DEVELOPMENT OF A HOSPITAL REHABILITATION PROGRAM FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

by

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CHAPTER I

INTRODUCTION

Statement of the Problem

The magnitude of the problem of chronic obstructive pulmonary disease, most notably emphysema and chronic bronchitis, is widely known. In the past 15 years morbidity and mortality for these diseases has doubled each five years. They are second only to heart disease as causes of disability under the Social Security System. Disability payments amount to 100 million dollars a year in the form of direct benefits. Approximately 81,000 productive man hours are lost annually from chronic bronchitis alone. (32, 33, 34)

At present, the ratio of emphysema, men to women, is ten to one, and men tend to develop a more severe form of the disease. The longer history and heavier smoking among males probably accounts for the disparity. As women adopt similar smoking patterns, the morbidity ratio may equalize. (30)

In a study designed to document the course and prognosis of patients under conservative and individual management, data were gathered from a group of 200 patients with chronic obstructive

pulmonary disease. "At the end of the one year follow-up, 186 patients were alive. At the end of seven years, 35 were alive, 104 were known to be dead and four were lost to follow-up. The overall mortality was 50 percent before six years." (2, 5) The study concludes that emphysema is a progressively deteriorating disease.

The disabling effects of emphysema usually strike between the ages of 45 and 55. The problems created are not only physical but also social and economic. It is the over 40 age group that is normally the most stable and economically productive in our society, but this is the group commonly affected. The gradual respiratory impairment and the subsequent decrease in activity capacity may precipitate work cessation and a loss of self esteem in any role. (41, 43)

Kimbel (19) used the Minnesota Multiphasic Personality Inventory on all the patients in his in-hospital program for rehabilitation of patients with chronic obstructive pulmonary disease. He found abnormalities in the first three scales, somatic concern, depression and conversion tendencies (the neurotic triad). There was a progressive increase in the mean scores for each of the groups as severity of symptoms and restriction increased.

The event of chronic illness precipitates a relatively orderly process that allows a person to adapt to living with illness. (9) Anger, denial, depression and dependency are responses to illness

familiar to the medical profession. The model of adaptation to chronic illness follows the grieving process as described by Engel. (11) He states that the process involves five events: shock and disbelief, developing awareness, restitution, resolution of the loss and idealization. Adaptation to chronic illness follows a similar pattern: disbelief, developing awareness, reorganization of relationships with others, resolution of the loss and identity change.

The primary symptom of disbelief is denial. Adaptation begins when the person learns either by diagnosis or change in function that he has a potentially disabling condition. This poses a threat. He denies the threatening condition to protect himself against the impact of it. This phase is particularly dangerous for the emphysematous patient who denies his disease and continues smoking, counteracting medical therapy. As the person moves further along in adaptation and becomes less able to maintain his denial, he becomes more aware of what has happened to him and its implications. Being sick implies acceptance of care and dependence on others. To some this is threatening. They defend themselves against the threat or against an unconscious wish to behave in a dependent way and to be cared for. Some persons defend themselves against guilt about being sick. A common defense against those feelings is anger. It starts as diffuse anger directed at numerous people or objects. It may be expressed openly, projected or directed inward against one's self and

manifested as depression. It may take the form of derogation and blame directed at persons on whom the patient depends for care, at family, at friends, at a supernatural power, or at himself. The underlying theme is that someone or something else besides the fact of illness itself is responsible and therefore the recipient of the feelings. As the person with the disabling disease moves further toward adaptation and is able to accept increased dependence, he also begins to undergo a process of reorganizing his relationships with family and friends. During the stages of resolution and identity change when the person begins to resolve his loss and comes to grips with the consequences of the illness, he acknowledges changes in how he perceives himself and he identifies with others who have similar problems. These two factors help him toward accepting himself as limited by a specific condition. The final stage of the adaptive process is reached when the person can say, "I have a disease and there are limits to my life because of it." When his behavior indicates this state has been reached, he does not push himself into unsafe or destructive positions. He is able to depend on others. This does not mean that he is adjusted, or accepts his illness, or does not mind being ill, but it does mean he is better able to live with his illness. Adaptation is not a static process but a prolonged dynamic process.

The primary role of medicine is diagnosing and treating; the

"cure" process described by Schulman, Mauksch and others. (27, 40) The primary role of nursing lies in the "care" process,expressive in nature and consisting of caring, helping, comforting and guiding. Brown (4) cites evidence to indicate that the doctor limits his perception of patient's problems--organic, psychiatric and social--because of lack of both time and training. Other research has shown that these limitations are greatest in the psychosocial areas. In their study of patient care in a university medical center, Duff and Hollingshead (10) report, "the physician focused his interest on physical disease; he was usually not concerned with personal and social influences in relation to the disease. Starfield and Borkowf (46) have shown that pediatric residents are more apt to record their awareness of patients' complaints if these relate to body symptoms or functions in contrast to behavioral or mental problems. Steiger and Yates (47) suggest that many physicians are more skilled and comfortable in meeting patients' needs for drugs and for diagnostic or therapeutic technologies than they are in providing a trusting relationship and skilled understanding.

Studies indicated that nursing places more emphasis on psychosocial factors in ambulatory care settings. (27) The process of adaptation to chronic illness is a fluctuating but generally ordered change during which care is focused on thorough understanding of how the patient is experiencing the change. Nursing, rather than

medicine, for the reasons cited above, is the logical profession to give this care. Nursing is therapeutic to the extent that the nurse is able to communicate her understanding to the patient by actions rather than by direct interpretation and by the degree that she permits the patient to experience the illness rather than repress the experience. Implied in this approach is nursing's responsibility for recognition of probable changes, planning for changes and being prepared for them.

Chronic illness may take several forms. It may be relatively stable, may be progressively degenerative with remissions and exacerbations leading to severe disability or may be terminal. If the person is able to make an adjustment to living without need for the nurse, she must be willing to let go. If the person has a condition that is degenerative, she may expect reactivation of the grieving with each new loss and would wish to plan for continued contact and supervision. If the disease is terminal, her role is to help the person achieve death as comfortably as possible. The nurses's role as a therapist is not to force, push, or try to change the patient but is to develop a therapeutic relationship in which the patient can use her as a guide to make necessary emotional and behavioral changes through the normal process of adaptation. (9)

"The unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to

health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge. And to do this in such a way as to help him gain independence as rapidly as possible." (17). In addition she helps the patient carry out the therapeutic plan as initiated by the physician. She is a member of the health team, helping other members as they in turn help her. Her role in rehabilitation of patients with chronic obstructive pulmonary disease (COPD) is only beginning to be defined. The challenge for the next few years is to determine her usefulness and versatility in the field of health maintenance and disease prevention.

Selection of Components of the Program

It has been suggested by a variety of authors that much can be done to rehabilitate patients with COPD in addition to standard medications and oxygen therapy. These measures for rehabilitation include postural drainage, preceded by bronchial hygiene, breathing retraining, graded exercise, progressive relaxation and patient education regarding the nature of the disease and its treatment. (8, 13, 16, 19, 35)

Petty et al., (34) described a comprehensive care program for patients with COPD. This program included patient education, bronchial hygiene using simple home equipment, breathing retraining and physical reconditioning. During a two-year period, 182 patients with

chronic airway obstruction and emphysema were accepted in the program. Most patients experienced immediate symptomatic relief. Of the 152 patients who were evaluated for six months or more, 91 were improved, 15 had no change, five were worse, two were not assessed, 11 had died and 28 were missing or pending. "Better" was considered to be a significant increase in daily activity at home, demonstration of increased measured-walk tolerance and ability to perform these tasks at a greater degree of comfort. At three months, statistically significant improvement was observed in resting partial pressure of arterial oxygen (PO_2) and oxygen saturation, walk tolerance on the level and work performed on stairs. No significant improvement was noted in vital capacity (VC), forced expiratory volume in one second (FEV_1), maximum mid-expiratory flow (FEF 25-75), partial pressure of arterial carbon dioxide (PCO_2) and pH. At six months the slight improvements in PO_2 and oxygen saturation were no longer statistically significant but there was no further deterioration in the group.

Since the program involved a variety of modalities of therapy, it is impossible to assign either clinical or physiological benefits to a given form of therapy. It was noted that the likelihood for real clinical improvement varies with the individual degree of functional abnormality modified by the personal goals of the patient. Functional improvement was not evident in many areas, but it was obvious to those

concerned with the study that improved activity level is the dividend most appreciated by the patient who is concerned with comfort and productivity.

The literature has described the development of various programs for patients with COPD. It has been noted that significant physical improvement resulted for a large number of those individuals who were participants in a comprehensive care program.

The preceding is a resume of the literature regarding already established programs. The components of such programs were thus identified. It was found that bronchial hygiene, breathing retraining, graded exercise, progressive relaxation and patient education are measures currently included in rehabilitation programs for patients with chronic obstructive pulmonary disease. There remains controversy concerning the usefulness of some measures. A further search of the literature ensued to determine which components would be developed as a part of the program reported in this study. Each is considered individually.

Bronchial Hygiene

Bronchial hygiene is a method of clearing the airways of secretions. It begins with the inhalation of bronchodilators followed by the inhalation of steam. Percussion and vibration are said to help to dislodge secretions so they can be moved to the larger airways

and expelled by coughing. Percussion is a smooth rhythmic motion executed with cupped hands and relaxed shoulder and arms applied over the areas to be drained. Vibration is the rapid, vertical oscillation of the hands while applying moderate, continuous pressure to the chest wall. Postural drainage is the removal of secretions in the lungs with the aid of gravity. Expulsive coughing follows. This is carried out the first thing in the morning and before bed at night routinely and may be done more often if necessary.

The impairment of the normal mucociliary clearance mechanism, and the excessive production of mucus and bronchial inflammation in chronic bronchitis, inhibit the maintenance of a clear airway. In emphysema, loss of effective elastic support for the bronchi causes the airways to collapse and readily obstruct when coughing is forceful, thus the cough is less effective in clearing the lungs and the patient's depleted reserve of energy is wasted by repetitive but non-productive coughing. Retention of secretions can add to the problem and cause acute respiratory failure. (19).

There is much controversy over the management of airway problems. The literature describes the inhalation of bronchodilators and steam followed by expulsive coughing. When unproductive, postural drainage with or without percussion and vibration is suggested.

Steam inhalation is being questioned as to its usefulness. A

study by Wolfsdorf, Swift and Avery (50) described the output of jet and ultrasonic nebulizers and the deposition of water particles in the respiratory passages of adult human volunteers as follows:

> Aerosol deposition in the upper and lower respiratory using technetium-labelled water aerosol, produced by jet and ultrasonic nebulizers with and without 10 percent propylene glycol was examined under conditions of nasal, normal mouth and tube breathing in 15 normal adults. With nasal breathing 91.5 percent (± 5.5) and 83 percent (± 6.3) of the mass of the aerosol produced by the jet and ultrasonic nebulizers respectively was deposited in the upper respiratory tract. Similar fractional depositions were observed with the addition of 10 percent propylene glycol. When breathing was carried out via a mouth tube, 43 percent to 59 percent of the mass of the aerosol produced by the nebulizers was deposited in the upper respiratory tract. The mass median diameters of the available aerosols produced by the jet and ultrasonic nebulizers were 6.0 μ (geometric standard deviation = 2.5) and 2.8 μ (geometric standard deviation = 2.1) respectively; the densities of the aerosols produced were 8 and 34 μl/liter of air. With nasal or normal mouth breathing, the volume of water in aerosol form that could be deposited per 24 hours in the lower respiratory tract of an adult was calculated to be about 6 ml and 49 ml for the jet and ultrasonic nebulizer respectively.

Lifschitz and Denning (22) studied the effects of water on the viscosity of sputum from patients with cystic fibrosis. They found that one ml of water reduced the viscosity of three ml of sputum by approximately 50 percent, suggesting that even small amounts of water deposited in the lower respiratory tract could have a significant clinical effect.

It may be concluded that in some patients the inhalation of steam is beneficial. If oral inhalation is used, displacing the tongue

downward increases the volume of water available to the lower respiratory tract.

