DEVELOPMENT OF A PULMONARY REHABILITATION PROGRAM:
A BIOPSYCHOSOCIAL APPROACH

by

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Chapter I

INTRODUCTION

For those of us involved in the clinical practice of respiratory care, the treatment of the chronically diseased pulmonary patient is an attenuated and often frustrating process. Unlike many chronic diseases incurred through the vagueries of chance, the chronic "lunger" is invariably solely responsible for his or her disease. This knowledge, coupled with the peculiar mind-set of the COPD patient, tends to foster an adversarial if not invidious relationship between therapist and patient that in many instances disintegrates over time into a sort of mutual antipathy.

The chronic lung patient is inevitably difficult to manage, often irascible, demanding, and prone to hysteria. Somatic preoccupation, anxiety, and depression complicate the interpersonal dynamic between patient and care givers, and this is further exacerbated by the psychotropic nature of pharmacotherapy and the neuropsychological dysfunction induced by hypoxemia. The relationship between therapist and patient is frequently complicated and uncertain, often beginning early in the disease process with occasional out-patient visits and routine diagnostic studies while the patient appears relatively asymptomatic. This relationship may extend over a period of time--ten to fifteen years--
engendering a sort of casual familiarity and even fondness. Patients begin to think of staff members as their personal providers, and often a proprietary, almost familial relationship will evolve over the years.

As the disease progresses, inexorably and insidiously, the irreversible and terminal nature of the illness leaves most patients total invalids emotionally, as physical capacity becomes increasingly diminished and interpersonal relationships strained. This physical and emotional deterioration often leads to a conspicuous reduction in general satisfaction with and quality of life. As breathing becomes increasingly difficult and feelings of hopelessness and even worthlessness increase, there are frequently dramatic changes in psychosocial behavior with alternating lability and profound depression. Indeed, it is not uncommon for patients to go from an almost torpid indifference to euphoria in one therapeutic session.

For the health care professional, it is an all too painfully familiar scenario. After years of personal and professional involvement, recurrent hospitalizations and increased morbidity are finalized in a slow, protracted, agonizing death amidst a sterile labyrinth of tubing and life support devices.

Until recently, the role of the health care provider has been almost exclusively clinical, and little meaningful
research has been reported on the psychosocial aspects of COPD. The following pages will hopefully provide a viable, multilevel analysis and intervention in the treatment and rehabilitation of the patient suffering from this disease. The unique etiologic and enabling factors inherent in chronic obstructive pulmonary disease provide an excellent opportunity for an integrated biopsychosocial approach involving the utilization of psychology and public health interventions within a framework of a comprehensive rehabilitation program.

Purpose Statement

The purpose of this project was to develop and implement a comprehensive pulmonary rehabilitation program in the Roanoke Valley utilizing respiratory therapy students and volunteer practitioners within a biopsychosocial rehabilitation model.

Significance of the Project

Although a number of pulmonary rehabilitation programs currently exist throughout the Roanoke Valley, the scope of these programs tends to be limited and the methodologies employed both inconsistent and insufficient. This is particularly true in terms of patient and family education and in ad-
dressing the psychosocial dimensions of COPD. The focus of these programs is limited to ameliorating the disease at home through a loosely prescribed regimen of traditional therapeutic procedures. In addition, evaluation methodologies, patient follow-up, and reinforcement techniques are not utilized.

The significance of the program described here is twofold: to improve the quality of life and reduce hospital recidivist rates of COPD patients, and incorporate such a program within an academic framework employing students, staff, and relevant volunteer practitioners. This would virtually eliminate any cost to the patient and at the same time provide a significant learning experience for the respiratory therapy students involved.

As the cost and incidence of chronic obstructive pulmonary disease continue to rise, the utilization of students in rehabilitation programs provides a unique opportunity to reduce health care costs, but perhaps more importantly, it engenders an awareness of social responsibility, community service, and finally the moral imperatives implicit in a profession committed to the health and care of human beings.
Defining Terms

A patient with advanced chronic obstructive pulmonary disease (COPD), now a respiratory invalid with severe dyspnea and distressing cough, at one time only suffered a slight morning cough associated with smoking. The symptoms gradually progressed through the years until they began seriously to interfere with his normal life. At what stage in this deterioration the condition can be termed chronic is bound to be arbitrary, but the American Thoracic Society in 1986 defined COPD as "a disorder characterized by abnormal tests of expiratory flow that do not change markedly over periods of several months observation." This airflow obstruction may be structural or functional and incorporates three relatively distinct anomalies: emphysema, peripheral airways disease, and chronic bronchitis. Any individual patient may have one or all of these conditions, but the dominant clinical feature in COPD is always impairment or limitation of expiratory airflow.

Mitchell and Petty (1989) provide a more precise definition, stating that COPD is a "clinical syndrome of dyspnea on exertion with objective evidence of reduced airflow not explained by specific or infiltrative lung or heart disease" (p. 147). COPD, however, is almost always a mixture of emphysema which is defined morphologically and chronic
bronchitis which is defined clinically. Patients who have advanced stages of COPD may have the "pink puffer" syndrome—intense dyspnea, marked weight loss, hyperlucent lungs, small heart, and normal blood gases, or the "blue bloater" syndrome—relatively mild dyspnea, no weight loss, large heart, episodes of right-sided heart failure, erythremia, hypercapnia, and hypoxemia.

**Epidemiology**

However one defines COPD, it has become increasingly clear that impairment and disability from pulmonary disorders have become a significant economic concern in the U.S. Data from the U.S. Department of Health and Human Services (1986) reveal that more than 10 million Americans are thought to have chronic obstructive disease. Since 1986, COPD has been the fastest rising major cause of death in the U.S. In 1983, there were more than 63,000 deaths due to COPD, approximately 17.6 per 100,000 people. Although COPD is still much more common in men than women, the greatest increase in death rate was for white females, an increase which reflects the increased number of women who smoke. In 1981, COPD was the cause of approximately 9.7 million office visits and 2.5 million hospital days, and the costs, and the costs of this disease are enormous, running into billions of dollars annually. Epidemiological
data from the California COPD Report show that COPD is now the fastest rising cause of death among any chronic disease in that state, causing 25.8 deaths per 100,000 population and accounting for 3.3 percent of all deaths (American Lung Association Report, 1985).

In virtually all countries from which figures have been published, mortality demographics are consistent (See figure 1), with male mortality rates higher than female for ages 55 to 64. In addition, there is a steady increase in mortality with increasing urbanization and a steady increase in mortality with descending socioeconomic class. A recent survey in Michigan, however, has suggested that smoking was the dominant factor regardless of the occupation or socioeconomic status (Crofton and Douglas, 1981).

**Etiology And Pathogenesis**

Although the causes of COPD have not been completely elucidated, it is clear that there are three important etiologic factors: cigarette smoking, atmospheric pollution, and infection. Most authorities conclude, however, that smoking is by far and away the most important risk factor in the pathogenesis of COPD, whether it is manifested by emphysema, chronic bronchitis, or both (Mitchell and Petty, 1989). Crofton and Douglas (1981) assert that
although it is possible that there may be an underlying genetic predisposition which influences the development of symptoms in individuals with similar exposure to smoking and pollution, the latter are of such overwhelming importance that a genetic factor is difficult to demonstrate.

