' learning illness management skills

Technique	Self-management group		Usual care group	
	Patients using the device/technology (%)	Skill evaluation	Patients using the device/technology (%)	Skill evaluation
Inhaler technique				
MDI	31	7.7 (1.5)[a]	35	7.4 (2.2)[a]
MDI with spacer	76	8.9 (1.5)[a]	73	8.3 (1.8)[a]
Turbuhaler	17	8.2 (2.4)[a]	15	9.3 (0.8)[a]
Breathing technique				
Pursed lip	98	77[b]	29	50[b]
Diaphragmatic	43	54[b]	4	0[b]

[a] Twelve steps score: mean score and standard deviation in parenthesis.
[b] Five steps performed: percent of patient with proper skills defined as performing 5/5.

psychosocial condition [24]. The study demonstrated that most of the COPD participants have made major lifestyle changes. Additional information was provided by this study [24]. Content analysis revealed that the helping strategies (disease-related skills) used to facilitate life changes most frequently reported by the patients were the following:

(1) to adopt energy conservation principles (81% of the patients);
(2) to use their action plan with a customised prescription of antibiotic and prednisone (69%);
(3) to use pursed lip breathing techniques (62%);
(4) to implement regular home exercise (58%).

Frequent barriers were the following:

(1) the natural progression of their disease (69%);
(2) the presence of associated co-morbid conditions (38%).

5. Discussion and conclusion

Human behaviour is part of a complex causal chain, so many factors have to be considered when planning health intervention. Patients may be limited to perform a given behaviour because of knowledge and skill deficits. Improving knowledge is necessary, but insufficient alone. Patients need to know less about the pathophysiology of their disease and more about how to integrate the demands of the disease into their daily routine. Behaviour modification implies the appropriate use of many disease-related skills. Skill training has to be incorporated in order to address specific skill deficits. Providing COPD patients with the tools they need to properly manage their condition is as important as writing the correct prescription. There is evidence to support that self-management programs specific to COPD patients increase knowledge [7–10] and skills [24] the patients needs to treat their own illness. For example, we learned that self-management programs can contribute to increased use of breathing techniques as well as proper patient skills [24].

Although knowledge and skills acquisition are important, self-efficacy or the person's belief in his or her ability to overcome the difficulties inherent in performing a more specific task in a particular situation, also has to be emphasised. Self-efficacy or self-perception of having skills to perform a behaviour is a well recognised and powerful predictor of health-related behaviour changes [6], and as such it is particularly important to consider when planning a successful health intervention. Self-efficacy appears to play a major role in explaining many health behaviours and is essential in planning our interventions. Self-efficacy has been shown in many COPD studies to influence specific health behaviours [17,20–22]. The adage that nothing succeeds like success is crucial if we want to make lifestyles changes in our COPD patients. For the patient, who needs to make lifestyle changes, belief that he or she has the ability to do so will be based on the present and past performance, both specific and of a similar nature. In self-management programs, intervention designed to enhance the patient's efficacy beliefs and confidence in outcomes, should be considered to be as important as strategies to increase the patient's knowledge about COPD.

5.1. Discussion

Very few studies in COPD have examined if self-management is an effective way to change lifestyle and health behaviour. The qualitative research by Nault et al. [24] suggests that reference educative tools such as those included in the program "Living well with COPD©" added to an individualised and regular management program help COPD patients to perform given health behaviours. Patients reported lifestyle changes with respect to specific physical conditions, and psychosocial conditions. COPD patients also perceived barriers and facilitating factors (disease-related skills) to lifestyle modifications. Awareness of specific factors that may facilitate or hinder behaviour changes should assist health professionals in optimising the effectiveness and efficiency of self-management programs for COPD. This qualitative study is complementary to a randomised clinical trial and provides descriptive findings so that we can as health professionals share COPD patient's experiences. This data cannot be interpreted like quantitative data, in which the strength or the significance of the relationship between variables is paramount. Trying to create and test a theory at this stage of our understanding would not be realistic and the exercise would be one of pure luck. The results of this qualitative study have relevance and provide tentative explanation for a similar problem in a particular setting.

5.2. Practice implication for research

Although there is still much to be learned about the specifics of a self-management program in COPD, successful programs do require a multifaceted approach. A multifaceted approach implies not only teaching various disease contents but also implementing effective methods for enhancing behaviour modification. Further fundamental and applied research should be carried out to gain insight in health behaviour change interventions in chronic disease, and specifically in COPD, in order to design more effective self-management programs.

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