A study conducted by Lorin and Denning (24) evaluated postural drainage by measurement of sputum volume and consistency. Subjects were 17 children and young adults with cystic fibrosis and varying degrees of pulmonary involvement, between the ages of six and 24 years. In the test group, patients received no aerosol or mist treatment for at least three hours prior to testing and postural drainage for 20 minutes included percussion and vibration. In the control group, patients coughed and tried to raise sputum every five minutes for 20 minutes. The period of time was the same for each group. Their data confirmed objectively the superiority of postural drainage to unaided cough in terms of volume of sputum expectorated. They concluded that postural drainage was more effective in dislodging mucus from the small airways where cough is ineffective and moving it to the larger airways where it can be coughed up.

A study by March (25) was conducted on 20 patients with COPD. He compared FVC, FEV_1, forced expiratory flow, 200-1200 ml (FEF 200-1200) and FEF 25-75, before and after therapy. After postural drainage for one hour, once daily, without percussion and vibration, no significant change was noted in any of the measurements as a result of treatment. The amount of sputum obtained generally was less than 25 ml despite reports that total 24 hour

sputum in some patients might approach 600 ml. Two patients with sputum of 30 ml showed increases in FEV_1, one approaching 10 percent. However, a patient with the greatest amount of sputum (65 ml) had a 16.5 percent decrease in FEV_1. The results of this study indicate the possibility that postural drainage as a treatment has limited value in patients with severe COPD. He recommended further research with determinations of work of breathing and alveolar ventilation.

In summary, there were not enough studies on the effects of postural drainage to make a definite decision relative to inclusion in the program. In certain instances, postural drainage may be beneficial and should be included in the program.

Breathing Retraining

Breathing retraining has included teaching pursed lip breathing and the use of abdominal muscles to aid in respiration. It is believed that relaxing the abdominal muscles on inspiration aids in pulling the diaphragm down thus aiding the inspiratory process. Contracting the abdominal muscles on expiration is thought to push the diaphram upward, decreasing the size of the thoracic cavity and aiding in expiration. Voluminous literature on the anatomy and physiology of breathing lends support to this traditional method of treatment, but extensive clinical testing is limited and nonconclusive.

Pfeiffer (36), using slow deep breathing with a prolonged inspiratory phase, showed improvement of oxygen saturation of arterial blood. Improvement in oxygen diffusion was thought to be related to more uniform alveolar aeration achieved through deeper, slower breathing.

Thoman, et al. (48) found that pursed-lip breathing resulted in decreased respiratory rate, increased tidal volume, reduced PO_2 and increased ventilatory rate of the most slowly ventilated component of the functional residual capacity. When patients were taught to alter the rate of their breathing without pursing their lips, increased tidal volume and decreased PCO_2 occurred. At the same time, the respiratory rate slowed to coincide with the rate occurring spontaneously during pursed-lip breathing. The value of pursed-lip breathing is probably due to the decrease in the respiratory rate rather than an increase in intra-airway pressure.

Altering the rate-depth pattern in an attempt to increase minute volume may increase the work of breathing. Since the activity of the muscles which produce the motor force for ventilation requires cellular oxygen, ventilation cannot be increased on a cost-free basis. Otis (31) states, "since the metabolic cost per unit of ventilation increases with increasing ventilation, the lowering of alveolar PCO_2 by voluntary hyperventilation will become progressively less effective the higher the ventilation and theoretically,

there will be a critical value for ventilation beyond which PCO_2 will not continue to be lowered, but will actually increase, ie., the tendency of the hyperventilation to lower PCO_2 will be offset by the increased metabolic production of CO_2 by the respiratory muscles."

Watts (49) believed that the most promising possibility for reducing energy costs is the reduction of inefficient muscular activity which the patient habitually uses to breathe. Examples of this are tense neck and shoulder muscles accompanying anxiety in the asthmatic patient and sustained abdominal tone persisting into the inspiratory phase of breathing, thus blocking effective descent of the diaphragm. She also mentioned that studies have indicated that in normal subjects at rest and during activity, the body tends spontaneously to choose a breathing pattern requiring minimum expenditure of energy.

Classically it has been taught that the diaphragm and intercostal muscles contribute to the active excursion of air in the lungs. Furthermore, ventilation can be assisted by using abdominal muscles to move the diaphragm. Patients are taught to push out or relax the abdominal muscles on inspiration and to contract the abdominal muscles on expiration. Relaxing the abdominal muscles permits the diaphragm to be pulled down by the weight of the viscera, thus aiding inspiration, while contracting the abdominal muscles pushes the diaphragm up, assisting exhalation. Thus, instead of using accessory

muscles with increased cost in work of breathing, abdominal muscles are used to aid the diaphragm to work more effectively.

Repshire (38) before an audience in Denver stated that Jere Mead from the Department of Physiology, Harvard School of Public Health, changed some thoughts about how air is moved in and out of the lungs and also questioned abdominal breathing techniques taught in physical therapy. He felt that Mead's research on the diaphragm indicated that the abdominal muscles and the intercostal muscles serve only one function and that is to put the chest cage, clavicles and scapula in optimum position for the diaphragm to function at its best. These muscles contribute nothing to the actual moving in and out of air other than placing the diaphragm into optimal position so that the diaphragm can generate its tension at its most optimal mechanical and biochemical advantage. Muscle cells work best when stretched to their greatest length. They are at a disadvantage when short. This is the reverse of what is usually taught.

Only one study was found concerning breathing exercises and this was concerned with equalizing ventilation. It was determined that alveolar ventilation was not improved by diaphragmatic breathing in normal persons, breathing normally, and repeating with a tight binder around their chests. (39)

In summary, breathing exercises are of questionable benefit. Slowing down respirations can be achieved through other methods if

the patient does not learn pursed-lip breathing naturally, and research indicates that abdominal breathing does in fact increase the work of breathing. Therefore, breathing exercises were not included in this program.

Patient Teaching

Education of the patient is aimed at his adaptation to his environment. Faunce and Bossing (12) stated that education "is conceived to be the adjustment of man to his environment, to the end that most enduring satisfactions may accrue to the individual and society." Therefore, education has a responsibility to assist man in developing a philosophy of life that will facilitate this adaptation. Education then becomes the cultivation of qualities and talents that help the human being grow in harmonious development of physical, intellectual, social, esthetic and spiritual powers.

Burton (6) said, "the process of learning is doing, reacting, undergoing, experiencing. Experience intimates a change in behavior and this, in turn, leads to changed values, interpretations, attitudes and skills, all of which are achieved by the learner through his own activity." In order to effect permanent change in behavior, that which is learned must be practiced. This basic concept underlies the rehabilitation program proposed in this paper.

"Nursing may be defined as a dynamic, therapeutic and

educative process in meeting the health needs of society. Lambertson (21) has indicated that nurses have devoted relatively little attention to health promotion, prevention of illness, and rehabilitation, and these areas depend upon nurses' competence in the educative processes.

There is an idealistic concept that staff nurses give complete bedside care, including patient education. This is truly idealistic. In fact, the nurse is an overseer; is bogged down with paper work or has large assignments due to short staffing. There appears to be a large chasm between nursing education and nursing service. Nurses are educated one way and perform another. (23)

It is generally agreed that education is important so that the patient can participate in his care and make intelligent judgments concerning his state of health and will be included in this program.

Progressive Relaxation

Progressive relaxation is a technique of contracting certain muscles in order to learn where to look for tensions; then practicing letting go. It is a learned technique that requires continuous practice and reinforcement.

Relaxation techniques are useful adjuncts to medical therapy in rehabilitation of patients with chronic obstructive lung disease. Tracheal-bronchial obstruction interferes with ventilation on

exhalation, and the interference is increased by the force or speed of exhalation. In part, this represents an increase in airway resistance, but careful evaluation of the process of exhalation suggests that the obstruction results from the collapse of large numbers of small bronchi and bronchioles. Spirographic tracings may be relatively normal for quiet breathing; but, where rapid forced breathing occurs, there is evidence of the onset of interference shortly after the beginning of and increasing throughout exhalation. This often results in the trapping of air within the alveoli so that during hypernea, the patient may be breathing off the top of his inspiratory capacity. Even in the normal lung, an increase in intrathoracic pressure above a certain maximum causes narrowing in the small airways at the very low intrathoracic pressures. When breathing slows down so there is less intrathoracic pressure, this obstruction is generally relieved and the spirographic curve returns to the normal level. Due to this mechanism, ventilation loses its efficiency as breathing becomes rapid. (15)

Relaxation is a technique that can be learned to gain control over the body. Techniques described by Jacobson (18) to develop physical awareness and control tension would seem to be of great value in slowing respiration and preventing acute anxiety attacks. With the relaxation technique as a tool, the patient with emphysema may be able to control his emotions so that fear does not precipitate

hyperpnea with its resultant cyclic threat. It will be included in this program (Appendix C).

Graded Exercise

Graded exercise is an individualized program designed for each patient gradually to increase his exercise tolerance. The formula for the safe heart rate of these patients is the following: 205 minus (the patient's age x 0.41) x 70 percent. This figure is the maximum heart rate for that patient to achieve during exercise. If the patient exercises enough to reach the given heart rate for eight minutes a day three times a week, he will achieve fitness. (26)

Ventilatory or circulatory insufficiency may be responsible for exertional dyspnea which causes fear. Fear promotes inactivity. Inactivity promotes diminished muscle tone, decreased muscle efficiency, easy fatigability and progressive physical debility. All these lead to more inactivity and increased exertional dyspnea. (20, 28, 41) The adjustment of the body to exercise involves ventilation, hemoglobin and the circulation of the blood. (7) The large surface area of the lungs permits almost unlimited exchange of gases between the alveolar surfaces and circulatory system in a normal individual.

Hemoglobin plays an important role in enabling the body to adapt to exercise. If to oxygenate the blood, the body had to depend primarily on dissolving oxygen in plasma, even at rest, it would have

to circulate nearly 150 liters of fluid per minute to accomplish the task.

The intake of oxygen per minute rises on a linear curve with work load until maximal intake is attained. Maximal oxygen intake in normal individuals is related directly to the capacity of the lungs for ventilation or diffusion and the pumping capacity of the heart. Thus maximal oxygen intake is more an index of circulatory capacity than pulmonary capacity. (7)

Cardiac output in normal man is about 5.5 liters per minute. Cardiac output can be altered by a change in heart rate or stroke volume. Isometric contraction of muscle, requiring metabolic energy, results only in production of tension not useful work since no load is moved. The development of ventricular pressure by isometric contraction requires energy even though no blood is ejected and, therefore, no work is done. Useful work is accomplished only if the heart ejects blood. (44)

Increased stroke volume, with heart rate and blood pressure constant, increases the efficiency of the heart. The greater volume pumped requires only a small increase in oxygen consumption to prolong systole. (44)

An increased heart rate, with blood pressure and cardiac output constant, decreases the efficiency of the heart. Since each contraction consumes oxygen and expends energy whether or not useful

work is accomplished, the increased heart rate is only inefficient. For instance, unless an athlete's heart adapts to provide a larger stroke volume at relatively low heart rates, the athlete will be unable to endure prolonged exercise. (44)

Training enables a person to achieve optimum cardiac output at rest or at work with a decreased heart rate and an increased stroke volume. This improves the economy of the heart muscle in energy requirements and oxygen demand. The mechanism underlying the effect of training on the work of the heart is unclear, but the final result is diminished oxygen consumption and blood flow through the heart muscle at a given cardiac output. (3)

At rest, pulmonary ventilation per liter of oxygen consumed is unaltered by training. With exercise, the depth of respiration may be increased and the respiratory rate reduced, but it is difficult to measure pulmonary ventilation without affecting the subject. Also training may improve tissue utilization of available oxygen volume. (3).

