




PULMONARY REHABILITATION







Definition of Pulmonary Rehabilitation

- “A multidisciplinary continuum of services directed to persons with pulmonary diseases and their families, usually by an interdisciplinary team of specialists, with the goal of achieving and maintaining the individual’s maximum level of independence and functioning in the community”
 - Sat Sharma, MD, FRCPC, Professor of Pulmonary Medicine, U. of Manitoba
- 




Consequences of Respiratory Disease

- Peripheral Muscle dysfunction
 - Respiratory muscle dysfunction
 - Nutritional abnormalities
 - Cardiac impairment
 - Skeletal disease
 - Sensory defects
 - Psychosocial dysfunction
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Mechanisms for these morbidities

- Deconditioning
 - Malnutrition
 - Effects of hypoxemia
 - Steroid myopathy or ICU neuropathy
 - Hyperinflation
 - Diaphragmatic fatigue
 - Psychosocial dysfunction from anxiety, guilt, dependency and sleep disturbances.
- 



Goals of Pulmonary Rehabilitation

- Aims to reduce symptoms, decrease disability, increase participation in physical and social activities and improve overall quality of life.
 - These goals are achieved through patient and family education, exercise training, psychosocial intervention and assessment of outcomes.
 - The interventions are geared towards the individual problems of each patient and administered by the multidisciplinary team.
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Structure of a Pulmonary Rehab Program

Program goals and objectives

BOX 50-2


Common Goals for Pulmonary Rehabilitation Programs

- Control of respiratory infections
- Basic airway management
- Improvement in ventilation and cardiac status
- Improvement in ambulation and other types of physical activity
- Reduction in overall medical costs
- Reduction in hospitalizations
- Psychosocial support
- Occupational retraining and placement (when and where possible)
- Family education, counseling, and support
- Patient education, counseling, and support
- Control of respiratory infections

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Exclusion criteria

- Patients with severe orthopedic or neurological disorders limiting their mobility
 - Severe pulmonary arterial hypertension
 - Exercise induced syncope
 - Unstable angina or recent MI
 - Refractory fatigue
 - Inability to learn, psychiatric instability and disruptive behavior
- 



Benefits of Pulmonary Rehabilitation

- Improved Exercise Capacity
 - Reduced perceived intensity of dyspnea
 - Improve health-related QOL
 - Reduced hospitalization and LOS
 - Reduced anxiety and depression from COPD
 - Improved upper limb function
 - Benefits extend well beyond immediate period of training
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Patient Selection

- Obstructive Diseases
- Restrictive Diseases
 - Interstitial
 - Chest Wall
 - Neuromuscular
- Other Diseases
- COPD patients at all stages of disease appear to benefit from exercise training programs improving with respect to both exercise tolerance and symptoms of dyspnea and fatigue.

Structure of a Pulmonary Rehab Program (cont.)

Patient evaluation

- Patient evaluation begins with a **complete patient history**.
- Next, a complete **physical examination** is done.
- A **chest radiograph, CBC, and ECG** may be needed.
- **Pulmonary function testing and exercise evaluation** are often needed.

Structure of a Pulmonary Rehab Program (cont.)

Patient selection

Box 50-4

Indications and Contraindications for Pulmonary Rehabilitation

INDICATIONS

- Symptomatic patients with COPD
- Patients with bronchial asthma and associated bronchitis (asthmatic bronchitis)
- Patients with combined obstructive and restrictive ventilatory defects
- Patients with chronic mucociliary clearance problems
- Patients having exercise limitations due to severe dyspnea

CONTRAINDICATIONS

- Cardiovascular instability requiring cardiac monitoring (consider cardiac rehabilitation)
- Malignant neoplasms involving the respiratory system
- Patients with severe arthritis or neuromuscular abnormalities (a relative contraindication—refer to physical therapy for case-by-case review)

Structure of a Pulmonary Rehab Program (cont.)