Death rates/100,000 bronchitis, emphysema, asthma (AS3) 1974
Age 55-64

<table>
<thead>
<tr>
<th>Country</th>
<th>Male</th>
<th>Female</th>
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<td>Ireland</td>
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<td>Scotland</td>
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<td>Australia</td>
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<td>New Zealand</td>
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<td>Singapore</td>
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<td>Italy</td>
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<td>West Germany</td>
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<td>Poland</td>
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<td>Finland</td>
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Source: WHO World Health Statistics Annals

Figure 1. International comparisons of mortality from COPD at ages 55 - 64. (WHO World Health Statistics Annual, 1977)
It has been found that the death rate for COPD is significantly higher in smokers than in non-smokers and increased with the amount smoked; also there is a much higher prevalence of cough and sputum among smokers than non-smokers (Crofton, 1981). Evidence incriminating atmospheric pollution as an etiological factor in COPD has been correlated with increasing mortality and prevalence with increasing urbanization. The precise factor in pollution which is responsible for the adverse effect is uncertain, but there is some evidence that smoke may be the most important. Crofton (1981) reports that the two great smogs that occurred in London in 1952 and 1962, were both associated with a rise in COPD mortality. Both had similar \( \text{SO}_2 \) (sulphur dioxide) concentrations, but in 1962, the smoke concentration was much less and so was the associated respiratory mortality.

Cigarette smoke may be harmful in other ways, since it contains numerous irritants that stimulate mucus production, impair and ultimately destroy ciliary function, and induce cough. Persons who regularly smoke cigarettes are also more susceptible to recurrent deep respiratory infections which contribute to the evolution of COPD. It appears obvious that the synergistic effect of these two factors significantly enhances morbidity and mortality.
The best evidence of a correlation between childhood respiratory infection and COPD in adult life is that of Colley and Reid (1972) who showed at the ages of 20 and 25, in a cohort followed from birth, that chronic winter cough was more common in both smokers and non-smokers in those who had a lower respiratory tract illness under the age of two. In a community study in Arizona, Lebowitz and Burrows (1972) found that a highly significant correlation existed between poor respiratory function in adults and a history of childhood respiratory illness. Crofton (1981), however, cautions that it is perhaps wrong to assume a causal relationship between childhood respiratory infections and adult COPD; that the common factor could very well be poor social conditions and/or poor medical services.

As indicated earlier, COPD is almost always a mixture of emphysema and chronic bronchitis. In emphysema, the airway tissues often become atrophic, resulting in flabbiness and premature collapse on expiration. Physiologically, it is identified by a loss of elastic recoil, increased total lung capacity (barrel chest) and impaired oxygen diffusion. The impaired diffusion tends to be balanced by the destruction of the capillary bed. Chronic bronchitis is characterized by hypertrophy and hyperplasia of the mucous glands lining the airway, increase in mucus-
glands lining the airway, increase in mucus-secreting goblet cells, loss of cilia, and squamous metaplasia (Mitchell and Petty).

**Clinical Picture**

Most of the patients who seek medical attention for COPD insist that dyspnea on exertion was their first symptom, but when closely questioned, many reveal that chronic cough started at the same time or soon after. Other patients begin with a sudden awareness of dyspnea and cough. Often these are episodes of pneumonia or bronchiolar inflammation which then may become chronic with episodic exacerbations. The characteristic symptoms of COPD are cough, sputum, wheeze, and breathlessness. As the disease develops, the cough gradually becomes more continuous, breathlessness on exertion more pronounced, and upper airway infections more frequent. At first, exacerbations may be so mild that the patient does not stay off work, and the cough subsides. Later the exacerbations last for longer and longer periods, and the patient may have to be off work for weeks or even months during the winter.

Obviously, there is considerable variation in different individuals in the amount of disability contributed by cough, sputum, wheeze, and dyspnea, and it may be these differences represent variations in the extent of anatomical
and physical involvement. The classical picture of the COPD patient is that of a middle-aged man appearing older than his stated age, obviously short of breath, wheezing audibly, and conspicuously anxious.

Diagnosis of the disease is established through a clinical assessment of the patient which includes physical and roentgenographic examinations, pulmonary function testing, and arterial blood gas analysis. Physical exam reveals signs of lung over-inflation, increased respiratory muscle effort, altered breathing patterns, and abnormal breath sounds. Spirometric abnormalities associated with COPD consist of a reduction in the forced expiratory volume in one second (FEV₁) and in the ratio of the FEV₁ to forced vital capacity (FVC). Repeated spirometric testing following medications (bronchodilators or corticosteroids) is performed to determine to what extent the disease is reversible and to provide guidelines for rational therapy (American Thoracic Society, 1987). Arterial blood gas analysis usually reveals hypoxemia (decreased oxygen concentrations) with or without a concomitant hypercapnia (increased carbon dioxide concentrations).

Characteristically, COPD affects middle-aged persons. As the disease progresses, the patient becomes increasingly dyspneic to the point where even simple physical maneu-
vers become difficult and every breath an effort. As functional reserve and exercise tolerance become more and more limited, patients often become overwhelmed by their disease and resign themselves to a lifetime of medication and inactivity. Recurrent hospitalizations increase in number and in length, as symptoms become markedly increased. Life becomes further complicated as diseases that normally would not require hospitalization by themselves, in the presence of severe COPD, represent a significant risk to the patient.

In the past, treatment has been largely curative (or palliative) in nature with little or no preventive measures and patients rarely participating in their own care. As the course of COPD is commonly punctuated by exacerbations, usually caused by infections, life consisted simply of a daily struggle to breath until the inevitable hospitalization. Here, treatment consisted of treating the superimposed viral or bacterial infection and hoping the underlying pathology was not so extensive that death resulted. Typical interventive measures included oxygen therapy, aerosolized bronchodilator therapy, chest physiotherapy, antibiotics, and mucociliary clearance. Once the infection was cleared up, the patient was released, only to return months or even weeks later, and the same regimen of therapy began once again.
Rehabilitation

Historically, rehabilitation implied methods of improving the functional abilities of individuals with chronic neuromuscular disorders such as cerebral palsy and muscular dystrophy and victims of acute traumatic injury, such as spinal cord injury or the loss of an extremity due to war or accident. Until recently, rehabilitation was not a consideration in the treatment of the COPD patient. This was probably due, in part, to the fact that the manifestations of COPD are less dramatic, and as Make (1986) suggests because the results of pulmonary rehabilitation are less spectacular, with the COPD patient having poor lifespan prognosis and less potential for productivity following rehabilitation. Another (perhaps more likely) explanation is that the COPD patient is classically poorly educated, socioeconomically disadvantaged, and psychologically complex. In short, it was not profitable, neither economically nor politically. In addition, a viable rehabilitation program would have to incorporate a multitude of therapeutic modalities involving many different disciplines as well as the usual rigorous medical and pharmacologic management necessary to reduce morbidity. In 1974, the American College of Chest Physicians recommended a separate definition for pulmonary rehabilitation:
Pulmonary rehabilitation may be defined as an art of medical practice wherein an individually tailored, multidisciplinary program is formulated which through accurate diagnosis, therapy, emotional support, and education stabilizes or reverses both the physio- and psychopathology of pulmonary diseases and attempts to return the patient to the highest possible functional capacity allowed by his pulmonary handicap and overall life situation.