During the first minutes of light exercise, energy can be delivered aerobically from the oxygen stored in the muscles bound to myoglobin and in the blood perfusing the muscles. As exercise continues, anaerobic processes supply the energy for the next phase and lactic acid is produced. Anaerobic energy is provided not only by the glycogenolysis or glycolysis but also by the breakdown of ATP

and creatine phosphate. The heavier the work load, the more the anaerobic contribution becomes. Blood lactate concentration increases and the body's pH decreases as work becomes more strenuous. A decrease in the body's pH affects muscular tissue, respiration and other functions. (3) It takes at least 60 minutes of rest before resting levels of lactic acid are reached so the resting time between periods of exercise should be at least one hour. Lactic acid, only partly buffered by bicarbonate, lowers the pH of the blood and stimulates respiration. Thus heavy exercise leads to hypernea and dyspnea. (3)

By training, the blood lactate concentration for a given work load can be lowered but levels attained during maximal physical effort are usually higher. The highest values reported are from samples drawn from well-trained athletes after strenuous competition of one to two minutes. (3)

The individual's maximal aerobic power plays a decisive role in his work capacity. If a given work task demands an oxygen uptake of 2.0 liters per minute, the man with a maximal oxygen uptake of 4.0 liters per minute has a satisfactory safety margin, but the man with maximal uptake of 2.5 liters must work close to his maximum with a consequent disturbance in his internal equilibrium. (3) Since regular training increases the maximal uptake by not more than 20 percent, natural endowment is thus the most important factor in

determining an individual's work capacity.

There is no linear relationship between the amount of training and training effect, and there is an individual limit to training effect.

Motivation or drive, the neural process which impels the individual to pursue specific objectives, may be the most important key to success since abilities and physical capacities alone are of little use unless the individual is motivated to commit all his endowment and capacity to the attainment of specific goals. Superior performance still may be impossible if the physical capacity of the body is limited. (3)

To totally mobilize energy metabolism, the amount of work is more decisive than is the intensity of work. To force the muscles to work against a large resistance without exhaustion, work periods should be under one minute. In order to maximally tax oxygen transporting organs, work periods of a few minutes duration are effective. The duration and spacing of exercise and rest periods critically affect the peak load on the oxygen transporting system. (3) If a resting period of five seconds is prolonged to 10 seconds (after running for ten seconds), the peak oxygen uptake is reduced from 5.6 to 4.7 liters per minute. In work of several minutes duration, the length of rest periods is less critical. In this case, the load on the oxygen transporting system is determined by the intensity of work.

The following exercises are suggested to develop the different

types of power necessary for top performance. (3)

1. Burst of intense activity lasting only a few seconds to develop strength in muscles and stronger tendons and ligaments.

2. Intense activity for about one minute, repeated after about four minutes of rest or mild exercise to develop the anaerobic power.

3. Large muscle activity of submaximal intensity for three to five minutes, repeated after rest or mild exercise of similar duration, to develop aerobic power.

4. Activity at submaximal intensity lasting 30 minutes or longer to develop endurance; i.e., the ability to tax a larger percentage of the individual's maximal aerobic power.

Regular training with a given standard work load gradually decreases the heart rate from 170 to 160 beats per minute. After a period of training with a heavier than standard work load, the standard load could be performed with a further decrease in heart rate to 140-150 beats per minute. An adaptation results from consistent training with a given load. To achieve further improvement, training intensity must be increased.

The emphysematous patient has gradually developed into a state of inactivity with loss of muscle tone or even wasting of skeletal muscles. It is important to bring these muscles back into a state of relative efficiency and strength so that mild exercise will not produce dyspnea. This should be begun early with a program in the hospital.

It has been reported repeatedly that patients with COPD who continue to be active remain in relatively better health than their more sedentary counterparts. (37) Physical training in patients with emphysema improves their efficiency in performing physical work. This is demonstrated by a decrease in physiological stress as indicated by a decrease in heart rate, respiratory rate, minute ventilation, oxygen consumption, carbon dioxide production and oxygen cost of exercise for any given level of activity. The improved efficiency following training is further indicated by the more rapid return of these parameters to resting levels after the termination of exercise. In addition, these patients show an increased capacity for work following physical training. This is indicated by their ability to walk longer at the same speed, walk at faster speeds, consume more oxygen, produce more carbon dioxide and contract a large oxygen debt. A relatively modest amount of daily exercise results in a lessening of the physiological stress of exercise in patients with emphysema. (37)

Most patients with COPD should not only be encouraged to remain in a physically active state to the limits of their tolerance but should be started on appropriate physical conditioning programs depending on their range of disability.

This study was undertaken for the purpose of reporting on the:

1. Development and implementation of a rehabilitation program

for patients with COPD.

2. Construction of a manual for use as a teaching aid in the various phases of the rehabilitation program, namely:

a. The nature of the disease

b. Diagnosis and treatment including bronchial hygiene and graded exercise

c. Progressive relaxation.

CHAPTER II

METHODOLOGY

Abdellah (1) states there are two types of research, descriptive and explanatory. Descriptive research is discovering new facts; explanatory research is discovering relationships among facts. To these traditional types, Abdellah has added metholological research. This, she describes as developing tools, methods, products or procedures for conducting further research or for use in practice. She further states that in nursing research there are two primary types of methodological research: (1) developing tools for nursing administration practice or education, and (2) developing tools for research methodology.

This study is an illustration of methodological applied research. A need for a rehabilitation program for COPD patients was established. Records indicated the tremendous rise in the number of emphysema patients annually. The chronicity of the disease inevitably resulted in lengthy hospitalizations and numerous readmissions. The development of the program first consisted of the following steps:

1. Establishment of need as indicated above.
2. Search of the literature to determine the nature of already

existing programs and to justify the development of the components of the proposed program. On the basis of the findings from the literature it was determined that the rehabilitation program would consist of:

a. Patient teaching regarding the nature of the illness and therapies.

b. Progressive relaxation

c. Graded exercise

d. Bronchial hygiene for selected patients.

3. Further search of the literature to locate authentic subject matter content to form the nucleus of information to be disseminated in patient education sessions.

4. Determination of how the information should be imparted.

5. Selection of appropriate means of assessing progress.

6. Gradual initiation of the program on a one-to-one basis by physician referral.

7. Assembling of materials to compile into a manual.

The population at the Veterans Administration Hospital, a 600-bed hospital in a large metropolitan area, consisted predominately of male patients. The patients were on a nursing unit which cared for medical respiratory patients of all types. There were 46 beds on the service and 15 were occupied by those with COPD. Approximately 500 emphysema patients are seen per year.

The service utilizes interns and residents from a medical school who change at frequent intervals. It is necessary therefore to inform each new group of the program and functions of the unit. This is done at a group conference on the first day of their assignment to the Medical Chest Service. At this time the rehabilitation program is described and consultation sheet made available so the doctors can check off individualized treatment on the patients they wish to refer to the service.

The program evolved gradually. It began in June, 1972. A study was initiated to measure changes in spirometric tests, blood gases, and heart rate during treadmill exercise, after a three-month course of either an exercise program or progressive relaxation training.

Criteria for Acceptance

1. A clinical diagnosis of emphysema or chronic bronchitis in keeping with the diagnostic standards of the American Thoracic Society.

2. Absence of other significant pulmonary disease, such as tuberculosis, silicosis and pulmonary neoplasm.

3. Freedom from other disabling nonpulmonary disease, such as uncontrolled diabetes, hepatic insufficiency, renal insufficiency, blood dyscrasia and neoplasm.

4. No demonstrable associated cardiac disorder, such as ischemic heart disease (cor pulmonale not excluded). Specifically: (26)

a. A history of arterioschlerotic heart disease manifested by either a myocardial infarction or angina pectoris within six months prior to entry into the program.

b. Hemodynamically significant valvular heart disease.

c. Clinical cardiac failure.

d. Those with more than three ectopic beats per minute not abolished by exercise.

e. Heart rhythm other than sinus (including fixed-rate pacemakers.)

f. Bundle branch block (complete).

g. Those taking antiarrhythmic drugs such as pronestyl, quinidine or propanalol. Digitalis is acceptable.

h. Hypertension with diastolic pressure greater than 100 and not responsive to therapy.

i. Prior cerebrovascular accidents and those with carotid bruit.

j. Hematocrit less than 30 percent.

k. Asthmatics who are not clinically stable.

l. Musculoskeletal dysfunction manifested by recurrent pain and swelling following jogging.

5. Patients must be alert, oriented, able to communicate, cooperative.

The graded exercise group was set up with an exercise program designed to their tolerance. The heart rate was the indicator of the amount of stress prescribed but in most cases the patients were unable to stress themselves enough to bring their heart rate up to the safe limit. Oxygen was administered as necessary to prevent dyspnea. The physician was the judge as to whether oxygen was needed. Occasionally blood gases were drawn before and after exercise to determine need.

The relaxation process was recorded on a casette for standardization. Each patient listened to the tape at assigned periods twice a day during hospitalization. The first two times the investigator was present to point out any difficulties the patient experienced. From that time on, the patient listened to the tape in his room. He was provided with a schedule (Appendix F) and was responsible for checking off as he carried out the program. He was instructed to use the relaxation without the recording at night as he was trying to go to sleep.

Eight patients were seen in each the relaxation and exercise group. During this time it became apparent that it was impossible to treat only one aspect of the patient's condition. The need for knowledge and support was evident immediately.

January, 1973, was the beginning of the education of patients on a one-to-one basis. The patients were selected by the nurse and if they met the criteria, approval was obtained from the patient's physician. The physician was given a consultation sheet which indicated services available and he could choose the therapy appropriate for that patient.

A detailed nursing history was taken on each patient (Appendix B). This assessment took between 20 and 45 minutes depending on the patient. The information was used to determine patient needs and when indicated, referrals were made to social service or the visiting nurse. Each visit was recorded on the chart as well as his progress and acceptance of the program.

The teaching took place in the patient's room or if more than one patient was involved, in the exercise room. Oxygen was available and if necessary, portable oxygen could be brought in.

Teaching was on a one-to-one basis. The sessions, approximately 30 minutes long, were not limited if the patient indicated need for more time. Occasionally more than one patient attended and groups tended to form spontaneously, hence it is anticipated that group teaching will be scheduled in the near future. Audio-visual tapes are being prepared on certain segments. Most of the material was presented through pictures and informal discussion. Slides are planned in the future. Demonstration was also used in selected areas.

CHAPTER III

THE PROGRAM

This study is an illustration of applied methodological research. A rehabilitation program has been planned, organized and implemented and a manual is being compiled as a teaching tool.

As previously indicated, the program was initiated by use of only two components, namely progressive relaxation and graded exercise. It soon became apparent that patients needed much more, hence the expansion to include a series of lessons which would better meet their total needs.

A nursing history was taken on each patient. The nursing history aided in establishing a relationship with the patient as well as giving important information about what the patient knew about his illness, the importance of the change in his daily life, who cared for him at home, and medications he was on. From this history a care plan was established.

Structured classes on the nature of the illness and treatment were available for all patients. The bronchial hygiene, exercise and relaxation were taught on the basis of patient need.

A series of class sessions has been developed, the content of

each consisting of authentic information obtained from the literature. The method of presentation varies according to the nature of the content. For each lesson, teaching aids appropriate for use with patients have been assembled. A brief assessment of what has been presented will follow each lesson. An elaboration of each lesson and concomitant learning activities will constitute the manual. At this time eight patients have been instructed in graded exercise, eight in the progressive relaxation and eight in the organized program consisting of instruction in the class sessions.

Description of Lessons

The following is a brief description of the lessons of the teaching program:

Lesson No. 1. Lung Structure and Function

1. Content. This segment involves lung structure and function. It includes normal and abnormal lungs, mechanics of breathing, anatomy and physiology of airways, alveoli and pulmonary capillaries, cells of the airway, cilia and mucus glands.

2. Approximate time is 20 to 30 minutes.

3. Teaching aids. A collection of real lungs in the expanded state with various abnormalities is available and used. A flexible

plastic lung in the collapsed state showing the airways and tiny alveoli is also used. Pictures that show what is being explained are also included. These pictures will be in the manual that the patients receive as well as the information that is given to the patient during this visit.

4. Location. The teaching takes place in the patient's room.

5. Assessment. The discussion of the questions that are being developed to succeed each lesson. The questions will be subjected to scrutiny as a means of validation.

Lesson No. 2. Pathology and Diagnosis

1. Content. The anatomy and physiology of chronic bronchitis, asthma and emphysema, and the diagnosis by pulmonary function test and blood gases.