Program design

- **Open-ended** designs allow the patient to enter the program and progress through it until he or she achieves certain goals.
- **Closed designs** use a set time period to cover the program content.
- Classes meet 1 to 3 times per week for 6 to 16 weeks.

Structure of a Pulmonary Rehab Program (cont.)

Content – not just physical rehab, education too!

TABLE 50-2

Sample Pulmonary Rehabilitation Session

Component	Focus	Time Frame
Educational	Welcome (group interaction)	5 minutes
	Review of program diaries (past week's activities)	20 minutes
	Presentation of educational topic	20 minutes
	Questions, answers, and group discussion	15 minutes
Physical reconditioning	Physical activity and reconditioning	45 minutes
	Individual goal-setting and session summary	15 minutes
Total: 120 minutes (2 hours)		

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Structure of a Pulmonary Rehab Program (cont.)

Physical reconditioning

- Consists of an exercise prescription with target heart rate based on the initial evaluation
- For most patients, an initial target heart rate is **20 beats/min above resting rate.**

Structure of a Pulmonary Rehab Program (cont.)

Physical reconditioning (cont.)

- The exercise prescription includes the following:
 - Lower extremity aerobic exercises
 - Timed walking (6- or 12-minute walk)
 - Upper extremity aerobic exercises
 - Ventilatory muscle training using progressive resistance

Structure of a Pulmonary Rehab Program (cont.)

Educational component

1. Respiratory structure, function, and pathology
2. Breathing control methods
3. Methods of relaxation and stress management
4. Exercise techniques and personal routines


Structure of a Pulmonary Rehab Program (cont.)

Educational component (cont.)

- Bronchial hygiene techniques
- Home O₂ and aerosol therapy
- Medications
- Dietary guidelines
- Recreation and vocational counseling





Education

- Encourages active participation in health care
 - Better understanding of disease
 - Improved compliance
- 




Medication and other therapies

- Types of medication, action, adverse effects, dose and proper use of inhaled medications .
 - Instructions in inhaler technique.
 - Appropriate use of oxygen
- 



Psycho-social Intervention

- Anxiety, depression, difficulties coping with chronic disease
 - Aided by regular patient education session or support groups
 - Instruction in progressive muscle relaxation, stress reduction, panic control
- 


Chest Physical

Therapy

- Pursed Lip Breathing – shifts breathing pattern and inhibits dynamic airway collapse.
- Posture techniques – forward leaning reduces respiratory effort, elevating depressed diaphragm by shifting abdominal contents.
- Diaphragmatic Breathing – Some patients with extreme air trapping and hyperinflation have increased WOB with this technique
- Postural Draining – valuable in patients who produce more than 30cc/24 hours/ Coughing techniques




Nutritional Assessment

- Diet history, BMI
 - Over or Under weight.
 - Classes in weight management and/or nutritional counseling to improve weight management
- 




Facts About COPD & Diet

- Diet and Nutrition should be an important part of treatment
 - Breathing requires more energy with COPD
 - Muscles involved may require 10x more calories than those without COPD
 - Good nutrition will help reduce hospitalisation from chest infection
- 





General Dietary Advice

- Enjoy variety of foods
 - Limit salt intake
 - Drink plenty of fluids 6-8 glasses/day
 - Include high fibre foods e.g. veg, fruit, wholegrain foods, cereal, pasta, rice
 - Eat several small meals per day
- 

Body Mass Index (BMI)

- Used to measure if an individual is a healthy weight, underweight or overweight

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$$

- Fit into certain categories
 - 16-19 = Underweight
 - 20-25 = Normal weight
 - 26-30 = Overweight
 - 31-40 = Obese



Dietary Advice if you are underweight

Underweight

Weight loss



More energy required
to breathe



Loss of respiratory
muscle strength



Increased difficulty
breathing and increased
risk of infection



Poor appetite

- Have regular meals & snacks
- Eat anything fancied
- Eat from a smaller plate
- Avoid filling up on veg, salads, fizzy drinks
- Sip nourishing high energy fluids e.g. milk, hot choc, milkshake
- A short walk before meals may increase appetite