As this definition suggests, the major goals in the management of individuals with COPD are (1) reduction in the degree of airflow obstruction, (2) prevention and treatment of complications, and (3) improvement in the patient's quality of life. The components then of a comprehensive program of pulmonary rehabilitation require the involvement and expertise of many different disciplines working together to address and attend to the medical and psychosocial needs of the COPD patient.

At the risk of belaboring the point, the COPD patient is a unique and singularly complex organism. Thus, any therapeutic program will differ from one patient to the next depending upon the needs of each individual and the physiological and psychological derangements caused by the underlying disease. Any rehab program, however, is effort dependent, and it is both foolish and unrealistic to expect positive results without patient compliance. Unfortunately, due to the psychosocial implications of COPD, it is often difficult, if not impossible, to obtain
cooperation. Subsequently, recognition and identifi-
cation of the psychosocial components of a person's
illness is imperative for any effective therapeutic in-
tervention.

**Psychosocial Characteristics of COPD Patients**

Despite a plethora of observational and anecdotal
material written on the range of emotional dysfunction as-
sociated with COPD, it has only been within the past five
years that the psychosocial aspects of COPD have been
addressed. Although little is understood regarding the
brain mechanisms involved, it is known that changes in
the rate, depth, and regularity of respiration correlate
with emotional and behavioral states, and it is becoming
clearer that COPD patients experience nonspecific and
life quality changes similar to those of other groups
with chronic and progressive illnesses. Clinical res-
piratory care practitioners have long suspected that the
psychological response to chronic pulmonary disease could
be profound, and the irreversible and terminal nature of
the disease, like cancer, left many patients total in-
valids emotionally. Sandue (1986) reports that physical
and emotional restrictiveness make it difficult for pa-
tients to continue using their usual adaptational styles
and coping strategies which leads inevitably to a profound arousal of negative emotions and attitudes. Repeated general findings among COPD patients include anxiety, depression, fatigue, difficulty with coping, and somatic preoccupation.

Some clinicians (Dudley, et al, 1980) have found that dyspnea can accompany emotional changes without necessarily being associated with pathophysiologic changes. Thus, patients with COPD, in attempting to adjust to their situations and avoid the subjective distress of dyspnea may begin to live in "emotional straitjackets." They defend themselves by isolation, attempting to avoid all emotional arousal such as anger, depression, or even happiness because any degree of emotion may trigger depressing symptoms and lead to physiologic decompensation. In short, dyspnea begets fear, and fear generates dyspnea. In another study, Dudley (1968) asserts that dyspnea produced by physiologic factors tends to exacerbate the patient's psychological reactions, which in turn produces more physiologic insufficiency. This insufficiency increases the dyspnea further, completing a vicious cycle of events that are difficult to stop, and that may completely incapacitate even patients with mild levels of COPD.
**Chronic Hypoxia and Neurophysiological Deficits**

It is well known clinically that hypoxemia can lead to altered and/or reduced cerebral functioning. Studies (Jacobs, et al, 1969) have demonstrated that oxygenation can improve certain cognitive deficits in the aged, and that improvement following phlebotomy has also occurred. In addition, Grant (1980) has proven that greater degrees of hypoxemia lead to greater losses in abstracting abilities, complex perceptual motor integrative abilities, simple motor skills, and attention. Thus, COPD patients, who, by definition, are chronically hypoxemic, must adjust to complex neurophysiological deficits as well as to their physical disabilities.

Reduction in vocational, social, recreational, and sexual activities can place a tremendous strain on the ability to maintain a sense of self and a secure role within a family. Psychosocial assets play a major role in the patient's ability to cope adaptively, as low assets have been significantly linked with increased morbidity and mortality, as well as resentment, anger, anxiety, fear, helplessness, and hopelessness (Dudley, 1979).

As a chronic illness, COPD has a pronounced draining effect on patients, their families, and support systems, as well as on care-givers themselves. The permanent and
irreversible nature of the disease and the slowly deteriorating course gives little respite or cause for hope. As with any chronic disease, distress leads to anxiety, irritability, depression, and withdrawal. Patients, especially the COPD patient, often feel guilt and shame at having caused their condition or having burdened their families. This may become especially difficult when spouses or family members in turn have aggressive and/or hostile feelings toward the patient.

Chronic illness often exacerbates already existing resentment and ambivalence in relationships, especially for those most directly affected and concerned with the patient's care. For care givers, this can lead to a vicious cycle of resentment, guilt, and compensatory behavior. According to Barstow (1974), probably the single most important prognostic factor in adjustment is a supportive significant other in the home, and social supports are among the most important psychosocial assets determining a person's ability to adjust adequately to COPD. He further points out that although illness may help a family to rally together, chronicity can lead to eventual fatigue in even the strongest. His study of spouses of COPD patients repeatedly indicates high levels of subjective stress, increased interpersonal tension, con-
flict, and depression, with significantly lower levels of life satisfaction.

It becomes clear that patients with severe organic dysfunction, poor socioeconomic state, low psychosocial assets, along with anxiety and depression need vigorous intervention into all facets of their illness. As Engle (1977) has suggested for medicine generally, a comprehensive biopsychosocial approach to evaluation and management is necessary to deal effectively with the COPD patient. Clinical studies support the perception that patients with COPD have more frequent psychiatric symptoms than matched controls (Grant, 1982). Thus, assessment of the COPD patient should include a complete psychosocial history designed to obtain an understanding of the patient's social, marital, work, health, and interpersonal philosophy and habits.

Just as patients with COPD often find themselves struggling with their own relative impotence, care-givers treating these patients often feel the same. The frustration and helplessness felt by care-givers when called on to deal with psychosocial problems that are interfering with successful rehabilitation can be extremely discouraging and even counterproductive. Sandhu (1986) contends that every physician should provide some measure of
counseling, whether it is couched in an educational, informational, reassuring, or supportive context. Obviously, the approach to psychological problems in patients with COPD depends on the nature and severity of the disorder. There are several specific aspects of pulmonary rehabilitation that can relieve psychological problems. In some patients group therapy or individual psychotherapy may be considered. Others may benefit from behavior modification, medication, and biofeedback, with the goal of restoring control of symptoms to the patient. Some of the more effective interventions are briefly addressed in the following paragraphs.

**Goal Setting**

Uncertainty about their abilities and condition often affects patient's motivation and progress in rehabilitation. The technique of setting goals, mutually discussed and agreed upon, can be extremely helpful in restoring a sense of hope, control, and confidence to a patient. Realistic goals, based on appropriate appraisal of the patient's life-style, care-giver abilities, and stage of disease, can increase patient involvement with the program and provide impetus and incentive toward optimizing progress. Achievement of specific objectives can enhance self-pride
and bolster self-esteem (Fogel and Rosillo, 1969). Obviously, goals should be tailored to fit the individual's wishes and should be clearly within the level of the patient's abilities to avoid discouraging and damaging failure.