2. Approximate time is 20 to 30 minutes.

3. Teaching aids. The manual will contain the information that is discussed. Pictures are used to demonstrate the content.

4. Location. Teaching takes place in the patient's room.

5. Assessment. At present there is no means of assessment. Questions will be developed which the patient can answer at his leisure and discuss at the next meeting.

Lesson No. 3. Treatment

1. Content. Treatment by drugs and oxygen is discussed. The importance of exercise and how to walk and work with the least energy expenditure are included. If the patient is not already on an exercise program because of his physical condition, a home program is discussed with him.

2. Approximate time is 30 minutes.

3. Teaching aids. In the drug segment a great deal of time is devoted to assessment of patient knowledge. Each patient is asked to write down the drugs he took at home in a methodical way, beginning with the first he took in the morning and continuing throughout the day. He is asked what he thinks each drug does for him. He is also asked if he has found any drugs not prescribed by the doctors that he found helpful. He is asked to point to each pill he was taking on a board which contains numerous drugs of all types. This enabled an assessment to be made regarding the patient's understanding of his drugs. Following the assessment each patient's medication is discussed in detail. He is given a 3x5 card listing each medication, the time each should be taken, the action and the major side effects. The time the patient's drugs should be taken is discussed with him and his convenience taken into consideration.

4. Location. The teaching takes place in the patient's room.

5. Assessment. The discussion of the questions and content will indicate whether the patient understands.

Lesson No. 4. Smoking Cessation

1. Content. Smoking cessation is presented in three sessions.

2. Approximate time is 15 to 30 minutes on three separate occasions. The topic is first introduced at the time of the nursing history if the patient indicated an interest in quitting smoking.

3. Teaching aids. A pencil and paper, Cigarette Tally, rubber bands, Smokers Insight test are needed.

4. Location. This segment takes place in the patient's room.

5. Assessment. The smokers tally assesses the number of cigarettes the patient is smoking per day. Since this is designed to motivate patients, it only takes a few days to discover whether or not the patient can be motivated to stop smoking.

Lesson No. 5. Prevention of Infection

1. Content. This section contains miscellaneous information such as increasing resistance to infection through proper diet, prevention of fatigue, air hygiene and proper disposal of wastes and care of equipment, and description and purpose of postural drainage.

2. Approximate time is 30 to 45 minutes.

3. Teaching aids. The manual will contain the information covered in class. Postural drainage is performed on the patient. Whenever possible this is demonstrated to a family member.

4. Location. Teaching takes place in the patient's room.

5. Assessment. Postural drainage is performed by a family member while being observed by nurse. A home visit by the visiting nurse as follow up to determine whether or not the patient understands and is carrying through at home.

Lesson No. 6. Relaxation

1. Content. This lesson includes the purpose and process of progressive relaxation.

2. Approximate time is 30 to 45 minutes.

3. Teaching aids. A tape recorder and the relaxation technique in written form (Appendix C).

4. Location. Teaching takes place in the patient's room.

5. Assessment. At the present time there are no measurements available for the relaxed state. The patient's subjective statements will be used to assess the success of the procedure.

The preceding brief descriptions of the series of six lessons served as the overview of the course. The sequence was determined

rather arbitrarily, but each session is sufficiently compact to permit a rearrangement of the lessons according to patient need and expressed interest. The one-to-one teaching is a distinct advantage in this respect.

The continuity of subject matter content proceeding from structure, function, pathology and diagnosis to treatment is definitely a logical arrangement. However, this sequence was determined not by orderly, reasonable criteria but by the patients' request for information. As noted earlier a patient history was obtained. This was not a data collection activity, but instead a means of getting acquainted and of eliciting information essential for individualizing the plan for rehabilitation. It was possible to ascertain what the patient knew about his disease, what he had been told (or thought he had been told), what he understood or did not understand. Responses revealed that patients wanted to learn more about the nature of their illness, its cause and treatment. A consequence of these informal conferences was the development of familiarity with the patients' vernacular and an indication of their interests and needs for instruction. Accordingly the subject matter could be selected to meet the patients' psychological needs. It would take further study to determine if the resultant arrangement that is both logical and psychological is merely coincidental or is the result of factors such as the wording and order of the questions posed to the patients, the

influence of previous instruction, the availability of literature prepared for the laity, or some subtle effects not now in evidence.

The subject matter content of the six lessons has been written in a conversational narrative form using terminology consistent with the patients' vocabulary. These lessons plus specific directions for the therapies (See Appendices C, D, E) will constitute the manual. During the teaching, slides and various multisensory teaching aids will be used. When feasible these will be converted to pictures to be included in the manual.

Narrative of the Lessons

The narrative of the six lessons follows.

Lesson No. 1. Lung Structure and Function

As you can see you have two lungs. They are made up of tissue very much like sponge. (a)[1] Just as sponge soaks up water, the lungs absorb air. The chest cavity (b) is moveable allowing for the lungs to expand as they fill with air and squeezing the air out as we breathe out. The cause of the change in size of our chest is our muscles of respiration. They move the ribs out and up and the diaphragm down. This gives the lungs room to expand and air rushes

[1] Letters in parentheses refer to description of pictures used in the program (See page).

in to fill the space. When the muscles relax, the chest cavity is made smaller and the lungs empty. The diaphragm is the most important muscle as it has greater ability to change the size of the space the lungs occupy.

The lungs are made up of airways (c) which branch and become smaller and smaller as they get deeper and deeper. This can be compared to a tree turned upside down in the body. The trachea or windpipe is the trunk and just as a tree branches out into smaller and smaller branches, so do the airways.

At the end of the airways are the alveoli (d) which are comparable to the leaves of a tree. There are millions of these tiny alveoli or air sacks which have the very important function of exchanging the oxygen we breathe in for the carbon dioxide we make as a waste product in our body.

You know that we have blood in our body, constantly being circulated by the pumping action of our heart. Have you ever thought about why this blood circulates? The reason is to supply food and oxygen to each cell of the body. Notice the blood vessels that completely surround each of the airsacks. The walls of the airsacks and the blood vessels are very thin so that it is very easy for oxygen and carbon dioxide to slip across. As soon as the oxygen gets into the blood stream, it is carried all over the body to be used by the cells. Just as fire needs oxygen to burn, our cells need oxygen for the fire

of metabolism. This metabolism causes carbon dioxide to be produced and this gets into the blood stream and is carried back to the lungs where it crosses over from the blood stream to the airsacks and is exhaled. We want to stress the fact that there are millions of these little airsacks which can be compared to tiny balloons. They blow up with air just as a balloon does when we breathe in and the air rushes out of them due to the elastic recoil just as a balloon when you release hold and the air rushes out.

The airways are lined with special cells which produce mucus to lubricate the surface (e). Other cells give rise to hairlike structures called cilia which beat in a wavelike action much like wheat in a field on a windy day. These cilia beat in an upward motion and literally sweep the airways clean of mucus and debris which may be inhaled. Normally this mucus is not enough to require coughing to bring up.

The following is a description of the pictures used:

a. Real lungs are used to show how normal lungs look when filled with air. Casts of lungs in the collapsed state are also used.

b. The muscles of respiration.

c. Branching airways.

d. Close up of an alveoli showing blood vessels surrounding each.

e. Cells of the airways with mucus glands and cilia.

Lesson No. 2. Pathology and Diagnosis

Chronic bronchitis is an inflammation of the airways. The same reaction happens in the airway as a sunburn or an inflammation of your eye. The most common cause of bronchitis is cigarette smoking. Once the bronchial tubes have been irritated over a long period of time, excessive mucus is produced. It is probably the mucus glands' feeble attempt to try to prevent the irritating substance from reaching them. Later these mucus glands grow larger in order to be able to make more mucus. The cilia, those tiny hair-like structures, try to move this excessive mucus upward, but it becomes a hopeless job. Smoking is not only irritating, it also causes those little hairs to become paralyzed after the first few puffs. If smoking continues over a few weeks, the cilia are destroyed. The only way the mucus can be raised when this occurs is by constant coughing. The mucus in the smaller airways is almost impossible to raise by coughing. It lodges there and is not only an ideal breeding place for infection but is a plug in the airway preventing air from getting in and out of the lungs.

Chronic bronchitis does not strike suddenly. After a winter cold, you may cough and spit for several weeks. The coughing and spitting last longer after each cold. As time goes on the colds become more damaging. Soon coughing is present at all times;

before colds, during colds and after colds. The cough is usually worse in the morning and evening and during damp cold weather. An ounce or more of yellow mucus may be brought up each day. The cough is an indicator of disease but is also a protective mechanism to get the mucus out.

Continual irritation of the bronchial tubes causes changes in their walls. Normally our tubes are held open by an elastic spring-like action. When we lose the springs that hold our airways open, they collapse when we breathe out and air is trapped inside the lungs. The important thing to remember about this is that the faster you breathe the more air trapping. Remember to breathe slowly and longer so that all the old air can be removed from the lung.

The tiny air sacks are eventually affected by this air trapping. Think of the air sacks as being like balloons. A balloon blown up to moderate size and immediately deflated returns to its original size and shape. If it is blown up very large for a few hours, it will develop wrinkles when it is deflated. So it is with the air sacks. The abnormally high and prolonged pressure overdistends them and changes occur in their walls. Just as a balloon that has been over-distended cannot force all the air out, neither can the air sacks. Therefore, with each breath, old air is left in the lungs. As there is only so much room for air, new air with oxygen loses out and less oxygen gets into the blood stream to get to the tissues. The problem

in emphysema is basically getting the old air out so that there will be room for the new air. The unnaturally distended air sacks tend to push against the blood vessels surrounding them, thus making it harder for the heart to pump blood through. This increased work-load eventually affects the heart causing it to fail. The lungs become larger due to all this air trapping. They push down on the diaphragm making it ineffective.

While bronchitis can at least partially be cleared up with removal of the irritant such as smoking, once emphysema with its destroyed airways has begun, there is no cure. Lung tissue cannot repair itself. Once it is gone, it is gone. It is doubtful whether medical science will ever come up with a method of producing new lung tissue where it is damaged. Perhaps in the future lung transplants will be the answer but that is a long way off. At present the only answer is to remove the irritant and clear up the bronchitis and prevent further lung damage.

You have emphysema, but you can arrive there in different ways. There are those that got there by way of chronic bronchitis. Some have pure emphysema but this is extremely rare. If you have pure emphysema, you have an enzyme deficiency that causes it. Normally everyone has trypsin in their bodies to help digest food. Trypsin is an enzyme which we need in order to use our food for energy. In the lungs, however, trypsin can do much harm. It can

digest the lungs much the same as it digests food. In order to protect our lungs, we produce another enzyme in our lungs called alpha-1-antitrypsin. And it is just that, anti-trypsin. It protects our lungs from the digestive action of trypsin. To have a deficiency in this enzyme is extremely rare, but people who have the deficiency suffer from emphysema at a very early age. Their emphysema is caused by actual destruction of the lungs due to trypsin.

Asthma is another disease of the airways which can occur. This is caused by the constriction of the muscles of the airway. Usually asthmatics do not get emphysema unless they are also smokers.

As you can see there are a number of airway diseases which can occur separately or together in any combination. Most people don't just have pure emphysema.

It is important to understand that there are different degrees of severity of emphysema. There are those that fall into the mild group, the moderate group, the severe and the very severe. The mild and moderate group usually don't need much treatment. It is the severe and very severe who are usually on medication, machines for breathing treatments and oxygen.

The damage of emphysema does not show up on X-ray until very late stages when the lungs enlarge so much that they push down on the diaphragm and this downward displacement of the diaphragm

can be seen.

We must use indirect methods to diagnose the disease and this is done by breathing tests. By breathing into a machine, the volume of air can be measured as well as the time that it takes to blow out the air. This information is used to evaluate whether or not disease is present and its severity.

People with normal lungs can blow out a certain amount of air in a specified length of time. Given a long time, the patient with emphysema can blow out nearly as much as a normal person. But if he blows the air out as rapidly as he can, air tends to trap in the lungs due to collapse of the poorly supported bronchial tubes. The air he blows out in a few seconds is less than normal for this reason. When the breathing test is done, sometimes it is repeated after the patient inhales a medication called a bronchodilator. This medication can open the airways allowing more air to be expelled during the allotted time. If the patient does improve with bronchodilators, this means that we can control his disease to some extent with drugs. If the patient's breathing does not improve with bronchodilators, this indicates damage that cannot be corrected with drugs.