**Biobehavioral Techniques: Relaxation and Biofeedback**

Relaxation techniques are often suggested as interventions that may break into the vicious cycle of dyspnea-hypoxia-anxiety. These appear to be most useful when fear and apprehension become generalized. Although studies have proven inconclusive regarding the efficacy of biobehavioral techniques in controlling the panic and anxiety produced by dyspnea, it is perhaps just as important to provide self-initiated techniques that can enhance feelings of control and independence through behavioral interventions. It seems reasonable to assume that to have an area of mastery in a world otherwise outside of one's control, would be essential in strengthening motivation and self-esteem, not to mention coping ability, in the face of one's disease.
Socialization

Supportive others and satisfying social interactions appear to play a major protective or ameliorating role in illness. In a study of 60 elderly people, Arnetz et. al. (1983) found social isolation and understimulation to be associated with a wide range of psychophysiologic effects, including increased physiologic activation and metabolism, a relative increase in catabolic hormones, and a significantly increased level of restlessness. Rehabilitation personnel need to encourage patient participation in collaborative ventures and fully understand that support, warmth, enthusiasm, and genuine caring can make a difference. Comprehensive programs must aim at improving the level of patient activity and social interaction through continued and persistent emotional support.

Psychotropic Medications

Anxiety and depression tend to be the most common emotional reactions to COPD and may require treatment with medication. Even with the use of behavioral techniques, family counseling, and supportive psychotherapy, some individuals will still require adjunctive pharmacotherapy, whether to help with sleep deprivation, appetite enhancement, or to free up sufficient energy and interest to
engage in a rehab program. Anxiolytics, neuroleptics, phenothiazines, and antidepressants can be extremely important adjuncts in COPD treatment. It should be noted that most psychotropic medications may have untoward physiological effects such as anticholinergic reactions, hypercapnia, excessive sedation, and cardiovascular symptoms which might interfere markedly with rehabilitation efforts.

Methodology

The components of a comprehensive program of pulmonary rehabilitation include a wide variety of therapeutic and diagnostic modalities, the latter composed of medical as well as psychological and educational dimensions. Obviously, the first step in the management of individuals with pulmonary disease is to make an accurate diagnosis. The functional and physiologic severity of the patient's condition should be documented both as an aid to determining the necessity for specific components of the rehabilitation program and also to serve as an initial index of the patient's status upon which to base an assessment of the effectiveness of the interventions.
Medical Component

The first goal of a program for the management of individuals with COPD is to reduce reversible airflow obstruction. Thus, a trial of bronchodilator medications should be considered. The trial should be guided by the patient's subjective response to pharmacotherapy in terms of exercise tolerance, dyspnea, ability to mobilize secretions, results of repeat spirometry, and patient tolerance to specific medications. The basis for this component is to maximize the benefits to be achieved from bronchodilator agents while minimizing the potential side effects of those medications. Whenever possible, the use of corticosteroids should be avoided, as the major adverse effects of these drugs include osteoporosis, cataracts, hyperglycemia, and cosmetic changes ( integumentary changes and increased subcutaneous deposition). Usual pharmacological intervention consists of beta_2 sympathomimetics such as Albuterol, xanthine agents (theophylline), mucolytics, and prophylactic antibiotics. It should be noted that chronic antibiotic administration should be avoided whenever possible inasmuch as in exacerbations of COPD, the infecting organism is frequently viral.
Oxygen Therapy

Oxygen therapy is distinctive among the therapeutic interventions used in patients with chronic airflow obstruction. Hypoxemia, which is a common characteristic in severe COPD, causes significant complications, including pulmonary arterial vasoconstriction, pulmonary hypertension, polycythemia, and neuropsychiatric dysfunction (Mitchell and Petty, 1989). The physiological response to hypoxemia and the effects of oxygen on the respiratory system are singularly complex and will not be addressed here. It is important to note, however, that studies have shown that COPD patients on continuous oxygen therapy have a significantly lower mortality rate despite no difference in the number of days hospitalized for respiratory disease (Make, 1986). Patients and family must understand at the outset the long-range goals of oxygen therapy and the importance of compliance, independent of symptom relief, as the major benefits of oxygen therapy (reduction of mortality, hematocrit, and pulmonary hypertension) are long-term and not usually immediately obvious to the patient.
Smoking Cessation

Since the structural changes associated with COPD are irreversible and the physiologic and functional consequences so severe, it is logical to attempt to prevent further lung damage. Thus, cessation of smoking must be a priority of all programs for the management of COPD. A question often arises whether patients who are still smoking should be enrolled in a pulmonary rehab program, or whether smoking cessation should be completed prior to institution of the other program aspects. It has been my experience that smoking cessation is an index of patient motivation, and unless the patient is will to quit, further rehabilitation efforts will be unsuccessful.
Education

The general goal of education of patients with any disease is to improve compliance with the prescribed therapeutic program. Mazzuca (1982) concluded that educational programs with a behavioral emphasis showed a greater positive effect on compliance than those with a didactic emphasis. He further states that patients need to know less about the pathophysiology of their disease and more about integrating new therapies into their daily lives. The most successful techniques were regular contact with the same health professional, control over stimuli, rewards for progress, and establishment of pneumonic systems and daily care rituals.

In patients with COPD, the goal of education should be to improve the patient's ability to cope with his condition and increase responsibility for his own care. It is imperative that family members also be part of the education process and instructed in the anatomy and physiology of the disease. It is important that an educational component be included in all aspects of the patient's rehabilitation and the responsibility of all members of the rehab team. This can be accomplished individually or in groups utilizing traditional pedagogic methodologies. I have found that most patients delight in discussing their
disease, and informal group discussions prove to be animated and productive. Although the clinical manifestations of COPD are relatively similar from patient to patient, most individuals seem to feel their disease is unique and will not hesitate to participate in classroom discussions. This has proven to be an excellent tool in the dissemination of new therapeutic modalities and at the same time in reinforcing goals. Giving the rehab members a name such as "Better Breathing Club" and holding monthly sessions with different topics and speakers not only encourages compliance but, perhaps more importantly, enhances the patient's sense of community and self-worth.

Exercise Conditioning

An exercise training program should be one of the cornerstones of a pulmonary rehabilitation program with the method of training tailored to the needs and ability of the individual patient. The usual exercise training methods include treadmill exercise, stationary bicycle exercise, walking, and respiratory muscle training. Probably the simplest form of exercise is walking. Here, the patient is encouraged to walk for a definite period of time--five or ten minutes--depending upon the
tolerance of the patient, and gradually increasing both the speed and duration of the exercise. It is important that members of the rehab team insure that patients understand the goals of an exercise program and to provide encouragement and reinforcement when patients meet or exceed expectations. In addition, it is often necessary to help allay patient fears and anxieties concerning exercise and dyspnea. It has been my experience that of all the components in our rehab program, exercise conditioning is the most difficult in terms of patient compliance. It appears the fear of dyspnea and the apparently phlegmatic nature of most COPD patients often preclude effective intervention in this aspect of rehabilitation.

**Physical Therapy**

Physical therapy modalities that are the most useful in patients with COPD include traditional chest physical therapy and breathing retraining. Simple techniques to improve sputum clearance include inhalation of warmed, moistened air, hydration, percussion, and postural drainage. Teaching patients to perform these techniques themselves or teaching family members substantially reduces the cost of the therapy.
Breathing retraining, or controlled breathing techniques, are also an excellent method of reducing patient dyspnea. Diaphragmatic breathing, lateral costal expansion, and pursed-lip breathing have also proven effective in improving respiratory muscle endurance and in reducing stress. Breathing exercises are essentially relaxation techniques that allow patients to control their own dyspnea and may result in decreasing respiratory rates. Basic yoga exercises and transcendental meditation, in conjunction with breathing exercises, also appear to have beneficial effects. Patients are encouraged to practice these exercises throughout the day, and it is hoped that patients can carry over these techniques to other unscheduled stressful times and therefore control their dyspnea on a more long-term basis.

**Occupational Therapy**

Occupational therapists traditionally focus on improving the ability of patients to perform activities required in their daily living, such as showering, personal hygiene, toileting, eating, cooking, etc. Occupational therapists assist patients in planning daily schedules to allow sufficient rest periods between tasks and avoid rushing which helps to prevent dyspnea. They also instruct pa-
tients in using assistive devices to reduce energy consumption such as the use of electrical appliances and hand-held shower devices.

Nutritional Evaluation

The classic depiction of a patient with severe emphysema is that of a thin, emaciated individual. Recent studies have demonstrated that patients with COPD may not only weigh less than normal people, but, in fact, may be protein-calorie malnourished (Driver and McAlevy, 1982). Although there are no clinical studies of the effects of nutritional repletion on the mortality of COPD patients, it is believed that it is important to evaluate the nutritional status of these patients and correct any deficiencies that are present. Therefore, a careful nutritional assessment by clinical history and physical examination, anthropomorphic measurements, and laboratory studies should be part of a comprehensive program.

Several points should probably be emphasized in regard to a nutritional program. First, many patients become dyspneic during and after meals. This is due to increased abdominal pressure impinging on the diaphragm and limiting excursion. In addition, many patients with lung disease swallow air during meals; thus further in-
creasing abdominal distention. This may be alleviated, in part, by encouraging the patient to take only small mouthfuls of food at a time and to eat slowly. Another point that has received considerable attention in recent years is that carbohydrates increase CO₂ production, and that large glucose loads in patients with COPD increase minute ventilation and decrease exercise tolerance. The importance of diet cannot be overemphasized. High fiber, low fat diets are encouraged to facilitate regularity and reduce hypertension.

Conclusions

From the preceding discussion, it becomes clear that there are many benefits to be derived from comprehensive care to patients with COPD. People function as biopsychosocial units, and there is a complex interplay between themselves and their environments. More often than not, this interplay determines the degree of illness, and therefore it is necessary to direct interventions holistically and with the use of supportive therapies and educational behavioral techniques based upon a solid working alliance with the patient.

The effectiveness of pulmonary rehabilitation has been demonstrated in a number of programs (See figures 2 and 3).
Figure 2. Survival of 72 patients in the Colorado rehabilitation program compared with that of matched patients from an earlier emphysema registry who did not participate in rehabilitation.

Figure 3. Cumulative Survival Rates of COPD Patients Reported From 4 Rehab Programs
Reductions in mortality, hospitalizations, and patient symptoms have all been documented (Hodgin, Zorn and Connors, 1984), with a substantial reduction in both inpatient costs and routine medical care.

Table 1 lists the benefits that have been attributed to pulmonary rehabilitation and include (1) decreased mortality, (2) reduced requirement for hospitalizations, (3) improved exercise ability, (4) improved ability to perform activities of daily living, (5) enhanced quality of life, (6) decreased dyspnea and respiratory symptoms, (7) decreased anxiety and depression, and (8) improved ability to be gainfully employed.

### Table 1. Benefits Attributed to Pulmonary Rehabilitation

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Major Responsible Program Components</th>
<th>Possible Contributing Program Components</th>
</tr>
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<tbody>
<tr>
<td>Increased exercise capacity</td>
<td>Exercise training</td>
<td>Psychological counseling</td>
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<tr>
<td></td>
<td>Inspiratory muscle training</td>
<td></td>
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<tr>
<td></td>
<td>Oxygen administration</td>
<td>Energy conservation</td>
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<tr>
<td></td>
<td></td>
<td>Nutritional counseling</td>
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<tr>
<td>Improved ability to perform routine activities of daily living</td>
<td>Exercise training</td>
<td>Energy conservation</td>
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<tr>
<td></td>
<td>Oxygen therapy</td>
<td>Psychological counseling</td>
</tr>
<tr>
<td></td>
<td>Inspiratory muscle training</td>
<td>Nutritional counseling</td>
</tr>
<tr>
<td>Reduced mortality</td>
<td>Oxygen therapy</td>
<td>Outpatient medical care</td>
</tr>
<tr>
<td>Reduction in hospitalizations</td>
<td>Oxygen therapy</td>
<td>Education</td>
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<td></td>
<td>Outpatient care</td>
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<td>Enhanced quality of life</td>
<td>Oxygen therapy</td>
<td>Inspiratory muscle training</td>
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<td>Energy conservation</td>
<td>Psychological counseling</td>
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<td></td>
<td>Exercise training</td>
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<tr>
<td>Decreased respiratory symptoms</td>
<td>Exercise training</td>
<td>Psychological counseling</td>
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<td></td>
<td>Inspiratory muscle training</td>
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<td></td>
<td>Oxygen therapy</td>
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<tr>
<td>Decreased anxiety and depression</td>
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<td>Improved ability to be gainfully employed</td>
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Although it is hoped that with reduction in cigarette smoking, the number of future patients requiring rehabilitation due to COPD will decrease, there is still much that can be done now to improve the lives of individuals suffering from this disease. Obviously, not all patients can benefit from pulmonary rehabilitation, but in most cases it affords the victim an opportunity to lead a more productive life and improve the quality of his or her existence. And this, of course, is immeasurable.
CHAPTER II

ORGANIZATION AND STRUCTURE
OF A PULMONARY REHABILITATION PROGRAM

Introduction

The following pages examine merely one alternative for structuring a pulmonary rehabilitation program that will support patient independence in the management of pulmonary disease. Basic groundwork must be performed before undertaking the development of a rehabilitation program. Often such programs fail because of a lack of a sufficient number of patients, or because financial or physical resources are not readily available. Some of the questions which need to be addressed in the planning process are as follows:

1. What are the financial implications to the patient and sponsoring facility?

2. What kind and number of patients are we trying to reach?

3. Is there community/physician support for such a program?

4. What kind of personnel do we need and what kind do we have?

What distinguishes the program described here from other comprehensive rehab programs is that it is college-
based, utilizing senior respiratory therapy students to perform the bulk of the patient and family teaching components, program evaluation, and patient follow-up. It is hoped that from this student-oriented program will emerge a multidisciplinary involvement which incorporates other allied health disciplines such as nursing, occupational therapists, dieticians, physical therapists, and physician assistants as well as health education and psychology majors.