Blood gas testing is another means of determining the status of the patient. The lungs are important in the exchange of oxygen and carbon dioxide. When we draw a blood gas from the artery of your wrist or arm, we have it analyzed for the oxygen and carbon

dioxide content and can treat conditions where this is abnormal.

These tests in combination with the history the doctor takes are the basis for the diagnosis of emphysema, chronic bronchitis and asthma.

Lesson No. 3. Treatment

Medications. The doctor cannot treat everyone who has emphysema the same way. He must get to know the patient and try a variety of medications and treatments until he finds just the right one. He cannot always do this in one visit. It usually takes several visits. First he must take a history to get to know each of you individually. He must find out how you got emphysema. To treat asthma when you have bronchitis would be just as wrong as to treat bronchitis when it is asthma. The doctor must find just the right medication and the right dosage for you. This usually takes time.

It is important that your doctor know just how you are taking care of yourself. If you are going to more than one doctor and these two doctors are prescribing different medications, you could be doing yourself more harm than good. It is important for each doctor to know what the other is doing in order to provide you with the best treatment.

The medications that are prescribed usually contain one drug or a combination of drugs in one pill. If there is a combination, one

of the drugs is usually ephedrine which dilates the airways. Unfortunately ephedrine also stimulates your nervous system and can make you feel jittery. It can also cause difficulty in urinating. For this reason it sometimes has to be taken away after once started as the patient simply cannot tolerate these side effects.

Another drug commonly included with ephedrine to reduce the jitters is a barbiturate. Usually this controls the problem adequately. However, something to remember if you are taking a medication that includes a barbiturate is that it is a depressant to the nervous system. Alcohol is also a depressant and if taken together the two might depress the nervous system enough to make you stop breathing. I'm sure you have read in the papers about people who have died because they took a barbiturate and then drank on top of it.

Aminophyllin is another drug commonly used. This also is a bronchodilator and when given together with ephedrine increases the action in some people. Aminophyllin can cause irritation to the stomach and may cause nausea, vomiting, cramps or diarrhea. These stomach problems may be minimized if the drug is taken after meals but in some cases this does not help and the patient is unable to take the drug. Aminophyllin can also cause nervousness.

The last ingredient that is usually found in the combined medication is something to liquify secretions such as glyceral guaiacolate or potassium iodide.

Sometimes your doctor will not want to give you a combination drug but will give you the drugs separately. That way he can find out which drugs affect you in what ways. Sometimes you do not need all the drugs in the combination drugs. Just as you have a fingerprint that makes you different than anyone else, your treatment of emphysema is different than other people. It is important that your doctor have all the facts and you follow his orders and report how you are reacting to the treatment.

Antibiotics may be prescribed if an infection is present. It is important to notify the doctor at the first sign of an infection. An increase in the amount of sputum, a change in color of the sputum or an elevated temperature are all signs that could mean an infection is beginning.

Occasionally steroids are ordered. These are drugs such as prednisone, cortisone, or aristocort. In selected cases these drugs are lifesaving, but they also have side effects which are undesirable so that doctors must weigh carefully the actual benefits against the possible side effects. We normally produce these hormones in our bodies. When we give steroids, we are increasing the dose over what our bodies make to take advantage of the good effects of reducing inflammation. However, just like any drug, we must treat it with great respect.

An important thing to remember is that it is important to

decrease the drug dose gradually, never just stop taking steroids. The reason is that when we give steroids in larger doses, your own body cuts down on its production so that when you stop taking the medication your own body has not had time to catch up and produce the amount you need. You, therefore, don't have enough and can get into serious trouble. Cutting down on the dosage gradually gives your body time to make up for the deficit before you completely withdraw the pill.

Digitalis preparations are given to strengthen your heart beat. It is a wonderful drug but like any other drug can produce harm if not taken as directed. Digitalis must be taken as directed. You must not omit a dose one day and try to catch up the next. If you do this, you will get into serious trouble. Signs that should be reported to the doctor include loss of appetite or nausea and vomiting, disturbance in vision and diarrhea.

Lasix or other diuretics may be ordered if you have a tendency to hold water in your body. Tiredness, dizziness, muscle cramps, thirst or any other symptoms not previously noticed before beginning the drug should be reported.

Potassium chloride is frequently ordered along with your water pill as along with water you also lose an electrolyte, potassium, which is needed for proper body function. If both a water pill and potassium are ordered, take them as directed. If one or the other

is discontinued, make sure your doctor knows that you are still taking one of them.

Oxygen. The air we breathe normally has around 21 percent oxygen and 79 percent nitrogen. It has very small quantities of other gases such as carbon dioxide. If we have normal lungs, this 21 percent oxygen is enough to keep the blood from 85 to 95 percent oxygen saturated so that the blood has an ample supply to carry to the cells of our body. If the lungs are not normal, sometimes this 21 percent is not a sufficient quantity and it is necessary to supply oxygen in greater strength than that found in room air.

We have a fairly large margin of safety in the amount of oxygen that we carry and what we actually need for survival. We can actually get by fairly well on blood that is 70 percent saturated; but when it drops down in the 50 to 60 percent range, trouble ensues. When oxygen is not present in sufficient amounts, the brain complains causing irritability, restlessness and confusion. The heart, liver, kidneys and muscles may not function as they should.

We are able to find out what the oxygen content of your blood is by drawing arterial blood from your wrist or arm. Since the oxygen content of your blood changes with exercise or with supplemental oxygen, it is necessary to draw blood often during the time we are trying to find out the best combination for you. It is the only way we

can find out whether we are doing the right thing.

Oxygen is a drug. It must be respected just as much as any other drug you use. Doctors know that oxygen has a safe dosage and an overdosage level just as other drugs. He will prescribe only enough oxygen for you to bring your blood level of oxygen to normal for you.

Overdosage of oxygen can cause depression of the breathing center in the brain. If too much oxygen is given, the patient will take shallow, small breaths instead of normal sized breaths, resulting in a build up of carbon dioxide (the waste product of metabolism that we breathe out). This can be dangerous. Instead of feeling energetic, as you would with just enough oxygen, you begin to feel tired and listless.

It is important that you realize how potent oxygen is. If your doctor prescribes it just at night, then use it just at night. If he orders it at two liters all the time, then that means just that. The on-again-off-again pattern of administering oxygen can be just as harmful as using too much or not enough. Your doctor has prescribed what is right for you because he has studied what oxygen does in your body. Never tamper with the dose your doctor has prescribed.

Exercise. Patients with disability from emphysema have a limiting factor that must be considered in selecting an appropriate

training schedule. The inside surface area of emphysematous lungs is so diminished that insufficient oxygen can be diffused to meet the demands of exercise. Thus the goal of this rehabilitation program for you is to improve your stroke volume (the amount of blood ejected from the heart with each contraction) to attain the maximal efficiency from your oxygen transporting system. However, many emphysema patients are unable to stress themselves enough to enhance their compensatory mechanisms.

The guideline for exercising patients is a calculated heart rate based on your age which should not be exceeded during exercise. As you continue to exercise on the bicycle or treadmill at a submaximal workload, the duration, quality or rate must be increased to maintain your heart rate at the predetermined level. As you gain in endurance, you increase your ability to further tax your capacity for exercise. An important aspect of regular physical training is to attain a physical condition and degree of fitness well above that required for the job. If, occasionally exercise demands the heart to pump ten quarts of blood per minute, it is apparent that having been trained to pump that amount at a slow heart rate, the oxygen transportation system is less severely jeopardized. COPD patients can through exercise increase their endurance. Improved endurance promises more independence, an appreciable gift to the otherwise invalid person.

You will exercise up to 30 minutes one to two times per day. If you are able, walk to the exercise room and attach the heart rate monitor to your ear and exercise on your own. Some patients must be accompanied by an attendant. A record is kept of the time exercised as well as the type of exercise so that you can view improvement (Appendix F).

It is important to learn to walk to save your breath. Read the pamphlet, "Winning the Battle for Breath" prepared by the Breon Laboratories, which you have been given. It may give you some pointers which will be of value.

Inhale through your nose to warm and moisturize the air and breathe out for a longer time than you breathe in. For example breathe in while taking two steps, and breathe out while taking four. Do any strenuous activity on exhalation only. When climbing stairs, climb only while you are exhaling. Rest while you are inhaling. You will notice a great difference in the amount of work or climbing that you can do if you remember to do all strenuous work on exhalation.

Lesson No. 4. Smoking Cessation (14, 29)

The smoking cessation segment designed for this program is concentrated on how not to start smoking again rather than on how to quit. It is thought that a positive attitude rather than a negative one will be most beneficial to the patient.

There is an attempt:

1. To show concern and provide encouragement.

2. To provide methods or approaches to help motivate the patient and aid in cessation.

3. To provide counseling.

4. To provide support in helping the patient maintain his motivation.

Session 1. This session is designed to talk with you about smoking cessation. Think and discuss your feelings about becoming a non-smoker and identify the problems of health maintenance specific to yourself. Write down several reasons for giving up smoking that have meaning for you, i.e. morning cough, burned clothing, ashes, example to children. Think about some of the problems you will have in becoming a non-smoker and discuss these things. What might you do to help you over these problems?

There is help available if and when you make the decision to become a non-smoker. Some prefer the "cold turkey" method, never having another cigarette from this moment on, others prefer to cut down each day. At any event you must be motivated to want to become a non-smoker or no program will be successful, so let's take one step at a time. Right now is the time to think about your reasons and plan of attack. Tomorrow bring back your well thought out reasons written down on a piece of paper.

Session 2. Select the most important reason from your list of reasons for becoming a non-smoker and write it down. Begin to think about how you will have to change your behavior if you wish to succeed and write these ideas down. Discuss any of these ideas if you wish.

This paper you are being given is a Cigarette Tally. It is used for recording information about each cigarette you smoke during the day, including time, occasion, feeling and value. The value is on a scale of one (most important) to five (least important).

CIGARETTE TALLY

	Time	Occasion	Feeling	Value
1.	8:00 AM	Rising	Depressed	1

Fold the Cigarette Tally sheet lengthwise twice, wrap it around the cigarette pack and secure the package with two rubber bands. Carry the pack where you normally do and continue smoking as you have done before, but everytime you take a cigarette you are to unwrap the tally sheet and fill in the appropriate information. Do this for three or four days.

Session 3. (This session is held three or four days after session 2 or on the day before the patient's discharge, whichever occurs first.)

Look over your smoking record that you've been keeping for

the past few days. Try to identify those circumstances under which you smoke heavily and which are the most important cigarettes in your daily routine. Some people like to cut down on the easy ones first. Others like to cut out the hardest ones first. Everyone is an individual and has to choose his own best way to stop smoking for (The smokers insight test is given and discussed.) (45) Some helpful hints in cessation of the smoking habit are given.

1. Establish a pledge card on which the target date is written.

2. Buy only one pack of cigarettes at a time. Never buy a carton.

3. Carry your cigarettes in a different place. In the hospital, give them to a friend.

4. Never carry matches or a lighter.

5. Hide the ash trays or give them to someone else.

6. Stock up on temporary substitutes--gum, low calorie candies, artificial cigarettes.

7. Change brands once a week. With each change, move to a lower tar and nicotine cigarette.

8. Walking or exercise helps. A change in activity patterns and an increase in physical exercise relieves the excess nervousness. The hospital has a bicycle and treadmill available if the patient is able to exercise.

9. Substitute opposite gestures. For example, instead of

reaching for a cigarette move something away from you.

At times, patients who are trying to stop smoking are bothered by roommates who smoke. If possible encourage your roommate to quit too as this increases motivation for both. If the roommate does not agree, one of the patients will be moved if possible.