Student involvement in the organization and structure of the program is significant in that it markedly reduces patient cost. There are obvious logistical implications in terms of program scheduling, but, by and large, the mechanics and methodologies employed here remain unaffected.
Needs Assessment

The first question which needs to be considered is whether a pulmonary rehabilitation program is, in fact, needed and whether it will be supported by physicians. For an objective estimate of the number of COPD patients available to participate, a careful assessment must be taken of the population of patients serviced by local physicians. The survey (APPENDIX A) would be sent to local pulmonary specialists, internists, and family practitioners. In addition, clinics which treat low income patients at hospitals, public health facilities, and volunteer clinics also need to be surveyed. Hospital discharge data can be provided by the Commission on Professional and Hospital Activities (CHPA). Statistics on local prevalence rates can be provided by the Epidemiology and Statistics Unit, Medical Affairs Division, American Lung Association. Blue Cross/Blue Shield also makes this information available from their files for some studies. The data include the number of COPD cases paid by BC/BS for inpatient hospitalizations, but reflects only the primary diagnosis.
Patient Selection And Evaluation

Medicine, not unlike human nature, tends to be imprecise and rather inconclusive. Patient response to therapy is variable and often dependent upon a host of biopsychosocial factors. Although it is possible, for instance, to determine whether a patient is responsive to bronchodilator therapy, the degree of responsiveness is not always consistent. A serious limitation in determining criteria for patient selection is that although patients may demonstrate comparable functional impairment, as measured by pulmonary function studies and blood gas analysis, the psychosocial dynamic inherent in COPD plays a significant role in the patient's response to pathogenic factors. Two patients with virtually identical physical impairment will react differently to exacerbations of their disease and to subsequent interventions.

Another concern is patient compliance with the treatment modalities outlined in the rehabilitation process. In spite of continuous reinforcement, compliance can not be ensured. Accidents, mortality, and, of course, the usual vagueries of chance are also possible among the participants and consequently beyond the control of the program.

Although COPD can affect any age group, specific criteria needs to be established for patient selection. Ini-
tially, patients would be limited to individuals 50 years and older. In addition, it would involve only non-smokers and individuals within a specific range of PFT and ABG parameters. It is felt that the variables of cigarette smoking and excessive morbidity would preclude effective rehabilitation.

Relevant area physicians would be contacted and solicited for possible candidates for the program (APPENDIX B). After reviewing patient records and selecting those patients who matched the criteria listed, those individuals would be sent a questionnaire inquiring if they would be willing to participate in a rehabilitation program (APPENDIX C). It is felt that those patients who respond affirmatively would indicate a willingness to improve their disease status and subsequently would demonstrate a higher degree of compliance with program standards.

NOTE: This is a singularly important variable in the selection process. It is imperative that all participants be willing to accept responsibility for his or her own care and demonstrate appropriate motivation. Criteria for admission to the program is as follows:

*Symptomatic for COPD
*Age: 50 - 70
*Spirometry: FEV₁ - 20 - 60% predicted
*ABG's (on Room Air): \( \text{PaO}_2 \) 55 mmHg
\( \text{PaCO}_2 \) 45 mmHg

*No evidence of acute MI within preceding six months, controlled arrhythmias or congestive failure

*No acute or chronic disease that may interfere with rehabilitation: cancer
organic brain syndrome
disabling stroke
substance abuse
strong history of medical noncompliance

*Evidence of social and family support

*Nonsmoker

In addition, possible candidates will be required to undergo a psychosocial functioning profile to assist in determining the level of patient psychosocial strengths, resources, and performances and to eliminate individuals with significant elevations in depression, hysteria, hypochondriasis, and psychoasthenia. Once a candidate is selected he or she would be required to sign a contract (APPENDIX D) signifying their understanding of and willingness to participate in the prescribed program.

**Team Characteristics**

The number and variety of allied health team members available cannot necessarily be used as a measure of successful rehabilitation. It is rather the quality of interaction among patients, the patients' families, and the program staff that ultimately determine a program's success.
The use of multiple allied health professionals allows each professional to evaluate and treat COPD patients in his or her own specialized area. Each member is concentrating on his or her own specialty (in collaboration with other team members), avoiding the possibility of missing key teaching that might otherwise be overlooked by one individual trying to cover may separate areas. Patients also seem to enjoy meeting and working with a variety of personalities and experiencing a variety of teaching approaches. In this particular program, different students would be assigned specific topics to cover during each session.

Whatever the size of the team, it is essential to have a designated coordinator. This individual should function as a communication facilitator among the various team members. He or she should work in collaboration with the medical director of the rehab team to oversee the patient's total care program. Although in the program designed here, the course instructor would serve as coordinator, other members of the team, including social workers, occupational therapists, physical therapists, dieticians, etc. could also serve in this capacity.

The importance of collaboration among team members must be stressed. Activities should facilitate the flow of ideas and information between professionals (students) and the pa-
tient. In this way, a smooth coordinated approach is accomplished to help the respiratory patient progress from a state of dependency upon team and family members to maximal self-reliance upon discharge.

Program Schedule

Program scheduling will depend on a number of factors. Time-of-day, time-of-year, patient availability, etc., are all important in determining actual program activities. The number and duration of sessions can vary according to participant accessibility. An example of content and scheduling is covered in APPENDIX E. Some points to consider when organizing a schedule are listed below:

*Avoiding overscheduling on orientation and evaluation days (Give patients time to settle in and adjust to "school" again).

*Use weekends as a time for relaxation and practice sessions; do not give new material or homework at these times.

*Schedule physically active classes between didactic/lecture-type classes.

*Allow slack time in classes for slow learners and have extra activities for faster learners.

*Provide individual as well as group teaching
Program Evaluation

Individual evaluations are done at the close of each day of the program by the participants and instructors to determine if the program is meeting the goals and objectives set for each patient. Strengths and weaknesses are brought out and suggestions for improvement are made. At the close of the program, patients perform the evaluation procedure and provide suggestions for improvement. At this time an appointment is made for a follow-up home visit, and the patient's progress at home will be discussed (SEE APPENDIX F).

Patient participants in the program would be followed for 18 months to determine if the rehabilitation program did, in fact, significantly reduce hospitalizations and in-hospital days. Mean hospitalizations and in-patient days would then be compared to individuals' previous hospitalizations utilizing a simple t-test to determine statistical validity of the program.

Discussion

As I indicated earlier, although not all patients will benefit from pulmonary rehabilitation, I feel the program outlined here will demonstrate that a comprehensive rehab program utilizing an integrated biopsychosocial approach
will clearly demonstrate a reduction in costs, symptomology, and the need for hospitalization for those seriously participating. I also feel that patients with strong psychosocial assets are more likely to respond to rehab; although further studies would be necessary to determine which component of the program is largely responsible for the improvements demonstrated.
REFERENCES


Dear Physician:

I am writing you to assess the need for a Pulmonary Rehabilitation Program for patients with chronic obstructive pulmonary disease in the Roanoke Valley.

As a registered respiratory therapist and Director of Respiratory Care Education at the College of Health Sciences, I have seen a need for a comprehensive pulmonary rehabilitation program as a means of maximizing the benefits of your prescribed medical treatment. The program we have developed is part of our curriculum and utilizes a multidisciplinary, biopsychosocial model. Our objectives are to offer a program which would provide quality patient care at no cost to your patient and at the same time provide a rewarding and educational experience for our students. We feel that such a program will reduce hospital recidivism for COPD patients while assisting them in achieving a more active, fulfilling life.