Lesson No. 5. Prevention of Infection

Poor nutrition is often a predisposing factor in the development of illness. Patients with emphysema often have poor appetites. It is very important that you eat a balanced diet high in protein. Sweets have a tendency to thicken secretions. If you are having a problem with thick secretions, avoid candy and other concentrated sweets. Frequent small feedings may lessen fatigue. It is just as important that members of the family eat well so that they can also fight infection. Drink at least two quarts of liquid daily. We have found that the only way to keep secretions thin is to have you drink plenty of fluid. If you have a tendency to hold water in your body, check with your doctor. He may need to change your diet or further evaluate your problem.

Fatigue may occur due to physical or emotional factors and weakens the body's defenses against infection. Feel free to call if you are having problems.

Be sure to cover coughs and sneezes. Control dust as much as

possible. The atmosphere of a room can be "cleaned" by admitting fresh air. Germs attached to dust and sneeze droplets are removed by the exchange of bad air for good. Even with the windows closed, air seepage has shown by experiment to provide up to ten turnovers of air per hour. Open windows provide 25-100 turnovers per hour. Do not open windows if it is going to be drafty; but if you go out, perhaps this would be a good time to air out the room or house.

It is better to block a sudden cough or sneeze with the bare hands than to try to reach for tissues and so fail to catch any of the escaping droplets. The soiled hand can be washed and is less hazardous in the chain of transmission than the free droplets. But protect the hands from cough and sneezing whenever possible. Use tissues only once and discard. Do not try to economize using them more than once, or return them to pockets or under pillows. After use, tissues should be placed in a paper bag which can be discarded.

Replace your toothbrush once a month and after each infection is under control. It is very important to keep the teeth clean as bacteria from a dirty mouth can cause infection in the throat and lungs. Brush three times daily.

Postural drainage may be used to help clear the airways of secretions. Secretions which remain in the lungs for long periods are breeding places for bacteria.

The postural drainage positions are kept as simple as possible.

You will be taught the face down, right side, left side and head up positions. Postural drainage should be performed at least twice a day, once before breakfast and once before bed. If you have excessive secretions, more often may be necessary. Postural drainage takes advantage of gravity to drain secretions from the lungs. It should be used only if it helps you and you are able to tolerate the positions.

Mucus is dislodged and coughed upward by the force of air behind it. It is, therefore, necessary to take a deep breath and take in as much air as possible in order to have an effective cough. Take a deep breath, stick out your tongue to allow for air to be expelled with a minimum of resistance and cough two or three times, contracting the abdominal muscles tightly. Coughing more than two or three times on one breath is ineffective because there is no longer enough air deep in the airways to push up mucus. You accomplish nothing but wear yourself out.

If medications are ordered by inhalation such as a Medihaler, it is important that you know how to use the instrument correctly and get maximum benefit from it.

Empty your lungs completely and slowly to be certain that all of the air is out. Now inhale deeply and at the same time squeeze down on the atomizer to release the mist of medication. Take the nebulizer out of your mouth, hold your breath for a second or two

then slowly exhale through pursed lips. The number of times depends upon the dosage recommended by the doctor.

If a hand bulb nebulizer is used, use the bronchodilator ordered by your doctor, dilute this by using twice as much sterile water as the bronchodilator and inhale eight breaths as above.

Many people have a tendency to over-use the inhaler medications. Be aware that these medications work well when taken as prescribed and will dilate the bronchial tubes as they are supposed to but when used to an excess there is a "rebound phenomena" which causes the bronchial tubes to constrict instead of dilate. When overused there will be immediate relief for an hour or so but then the original condition returns sometimes worse than before.

It is important that the respiratory equipment you use in the home be kept clean and free from harmful germs. Remember that you are breathing moisture deep into your lungs so it is especially important that you take care of your equipment.

After each use, the nebulizer should be rinsed in warm water and allowed to dry thoroughly before being stored in a clean plastic bag or box. Twice a week the equipment should be taken apart and soaked for 15 minutes in a vinegar solution of 1/2 cup white vinegar to four cups water. White vinegar is more refined. Gaskets should be removed and grooves cleaned. A clean needle should be inserted into the small nebulizing jet holes to be sure they are open.

If medication is used, it should be clear without visible particles in it. If it should change color or develop a sediment, the medication should be discarded and a new bottle obtained.

In certain areas where the water is not well filtered, it is necessary to sterilize the water that is used in the nebulizer (Appendix E).

Lesson No. 6. Progressive Relaxation

The relaxation technique which you will learn is a method of contracting certain muscles in order to learn where to look for tension then practicing letting them go. The relaxation technique is recorded on this cassette, but you will have assistance the first few times to assure that you understand the instructions.

When you feel you are ready to go through the procedure by yourself with the tape recorder, listen to the tape twice daily and try to think relaxation in your daily activity. Try to get to sleep at night by relaxing yourself without the aid of the tape.

When you have mastered the relaxation technique and know the difference between tension and relaxation in your body, it will no longer be necessary to go through the tensing of muscles. A short tape has been prepared which takes you through the relaxation technique in a five-minute period without the contraction of muscles.

You will be given written instructions of the relaxation technique

when you go home and a tape is available if you would like to purchase it for home use (Appendix C).

CHAPTER IV

DISCUSSION

This report of an experience in the establishment of a rehabilitation program for COPD patients logically requires a description of the events leading to the decision to develop a program, of the process of development and the problems involved therein of the extent of the on-going programs and of plans for the future.

The medical chest service of the Veterans Administration Hospital in which this program was established consists primarily of male patients with an occasional woman patient. The age range is 45-65 years. The incidence of COPD patients, about 15 at any given time, was sufficient to establish a need for a rehabilitation program. The chronicity and nature of emphysema eventuate in lengthy and repeated hospitalizations.

The philosophy of modern medicine and nursing, that all patients be assisted to restored or improved health, implies rehabilitation in the case of chronic illness. Prior to this time, no such program existed at the hospital.

Initiating change causes problems, this change was not unusual. The process of development was slow and fraught with difficulty.

Initiated by the nurse, one patient was followed throughout his hospitalization and into his home. His wife was involved in the program and a supportive relationship was established with the family. To follow through into the home, travel was required. This was of little consequence with one patient but with additional clientele would have become impossible. The relationships that have developed with the patients and their families have filled an unmet need in the care of the patient with emphysema. However, the time of nursing involvement with each patient has increased.

Patient teaching involves more than just education of the patient. It must offer hope to the patient with emphysema who considers his disease fatal. Emphysema as with other chronic illnesses, poses a serious emotional threat and the patient with hope of caring for himself is better able to cope. The purpose of the regimen is to assist the patient to feel that he can manipulate his environment. While the hope of cure is never over-emphasized, hope is not abolished.

The problems of the on-going rehabilitation program are due to the time required to deal with each individual patient and his family, to rotations of interns and residents which prevents development of a long-term therapeutic relationship, to the lack of follow up of discharged patients and to the lack of evaluation tools.

At present the program is insufficient. It handles only a few

select patients on a one-to-one basis. The teaching is done without the benefit of evaluation, and the time and utilization of professional people is disproportionate to the number of patients involved in the program.

Future plans include making periodic patient care planning and conference rounds with physicians, an essential means of correlating therapy. Group sessions with all currently hospitalized patients will be held every two weeks. Patients may attend on an outpatient basis. Group sessions cut down on the time invested by the professional staff and has benefit of social interaction of patients.

A simple teaching manual for patients will be developed for use in the group sessions. The manual will include the information discussed in each lesson.

On going evaluation of the program is essential to its success. This step is still in process of development. A follow-up questionnaire will be designed and sent to each patient after discharge as part of the evaluation.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS FOR FURTHER STUDY

This study is an example of methodological applied research described by Abdellah as the development of tools, products or procedures for conducting further research or for use in practice. Both further research and application in practice result from the experience of designing, developing and implementing a rehabilitation program and of compiling a manual for use as a teaching tool for COPD patients. In these respects the purposes of the study have been met.

The experience took place in a 600-bed Veterans Administration Hospital in a large metropolitan area. The need for a rehabilitation program was established. The literature was then searched to identify the components of existing programs for COPD patients. Further review was undertaken to develop a compendium constituting the subject matter for dissemination to patients and validating the use of prescribed therapies.

The program initially consisted of instruction in graded exercise (eight patients) and in progressive relaxation (eight patients). When it became apparent that structured classes were needed, a

series of six lessons were developed.

Within the limits of a study of this nature, overall success of the program is indeterminate since the program is recently underway and the scope and evaluation have yet to be determined. But even though there can be no finale to a program of this type (unless abolished), certain recommendations can be proffered for continuation, improvement and further study.

1. Establish a schedule that will provide teaching at a time and place which permits group rather than one-to-one tutorial instruction.

2. Make more extensive use of the patient history, specifically to identify need for guidance other than that included in class sessions.

3. Utilize resource personnel; e.g. dietitian, social worker, public health nurse and community agencies to further implement the rehabilitation program.

4. Participate in patient planning and conference rounds with physicians.

5. Keep detailed record of data collected from the chart, the patient history, the observations of the patient during various therapies, and the responses of patients to follow-up questions after class sessions.

6. Develop evaluation tools to assess the extent of learning and benefits of the program.

7. Utilize physiological tests that measure physical improvement resulting from the therapeutic modalities.

8. Develop tool to measure progress of patient on home care.

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APPENDICES

APPENDIX A

CONSULTATION SHEET

CONSULTATION SHEET

Name _____ Date _____

Room _____ Expected length of stay _____

Please check services you wish your patient to receive.

1. Education

_____ Brief explanation of their disease with emphasis on reversible effects and prevention of further impairment.

_____ Smoking cessation. Insight test. Behavior modification.

_____ Diet instructions.

Type of Diet _____

_____ Instructions on medications. Includes what medication is for, dosage and side effects. List below those drugs you wish patient to be instructed on.

_____ Dose _____

_____ Dose _____

_____ Dose _____

_____ Dose _____

_____ Dose _____

_____ Dose _____

_____ Instruction on Oxygen Therapy

Number of Liters _____

Administered when _____

Additional information _____

2. Bronchia Hygiene

_____ Handbulb nebulizer

_____ Retec

_____ Other _____

_____ Isuprel

_____ Bronchosol

_____ Other _____

Dosage

Medicine _____ drops

Sterile water _____ drops

Delivery of Moisture

_____ Gallon vaporizer

_____ Nebulization

Type _____

Fluid intake _____ quarts per day

Measures for removing secretions

_____ Postural drainage

_____ Percussion

_____ Expulsive coughing

How often _____

3. Graded exercise - Bicycle with heart rate monitor

_____ Baseline exercise with blood gas drawn before and after exercise.

_____ I would like to supervise the exercise after above data is in.

Additional comments _____

_____

4. Relaxation (Jacobson - isometric)

This patient does does not need relaxation training.

APPENDIX B

NURSING HISTORY FORM

NURSING HISTORY FORM (42)

1. Name
2. Address
3. Hospital Number
4. Study number
5. Year of birth
6. Male _____ Female _____
7. Marital Status - a) ____ Single, b) ____ Married, c) ____ Widowed, d) ____ Divorced, e) ____ Separated
8. Cultural Background
   a. Birthplace _____ How long in USA _____
   b. Language spoken at home _____
   c. Newspaper read, if any _____ Daily _____ Occ. _____
   d. Highest grade attended at school _____
   e. Religion _____ Practicing? Yes _____ No _____
9. Housing
   a. Number of rooms _____
   b. Number of people living there _____
   c. Floor _____
   d. Elevator? Yes _____ No _____
10. Household composition

Person	Relationship	Sex	Age	If you needed help because of sickness, could this person help?	In what way?
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

11. Primary diagnosis (as recorded in chart)

    _____

    _____

12. Other Diagnoses

    _____

    _____

    _____

    _____

We all know that sickness affects people's lives in many ways. I'd like to ask you some questions about your sickness and what you do at home from day to day. First, will you tell me

13. For what kind of sickness are you coming to this hospital now?
    Verbatim _____
    _____
    _____
    Check appropriate category of reply (check as many as apply)
    a. Symptoms or limitations _____
    b. Disease entity (ies) _____
    Is this (repeat patient's wording)
    a. A big problem to you _____
    b. Some problem to you _____
    c. No problem to you _____
    Why? _____
14. What has the doctor told you about your (repeat reason for coming as given by patient)?
    Verbatim _____
15. About how long ago did your present illness start?
    a. Less than 1 year _____
    b. 1-less than 5 years _____
    c. 5-less than 10 years _____
    d. 10 or more years _____

Think back to the time before your sickness started.