I am fully aware that your practice is a busy one, and you receive your full, fair share of requests for information and your time. It is essential, however, before we implement such a program, to know whether it would be beneficial to you and your patients.

Therefore, would you be kind enough to complete the enclosed questionnaire and return it in the stamped, self-addressed envelope as soon as possible.

Thank you for your time and consideration in this matter, and I look forward to hearing from you in the near future.

Sincerely,

Paul M. Lemons, MA.Ed., R.R.T.
Program Director
Department of Resp Care Ed.

P. O. Box 1751 • Roanoke, Virginia 24008 • 703 985-8487
PULMONARY REHABILITATION
NEEDS ASSESSMENT SURVEY

After each of the statements listed below, please, indicate whether you strongly agree (SA-1), agree (A-2), disagree (D-3), strongly disagree (SD-4), or undecided (U-5).

Patients with chronic obstructive lung disease would benefit from pulmonary rehabilitation.

SA   A   D   SD   U

COMMENTS: ________________________________
______________________________
______________________________

Would you refer a patient to a pulmonary rehabilitation program?

YES    NO

COMMENTS: ________________________________
______________________________
______________________________

The following components have been included in successful programs. Which ones would you select?

Education

SA   A   D   SD   U

COMMENTS: ________________________________
______________________________
______________________________
Exercise condition

SA A D SD U

COMMENTS: _____________________________________________

_____________________________________________________

Nutrition

SA A D SD U

COMMENTS: _____________________________________________

_____________________________________________________

Physical Therapy

SA A D SD U

COMMENTS: _____________________________________________

_____________________________________________________

Respiratory Therapy

SA A D SD U

COMMENTS: _____________________________________________

_____________________________________________________

Psychosocial Support

SA A D SD U

COMMENTS: _____________________________________________

_____________________________________________________
Please estimate how many COPD patients you see in your practice.

________________________

Of this estimated number, what percentage would benefit from pulmonary rehabilitation?

________________________

Physicians play such an important role by reinforcing the components of patient's care and by answering any questions the patients, their families and the rehabilitation team has. If the Pulmonary Rehabilitation Program is approved, would you be willing to conduct lectures or be involved in some aspect of the program?

We would very much appreciate any input you have concerning this subject. Please fill out the information below and send it with the survey if you could participate in this valuable service.

Thank you.

Sincerely,

Paul M. Lemons

________________________

Name: __________________________

Address: __________________________

I would like to help as a:

Medical Advisor __________

Speaker __________

Other __________
PULMONARY REHABILITATION PROGRAM

PHYSICIAN'S REFERRAL FORM

Patient's Name __________________________ Age _____ Sex _____

Address _______________________________________________________

Diagnosis:

Associated illness that may limit exercise and chest physiotherapy:

May patient climb stairs? _________________________________

May patient have conditioning exercises, including those for upper extremities?

______________________________

May patient receive home visits by trained personnel (senior respiratory care students and instructor) for pre-program explanation and/or follow-up?

______________________________

Does patient smoke? _________________________________

Does patient use home oxygen? ______________________________

Your impression and/or evaluation in relation to the following would be most helpful if included with your referral:

1. patient history
2. physical examination
3. chest x-ray report
4. electrocardiogram report
5. pulmonary function studies
6. arterial blood gases
7. current medication
8. current diet
Comments/Suggestions:

Date:___________  Physician's Signature:______________

Please return to:  Paul M. Lemons, R.R.T.
                 Director of Respiratory Care Department
                 College of Health Sciences
                 P.O. Box 1751
                 Roanoke, Virginia 24008
PATIENT INFORMATION SHEET

Name ___________________ Date of Birth _______ Sex _______

Address ___________________________ Phone _______

Date _______________ Physician _______________________

Living arrangements: House, apartment, mobile home, city, rural, extended care home?
________________________________________________________________________

How many people do you live with? _______ If alone, do you have family or a close friend nearby? ______________________

Occupation: ____________________________

Retired? __________________

How long? _______ Because of lung condition? _______

Was your previous lifestyle active? (exercise, hobbies, etc.)

Does your family show understanding and support of your lung disease? ______

Does your illness affect your family in any way? ______

How? ______________________________________

Do you have a good understanding of your illness? ______

Do you have questions? _______________________

What are your interests, hobbies? _______________________

What type of social life do you have? _______________________

Do you have a partner that might be interested in attending some or all of the sessions with you? _______________________

How long have you had difficulty breathing? ______

Have you had frequent colds or pneumonia? ______

Did anyone else in your family have this condition, or does anyone have it now? _______________________

__________________________________________
Did you ever smoke? _____ How many years? _________

How many packs per day? _____________________________

Do you still smoke? _______ When did you stop? _______

Do you drink alcoholic beverages? _______ How much _____

Have you ever been hospitalized for treatment of your lung condition? _________ How often? ___________

Do you have a productive cough?

To what extent does your lung problem affect your life?

Do you have any other physical problems? _______________

Are you ever frightened when you become short of breath?

What are the most difficult tasks for you to do?

How is your appetite? _________________________________

Do you have any problems sleeping? ____________________

How often do you see your doctor? _____________________

Are you satisfied with your medical management? ________

What would you like to learn about your breathing and lung disease? ________________________________

How would you like for your life to be different or better after you complete a pulmonary rehabilitation program?

____________________________________________________

____________________________________________________

Goals for patient:

Interviewer's Signature: _______________________________
COLLEGE OF HEALTH SCIENCES
PULMONARY REHABILITATION PROGRAM

PATIENT PARTICIPATION AGREEMENT

By enrolling in this rehabilitation program, I understand that I will be evaluated by members of a comprehensive pulmonary care team. Utilizing this team approach, I and my family will be given education and prescriptions for all phases of daily living and medical care.

I understand that maximum family involvement is strongly encouraged throughout all phases of the program. The objective of this program will be to provide me and my family with an opportunity to become acquainted with, learn, and practice a daily routine for home use.

I have been told some of the potential benefits of this program including improving my quality of life, lessening my pulmonary symptoms, maintaining or improving my present level of exercise tolerance, decreasing my number of hospital days, and improving my mental outlook.

I understand that the program will last ___________. Only by full attendance each day, by me, to all classes, tests, and activities can I hope to achieve the best outcome.

After discussing the program with a rehabilitation team representative and reading this summary, I understand the nature of this program and agree to participate.

Pulmonary Rehabilitation Candidate

Date

Pulmonary Rehabilitation Team Representative

Date
PULMONARY REHABILITATION PROGRAM

Purpose

The purpose of this program is to provide and assist chronic obstructive pulmonary disease patients and their families with information and the requisite therapeutic techniques which would enable them to lead a more productive and fulfilling life.

Program Goals

* To provide COPD patients and their families with a better understanding of their disease

* To improve breathing efficiency

* To improve bronchial hygiene

* To improve activity tolerance and reduce fear of activity

* To guide patients toward independent self-care

* To reduce the need and frequency of hospitalization

* To increase self esteem by setting individualized, realistic goals

Patient Eligibility

Any patient meeting the established criteria who has a physician referral.
Program Content

The rehabilitation program described here will consist of both didactic and laboratory sessions. The didactic component will consist of lectures, discussion, and audiovisual adjuncts. The laboratory sessions are essentially a workshop format and consist of hands-on training, which includes equipment review, exercise training, patient monitoring, and breathing and relaxation techniques.

Patients and their families will meet twice a week for six weeks with each session lasting approximately two hours. Time will vary depending upon the nature of the class and the number of participants. The following topics will be addressed:

1. Patient education
2. Anatomy and physiology of the cardiopulmonary system
3. Chronic Obstructive Pulmonary Disease - causes and effects
4. Pharmacology: drug actions and side effects
5. Infection control - awareness and prevention of disease
6. Respiratory therapy equipment - utilization and maintenance
7. Bronchial hygiene
8. Work simplifications and energy conservation
9. Adjustments in activities of daily living
10. Chest physical therapy
11. Controlled breathing and cough techniques workshops
12. Diaphragmatic - pursed lip breathing exercises
13. Conditioning exercises for ventilatory muscles
14. Relaxation exercises and techniques
15. Monitored exercise programs

NOTE: This program is provided at no cost by the College of Health Sciences Department of Respiratory Care Education.
PULMONARY REHABILITATION PROGRAM SCHEDULE

SESSION I

A. Orientation

1. Anatomy, physiology of lung and heart
   a. breathing mechanics - normal disease
   b. alveolar gas exchange
   c. arteries and veins

2. Video tape You Can Do It: "Living with a Breathing Problem"

3. Handout packet of information (pamphlets, vocabulary, etc.)

B. Workshop I

1. Issue routine cleaning of respiratory care equipment instructions

2. Issue patient exercise record and exercise precautions

3. Introduce breathing retraining exercises
   a. diaphragmatic breathing, standing, sitting, lying down
   b. pursed lip breathing

4. Introduce Inspiratory Muscle Training (IMT)

5. Issue instructions in use and care of IMT

SESSION II

A. Disease

1. Chronic Obstructive Pulmonary Disease (COPD)

2. Chronic bronchitis

3. Emphysema
4. Bronchial asthma
   a. causes
   b. symptoms
   c. effects

5. Video tape You Can Do It: "Learning to Breath Better"

6. Show chest x-ray: normal vs. COPD

B. Workshop II

1. Review breathing exercise

2. Review pulse taking, target heart rate (HR)

3. Introduce conditioning exercises (1-3)

4. Review exercises precautions - issue handout "Do's and Don't of Walking"

5. 12 minutes walk test

6. Evaluate and adjust IMT

C. Introduce monitored exercise program (Week #1)

1. Assign target HR (75% MAX HR)

2. Teach pulse taking

3. Parameters to be monitored:
   a. respiratory care
   b. heart rate
   c. oxygen saturation (SaO2)
   d. time
   e. distance and workload
   f. pulse recovery time
   g. post exercising SaO2

SESSION III
A. Drugs
   1. Bronchodilators
   2. Steroids
   3. Antibiotics
   4. Diuretics
      a. action
      b. side effects

B. Video tape You Can Do It: "Total Body Relaxation"

C. Workshop III
   1. Issue sample home exercise program schedule
   2. Review breathing exercises
   3. Review pulse taking, target HR
   4. Review conditioning exercises (1-3)
   5. Introduce conditioning exercises (4-6)
   6. Introduce relaxation techniques - issue relaxation
   7. Introduce metered dose device (MDD), issue MDD instructions

B. Evaluate and adjust IMT

D. Monitored exercise (Week #2)

SESSION IV

A. Bronchial hygiene - preventing infection

B. Respiratory care equipment, breathing aids, home O2 equipment

C. Video tape You Can Do It: "Clearing Your Airways"

D. Workshop IV

   1. Review breathing exercise and add 5 pound weight with breathing exercises
   2. Review conditioning exercises (1-6)
   3. Review relaxation exercises
4. Introduce Bronchial Drainage Program, issue instructions
5. Introduce Controlled Cough Method, issue instructions
6. Have patient prepare activities profile
7. Evaluate and adjust IMT

E. Monitored Exercise (Week #3)

SESSION V

A. Living with COPD
   1. Muscle O2 consumption
   2. Calorie values
   3. CO2 levels

B. How to cut down energy/O2 expenditure
   1. Daily activities
   2. Dress attire
   3. Breathing
   4. Eating

C. Smoking, pollution, lung irritants at home (powder cooking odors, etc.)

D. Diet
   1. Small meals - more of them
   2. Natural diuretics
   3. Foods with high potassium (K)
   4. Nutrition and calories

E. Alcoholic beverages (depressants)

F. Video tape You Can Do It: "Building Your Strength and Endurance"
G. Workshop V

1. Review breathing exercises
2. Review conditioning exercises (1-6)
3. Review relaxation exercises
4. Review bronchial drainage
5. Review controlled cough
6. Evaluate and adjust IMT
7. Relate proper breathing to daily activity (activity profile)

H. Monitored walking (Week #4)

SESSION VI

A. Discussion

1. Problem solving
2. Group activities, etc.
3. Friends who smoke, etc.

B. Community resources

C. Warning signs: when to contact your physician

D. 12 minute walk test - compare with first test

E. Patient evaluation of "Better Breathing Clinic"

F. Party prepared by patients

G. Handout home exercise check-off sheets to stimulate continuation of exercise

H. Workshop VI

1. Review all the above
2. Vital signs
3. Evaluate and adjust IMT

I. Monitored exercise (Week #5)

J. Monitored exercise (Week #6)

K. Monitored exercise
COLLEGE OF HEALTH SCIENCES
RESPIRATORY CARE EDUCATION

VETERAN'S ADMINISTRATION MEDICAL CENTER

PARTICIPANT EVALUATION: PULMONARY REHABILITATION PROGRAM

The purpose of this questionnaire is to gather information that will be used in evaluating the effectiveness of the pulmonary rehabilitation program here at the College of Health Sciences. Please be as honest as you can in answering the question.

1. Did the program help you better understand your breathing problem?

2. How would you rate the program according to: (please circle one.)
   a. Length: Too long Too short Just right
   b. Usefulness: Helpful Very Helpful Not Helpful

3. How would you rate the instructors in their knowledge of the topic? (Circle one for each). (VH = Very Helpful; SH = Somewhat Helpful; NH = Not Helpful).
   a. Your lungs
   b. Breathing retraining
   c. Medications
   d. Nutrition
   e. Chest percussion and postural drainage
   f. Coughing
   g. Reduction of exposure to irritants - Tips on daily living
   h. Relaxation and Panic control
4. How helpful were the following topics in learning to cope with your respiratory condition? (Circle one for each). (VH = Very Helpful; SH = Somewhat Helpful; NH = Not Helpful).

a. Breathing exercises       VH  SH  NH
b. Medications               VH  SH  NH
c. Nutrition                 VH  SH  NH
d. Exercise conditioning     VH  SH  NH
e. Chest percussion and postural drainage VH  SH  NH
f. Clearing your lungs       VH  SH  NH
g. Reduction of exposure to irritants VH  SH  NH
h. Tips on daily living      VH  SH  NH
i. Your lungs and how they work VH  SH  NH
j. Relaxation exercises      VH  SH  NH

5. Is there any area, which was not covered about which you would like more information?

6. Has this program helped you increase your daily activity level?

7. Would you recommend the program to a friend?