16. Do you think your sickness has changed your daily life? _____
    If "yes", how important have these changes been:
    a. Of no importance _____
    b. Of little importance _____
    c. Fairly important _____
    d. Very important _____
    If "a", ask: What makes you think that ? _____
    If "b", "c", or "d", ask: In what ways have your activities changed? _____
    _____

Now, let's talk about your eating arrangements.
List of desirable foods as given spontaneously by the patient.

Now, let's take yesterday. Starting with when you got up, will you tell me what you had to eat?

Morning	Where
Fruit	
Cereal	
Eggs	
Meat	
Bread	
Butter	
Beverages	
Sugar	
Cream or Milk	
Extras	

Noontime — Where

- Soup
- Meat or meat substitute
- Potato
- Vegetable: raw / cooked
- Bread
- Sandwich
- Butter
- Dessert
- Beverage
  - Sugar
  - Cream or milk
- Extras

Nightime — Where

- Soup
- Meat or fish
- Potato
- Vegetable: raw / cooked
- Bread
- Butter
- Dessert
- Beverage
  - Sugar
  - Cream or milk
- Extras

18. In which of these places do you generally eat?
    a. At home _____
    b. In a restaurant _____
    c. At a friend's home _____
    d. Someplace else (specify) _____

    If b, c, or d, how far away from home must you go?
    _____
    _____

19. Do you generally eat alone, or with someone else?
    a. Alone _____
    b. With others _____

    If b, with whom? _____
    _____

20. Who cooks the food when you eat at home? _____
    a. Self _____
    b. Other (Specify) _____
    c. No food cooked at home _____

21. Are you supposed to have a special diet? Yes _____ No _____
    (If yes, complete next two questions)

22. Why are you on this diet?
    a. Don't know _____
    b. Doctor's order _____
    c. Needed to control disease _____
    d. Needed to control symptoms _____
    e. Other (specify) _____
    Verbatim _____

23. Are you having any special trouble keeping to your diet? Yes _____ No _____
    If yes, what kind of trouble?
    Verbatim _____

24. Do you do your own shopping for food and other things?
Always _____ Usually _____ Rarely _____ Never _____

If other than "Never," where do you usually shop?
Chain stores _____ Neighborhood stores _____ Combined _____ Other (specify) _____

How often do you usually shop for food?
Daily _____ 2-3 times a week _____ One time a week _____ Less than once a week _____

Now, let's talk about sleeping.

25. Tell me if you sleep any differently since you've been sick?
Often _____ Occasionally _____ Never _____
If differently, in what way?
Verbatim _____

What do you think is making this difference?
Verbatim _____

26. Do you have any trouble getting to sleep?
Often _____ Occasionally _____ Never _____

If yes, did you have this trouble before you got sick?
Often _____ Occasionally _____ Never _____

27. Do you often wake up in the night? Yes _____ No _____
If so, did you often wake up before you were sick too? Yes _____ No _____
How often do you usually wake up at night?
Once _____ Twice _____ Three times or more _____
What wakens you?
Verbatim _____

If you wake up at night, do you have any trouble going back to sleep?
Often _____ Occasionally _____ Never _____
What sort of trouble?
Verbatim _____

28. Have your sleeping arrangements changed since you've been sick? Yes _____ No _____
If yes, in what way?
Verbatim _____

29. Is there someone on whom you can call if you need help at night?
Yes _____ Possibly _____ No _____
Does this represent a change since you first got sick? Yes _____ No _____

30. How do you feel about having (or not having) someone to call on?
_____

31. Does anyone else in your house get up at night to help you?
Yes _____ Possibly _____ No _____
Does this represent a change since you first got sick? Yes _____ No _____

32. Has your illness affected your sleeping in any other way that you'd like to tell me about?

Now, I'm going to read you a list of things that many people do to enjoy themselves. Will you tell me whether you do each one and about how often?

33. Social life and recreation

	Done Daily	Weekly	Monthly	Never
Reading				
Listening to radio/TV				
Working on hobbies				
Type:				
Sit and think				
Write letters				
Go for walks or rides				
Spend time in library				
Go to movies				
Visit with friends				
Engage in religious activities				
Attend club meetings				
Play cards				
Is there anything I've left out				
that you do?				
What?				

34. Has the frequency with which you do any of these things changed since you've been sick?
Yes _____ No _____ Uncertain _____

If yes, which things	In what way?
_____	_____
_____	_____

35. When you think about all the people you know in your own age group, how do you think your health compared with theirs?
a. Very good _____
b. Good _____
c. Fair _____
d. Poor _____
Verbatim _____

36. Now, I'd like to ask whether you take any kind of medicine regularly? Yes _____ No _____
If yes, could you begin when you get up in the morning and tell me what medicines you take throughout the day?

Medication	What do you think this medicine does for you?
_____	_____
_____	_____
_____	_____

37. Are there any others that you take less frequently?
If you get any injections, who gives these to you? _____

38. Have you found any medicines on your own (not ones that the doctor prescribed) that help with a headache or an upset stomach? Yes _____ No _____

If yes, what kind? _____
How often taken? _____

39. How much a month do you spend on medicines?
Verbatim _____
Is this a problem? Often? _____ Occasionally _____ Never _____
If other than "never", in what way?

Bed status

40. Are you usually: Check one
a. Up all day except to sleep or rest briefly _____
b. Up at least half of the day _____
c. Up for an hour or two each day _____
d. In bed most or all of the time _____

Walking status (check as many as apply)

41. Do you:
a. Walk alone without a crutch or cane _____
b. Need the help of crutches or a cane _____
c. Need the help of a wheelchair or walker _____
d. Need another person to help you walk _____
e. Need another person to help you in a wheelchair _____
f. Do you wear any kind of a brace or splint _____

Ambulation and travel

42. Do you have any special difficulty traveling?
Often _____ Occasionally _____ Never _____
If other than "never", what kind?
Verbatim _____

43.

Can you	Don't know	Easily	With difficulty	Not at all
a. Climb a curb				
b. Climb stairs				
c. Go down stairs				
d. Use a bus				
e. Use a car				
f. Use the subway				

44. Have you ever had the visiting nurse at home? Yes _____ No _____ Uncertain _____
If yes, was she able to help? Yes _____ No _____ Uncertain _____
If yes, what did she do or say that helped _____
Is the visiting nurse coming in now? Yes _____ No _____
What for? _____

45. When you think about all of the things that we've talked about today, are there any special ways that the clinic nurse or visiting nurse could help you now? Yes _____ No _____
Uncertain _____ If yes, or uncertain, in what ways _____

46. Interviewer's impression or opinion of nursing needs (from record and interview

47. Nursing needs as identified by interview and record

a. Diet
b. Medications
c. Injections
d. Skin care
e. Bath
f. Dressings
g. Irrigation
h. Physiotherapy
i. Occupational therapy
j. Activities of daily living
k. Teaching or health supervision (specify)
l. Other

48. Kind of nursing care needed (nurse's evaluation) (check as many as apply):

a. Care which cannot ordinarily be given by self or relatives _____
b. Care which can probably be given by self or relatives with help from visiting nurse _____
c. Care which can probably be given by self or relatives without visiting nurse help _____
d. Needs help with: Housekeeping _____
Cooking _____
Shopping _____
Laundry _____
Other _____

49. Needs continuing follow-up by clinic nurse for _____

50. Needs referral to social service for _____

51. Coping well _____
Coping with difficulty _____
Barely coping _____

52. Can you tell me anything about how lungs work?
Verbatim _____

53. Do you know what has happened inside your lungs to cause your symptoms?
Verbatim _____

54. Do you smoke? Yes _____ No _____
Have you ever tried to quit before? Yes _____ No _____
Do you see any reason to quit now? Yes _____ No _____
If yes, would you like some help quitting? Yes _____ No _____

55. Are you a nervous person? Yes _____ No _____
Do you find it difficult to relax ? Yes _____ No _____
Would you like to be taught some relaxation techniques? Yes _____ No _____

56. Do you have a bad cough? Yes _____ No _____ Productive? Yes _____ No _____
How do you take care of your cough at home? _____
Where did you learn this? _____
Do you know when you are getting a chest infection? Yes _____ No _____
If yes, how do you know? _____
What do you do when you think you have a chest infection?
_____

57. Do you use any mechanical devices at home? Yes _____ No _____
If yes, what are they? _____
How did you learn to use them? _____
What specifically would have been more helpful to you? _____

58. Would you be interested in attending classes with other patients with similar problems on your disease and its management while in the hospital? Yes _____ No _____
If no, why not? _____

Would anyone in your family be interested in attending the same classes with other family members also there? Yes _____ No _____
If no, why not? _____

APPENDIX C

PROGRESSIVE RELAXATION INSTRUCTIONS

PROGRESSIVE RELAXATION

You start each session in a lying position with as many pillows as necessary for comfort and so that you are breathing easily. Your assignment is to contract certain muscles in order to learn where to look for tension, then to practice letting them go. This is continued until all major groups of muscles have been included and you may scan your body mentally for touble spots.

Practice always starts with five minutes of rest. Think of your body with its many muscular activities, as an automobile speeding along at 60 miles per hour. You want to stop the car, but you have no brakes. So you turn off the ignition and coast until the car stops. In the same way, you can turn off your personal ignition by sitting down to relax, but your body must also coast to a stop. In most persons, even after training in relaxation, this takes from 15 to 20 minutes. Though you seem to remain tense and restless, you are learning. Many slow learners become expert at relaxing.

You need at least 45 minutes of uninterrupted practice for a relaxing period. Do not watch the clock, but concentrate on what you are doing. If possible, practice relaxing in a quiet room without anyone else around.

The reason we need to practice relaxation is because our bodies are so super-sensitive. Back in the cave man times the only protection we had against the dangers around us was our quick reactions, our ability to speedily fight or run. In our day, our bodies still have this ability but our world has changed and we no longer need to be so hyper-reactive. So now we have to learn how to control ourselves, to relax.

Relaxing requires active cooperation and participation. A passive attitude will merely waste time. Regular practice is essential. These instructions will tell you to relax, go to negative and to go to zero. They all mean, "Let yourself go." This may be difficult at first, but don't worry. Continue to practice and you will be rewarded. Learning any skill takes time; very tense people may need as much drill as in learning to type or to swim. Don't be discouraged. Remember that you are studying a hard condensed course and gaining thereby a lifetime skill. With practice, you discover unsuspected tensions, some of which you may have harbored for years. And you may get rid of them with ease if you don't give up too soon.

We're going to start with breathing because it is very important that you release any tension in your muscles on exhalation, when you breathe out. I want you to think of a tulip. Your eyes are closed and you see a tulip in your mind. Feel the flower opening in your throat as in a slow motion film. Imagine the flower opening in the

next two or three exhalations. Feel what this does to your throat region during the next two or three exhalations. Is there a widening? Is there moisture? And while you are doing this, be sensitive to the flower closing on inhalation. Be aware of the feeling of tension with expansion. As your chest expands as you breathe in, feel the tension. As you exhale, feel the tension go out.

Now we are going to learn to locate tension in the forearm muscles. Bend up both hands, fingers straight. Hold this position for about 30 seconds. Muscles in your forearm have contracted to bend up your hands. Where do you feel the effort? Where are the tense muscles? Some persons will indicate the wrist, but this is discomfort from tendon stretch or strain, not from the effort felt in the muscles themselves. The tenseness is in the upper, outer, and back part of the forearm where the muscles bulge. Can you feel it? Now, on exhalation, release the tension in your forearms by letting your hands fall limp. Notice the feeling of relaxation so that you can recall it. Continue to relax for a few seconds, then repeat the bending-up movement of the hand. Hold it still. Feel the tension. Relax on exhalation and concentrate on this feeling of relaxation.

Next, turn your arms onto their sides and bend the hands inward. Note the feeling of tension centered now in the large muscles on the inner surface of both forearms. Relax the tension suddenly and let the hands hang. Did you feel the tension decrease or vanish?

Feel the relaxing feeling for a few moments then repeat this exercise. Always relax your muscles on exhalation.

Put your mind now into your fingers. Make many movements during exhalation. Don't wiggle them too much. Sometimes it is better to imagine movements instead of actually doing it. Notice the tingling this makes.

Now let's observe tension in the lower and upper arm as a unit. Put your mind into your left arm. Without moving it from its position, slowly tense the whole arm, curling your fingers into a hard fist. Continue until the arm is as rigid as you can make it. Observe tension all through the arm. Now on exhalation, gradually let the muscles go limp until no tension is felt. Continue to relax the arm and notice the feeling. Next, repeat the tensions with both arms at the same time, squeezing the fists until all the muscles in your lower and upper arms are rock hard. Notice the tensions in all contracting muscles of both arms. Now, on exhalation, slowly decrease this tension, gradually relaxing the effort that holds the muscles hard, permitting the entire arm to go negative. Continue to relax both arms, noticing the wonderful feeling of relaxation. Remember this feeling so that you can recall it.

Now, we learn to identify tension in both legs. Slowly bend both feet up at the ankles as far as you can. Where is the tension now? Quickly relax on exhalation, and notice the difference. Repeat

the bending and locate the tension again. After holding it a few seconds, you should feel it along the shin. On exhalation, quickly relax and notice the warm feeling. Remember this feeling.

Next check the tension in your calf muscles. Point your feet down toward the end of the bed. Now notice the tension in your calves. Quickly relax, bringing your toes upward to a normal position. Notice the relaxed feeling compared to the tenseness you just experienced. Repeat this exercise, tensing your calf muscles and releasing on exhalation. Remember the feeling of relaxation so that you can recall it.

Put your mind into those large muscles that lie beneath the thigh bone. Bend both legs back at the knee, lifting your feet off the bed. Hold the legs in that bent position for a minute or so and note the tension in the muscles at the lower, back part of the thigh. On exhalation, quickly relax and note the difference. Now bend the legs back hard again, locate the tension and relax. Let your thigh muscles go negative. Relax. Notice that wonderful feeling of relaxation and remember it.

Your torso and its muscles are the next area of concentration. Pull in your stomach muscles. Pull in your stomach until it is hard and flat, noting the tension that spreads all over the abdominal wall. On exhalation, quickly relax and notice the difference. Now contract the same muscles but only slightly, just enough to notice the beginning

of tension over the abdomen. On exhalation, relax slowly, until you are entirely free of tension over the abdomen. Stay relaxed for a few moments and concentrate on this feeling of relaxation so that you can recall it.

Now sit up on the edge of your bed. Take advantage of all the physical support of your surroundings. Make a conscious effort to feel the support of the floor. Take all the advantage of the support the bed and floor give you. On exhalation, note the tensions flowing out of you, flowing into the floor. Sit and feel the support of the bed. Take advantage all you can of this support. If you are sitting in a chair, take advantage of the support of the back of the chair and the arms.

Next, arch your back. Arch it slowly but firmly until it reaches the extreme arched position. Hold it until you feel tension in your back muscles. Quickly relax. Now simply imagine that you are arching your back, and see if you note a faint tension in the region of your spinal column. You may feel it quickly or it may take several days to come through. After about 30 seconds, stop imagining that you are still arching your back, and relax, letting the back muscles go to zero.

Your breathing, neck and shoulder muscles are next. Take a deep breath and hold it. Note where diffuse tensions are felt in the chest. Then breathe out normally. Take another deep breath, and

again make a mental note of the location of tension and exhale. Now breathing normally, see if you can feel a trace of those tensions in your chest muscles. After a minute or so, discontinue this search and go to zero.

Now attend to your neck muscles. Press your head back as far as it can go and feel the tension in the neck; roll it to the side and feel the tension shift; now roll it to the other side. Straighten your head and bring it forward; press your chin against your chest. Let your head return to a comfortable position and study the relaxation.

Next study tension in your shoulders by pulling both shoulder blades straight back until you feel the contraction along the spine between them. Relax. Repeat the movement of pulling the shoulder blades together hard, hold, and relax. Repeat again, but this time use only enough contraction to provide a weak sensation of tension. Relax and go to zero.

Slowly raise both shoulders as high as possible. Note where you feel the tension and relax. The contraction was probably strongest over the top of your shoulders. Now, without moving, slightly tighten the muscles that lift your shoulders, study the tensions you feel, and relax again. Let your muscles stay negative without any perceptible tension for 15 to 30 seconds.

Wrinkle up your forehead now; wrinkle it tighter. Now stop wrinkling your forehead. Relax and smoothe it out. Picture the

forehead and entire top of your head as becoming smoother as the relaxation increases. Now frown and crease your brows and study tension. Smooth out the forehead once more. Think of cool hands on your forehead, smoothing it out. Smoother, smoother.

Now close your eyes tighter and tighter. Feel the tension. Relax your eyes. Let them close, using no effort and notice the relaxation.

Put your mind now in your jaw and mouth. Your tongue is in your lower jaw. Imagine that your mouth is a moist warm cave and there is a lake in the bottom. Your tongue is floating on the lake. Your jaw is relaxed, your lips parted.

Now your nose. Relax the band of muscles along the top of your nose. Your nostrils are flared. Feel the warmthness on exhalation, and on inhalation you feel coolness and dryness. On exhalation, notice the warmth and widening. On inhalation notice the coolness and dryness and the nostrils constricting.

You have completed the exercise. Remember what a wonderful feeling relaxation is. Notice how even your breathing is. And remember that it is your control over your body that achieved this. The more you practice the better control you will have. You won't have to go through this whole series in order to relax. You will notice areas of trouble and can call upon that area to relax at will.

I am going to count to five and on five you will open your eyes and be fully awake and feel alert and refreshed but calm and relaxed.

One, two, three, four, five

PROGRESSIVE RELAXATION

Short Form

Now that you have mastered the relaxation technique and know the difference between tension and relaxation in your own body, it is no longer necessary to take the time to tense your muscles. Get comfortable now, loosen your clothing so that you have nothing to think about except relaxing your muscles.

This exercise puts you almost entirely on your own. We're not going to tense the muscles, only relax them. It is just like turning the lights out in the house. Go through your body as you go through the rooms of a house and turn out the tension as you would turn out the lights. Scan your body for trouble spots. Let out the tension. Don't force it to happen, just let it flow out. Enjoy the experience of the calmness and peace that spreads over your body.

Put your mind in your feet and see if you can locate any tension and let it go. Scan your heels, soles, ankles, your whole foot for trouble spots and let the tension flow out. Feel the warmthness and looseness as the relaxation occurs.

Now your legs. Scan your legs. Turn off the tension as you turn off a light. Feel the tingliness as you give up the tension.

Notice how limp and heavy your legs are. How good it feels to be relaxed.

Now relax your abdomen. Don't force it--just let it happen. Just let go.

Your respirations have become deeper, freer, more regular than they were before. You're relaxing and just letting it happen. You are experiencing the calmness, the relaxed feeling that comes with letting go of tight muscles.

Look for tensions in your fingers, arms and shoulders and let go. Feel the warmth and looseness as the tensions flow out.

Let go of the tension in your back.

Now your neck and jaws. Let go. Let your mouth fall open, lips separated as you relax your jaws. Many people experience headaches just because of tension in their neck and jaws. Let the tension flow out....let go.

Now your forehead. Smoothe it out. Relax your nose, cheeks, mouth, teeth, tongue.

Once more scan your body and focus on the tenseness. Let the tension slip out, ease out. You are in complete control of your body and you are calling on it to relax. You have good feelings, pleasant feelings. You feel warmth and looseness. You feel limp and heavy.

Use this relaxation technique in your every day life. The more you practice the more skilled you will become. Think in terms of

relaxation. When you are waiting in the car at a stoplight, think of the time as 15 or 30 seconds you can relax. Let your arms fall to your side. Relax your legs and let the tension ease out. Any time you are sitting, take the opportunity to relax. See if you don't notice a change in yourself because you now know how to relax and use this knowledge to your benefit. Call upon it any time.

Your session is now over. When I count to five you will open your eyes and feel alert and refreshed but calm and relaxed.

One, two, three, four, five

APPENDIX D

POSTURAL DRAINAGE INSTRUCTIONS

POSTURAL DRAINAGE[2]

Postural drainage is a simple method of helping you clear your chest of excessive secretions. Because you are upright most of the day, your lungs tend to pool secretions in the bases. By changing your position, gravity assists in draining the secretions higher into your chest so that you may cough them out more easily.

Because your secretions are thick, postural drainage should be done following the use of bronchodilators and steam. Each postural drainage position should be tried for five minutes; if no secretions are produced, proceed to the next position. If secretions are produced, maintain the position until the secretions diminish, but no longer than five to ten minutes.

To position yourself at home, a twenty-inch stack of old magazines and newspapers can be tied together with tape and used in the following manner:

1. On top of your bed, place the magazines or tightly rolled blanket with a pillow over the top.

2. You may place the magazines under the foot of a light framed single bed. Push the head of the bed against the wall for

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[2]From Colorado General Hospital, Denver, Colorado.

safety. This will elevate the foot of the bed so that you will be in a position with your feet higher than your head for good drainage purposes.

3. On a couch, angle sofa cushions over the block of magazines with a soft pillow over the top for comfort.

Be sure that you are comfortable, relaxed and able to concentrate before you begin. Four positions are given below in order of areas to be drained.

1. Face lying with hips elevated 18-20 inches on magazine stack, making a 30-45 degree angle. Purpose: to drain posterior basal segments.

2. Lying on left side, hips elevated 18 to 20 inches on a magazine stack. Purpose: to drain right lateral basal lung segment.

3. Sitting upright or semi-reclining. Purpose: to drain the upper lung fields and allow more forceful coughing.

4. Lying on the right side, hips elevated on magazine forming a 30 to 45 degree angle. Purpose: to drain lateral basal segment.

APPENDIX E

INSTRUCTIONS FOR MAKING STERILE WATER

INSTRUCTIONS FOR MAKING STERILE WATER[3]

1. Equipment Needed
   a. Small saucepan
   b. Corntongs
   c. Glass jar with tin lid (Gerber baby food jars are best)
2. Instructions
   a. Remove lid from jar.
   b. Place corn tongs, jar and lid in small saucepan (allow handle of corntongs to protrude from saucepan).
   c. Fill saucepan with tap water, deep enough to cover jar and lid.
   d. Place on stove, bring water to boil and let it continue to boil for 30 minutes.
   e. After water has boiled for 30 minutes, remove saucepan from stove and allow it to cool until you can touch corntongs.
   f. Pick up the jar with corn tongs and scoop up water from the saucepan while removing jar.
   g. Using corn tongs, place jar of water on table (Make sure corn tongs do not come in contact with anything).

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[3] From Colorado General Hospital, Denver, Colorado.

h. Now use corn tongs to lift lid from saucepan.

i. Place lid on jar tightly and store in refrigerator.

j. Discard leftover sterile water after three days.

Note: Water kept longer than three days may contain bacteria which can cause infection.

APPENDIX F

PATIENT PROGRESS RECORDS

Exercise Group

Name _____

Date	Exercise	Time Spent	Comments

Relaxation Group

Name _____

Date	AM	PM	Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

AN ABSTRACT OF THE FIELD STUDY OF

SUZANNE E. BITHER

For the: MASTER OF NURSING

Date of receiving this degree: June 8, 1973

Title: DEVELOPMENT OF A HOSPITAL REHABILITATION PROGRAM FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Approved: [redacted]
May Rawlinson, Ph. D. Field Study Advisor

Methodological, applied research was employed to survey and evaluate methods of treatment presently used in the rehabilitation of patients with chronic obstructive lung disease, with the goal of developing a plan for the rehabilitation of COPD patients at a Veterans Administration Hospital.

Patient teaching related to the nature of the disease and its treatment, bronchial hygiene, graded exercise and relaxation, components of the program, were developed into lessons. This information will be compiled into a patient manual.

Problems related to the initiation of the program were discussed and recommendations for continuation, improvement and further study were offered.