Short of Breath While Eating/ After Meals



- Eat more slowly
- Choose foods that are easy to chew - softer foods
- Try eating 5-6 small meals/day.
- Eat while sitting up to ease pressure on the lungs



Nutritional Supplements

- If the discussed ideas do not help to improve your intake, nutritional supplements may be used
 - Complian[®] and Build-up[®] are available to buy “over the counter”.
 - Others are available on prescription from your GP.
 - Variety of flavours (sweet and savoury).
 - Can be incorporated into recipes e.g. milk pudding, ice cream, custard, milkshakes, mousses.
- 



Dietary Advice if you are Overweight

Overweight

- Consequence of :
 - high energy intake from food
 - reduced exercise tolerance
 - steroid use
- Extra weight increases workload of heart and lungs to supply oxygen around body
- Excess fat in abdominal area makes it difficult for the lungs to expand fully



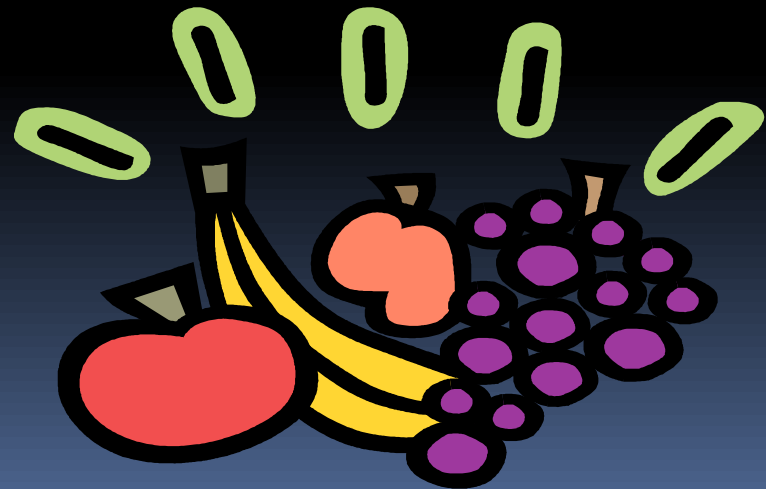
Starchy Foods


- Include at each meal
- Main source of energy
- Starchy foods are filling
- Choose wholemeal + wholewheat varieties
- Myth that starchy foods are 'fattening'



Fruit and Vegetables

- Rich in vitamins and minerals
- Help protect against infection
- Aim for 5 portions per day
- Fresh, frozen, canned or dried





Meat, Fish and Alternatives

- Provides protein, vitamins + minerals
- Recommend 2 servings/day
- Avoid roasting or frying in large amounts of oil/fat
- Try healthier cooking methods
- Choose lean meat
- Remove visible fat & skins from meat_and poultry.

Milk and Dairy Products

- Provides protein and calcium
- Recommend 3 servings/day
- Use semi-skimmed milk instead of full cream milk
- Use low fat cheeses e.g. Cottage cheese, edam, half fat cheddar
- Try low fat yoghurts
- If on long term steroids - it is important you have enough calcium.

Fatty and sugary




- Try using sweeteners
- Choose lower calorie sugar free/no added sugar drinks
- Keep sweets, puddings, cakes, chocolate, take-aways, pies and pastries as a treat
- Try tinned fruit in natural juice rather than syrup.



Hints for weight control

- Think of the benefits of weight loss
 - Make healthier changes to your diet
 - Fill up on fruit and vegetables
 - Have regular meals

 - Set realistic, achievable target lose (1-2lbs/week).
 - Do not crash diet. Consider keeping a food diary
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Structure of a Pulmonary Rehab Program (cont.)

Psychosocial and behavioral component

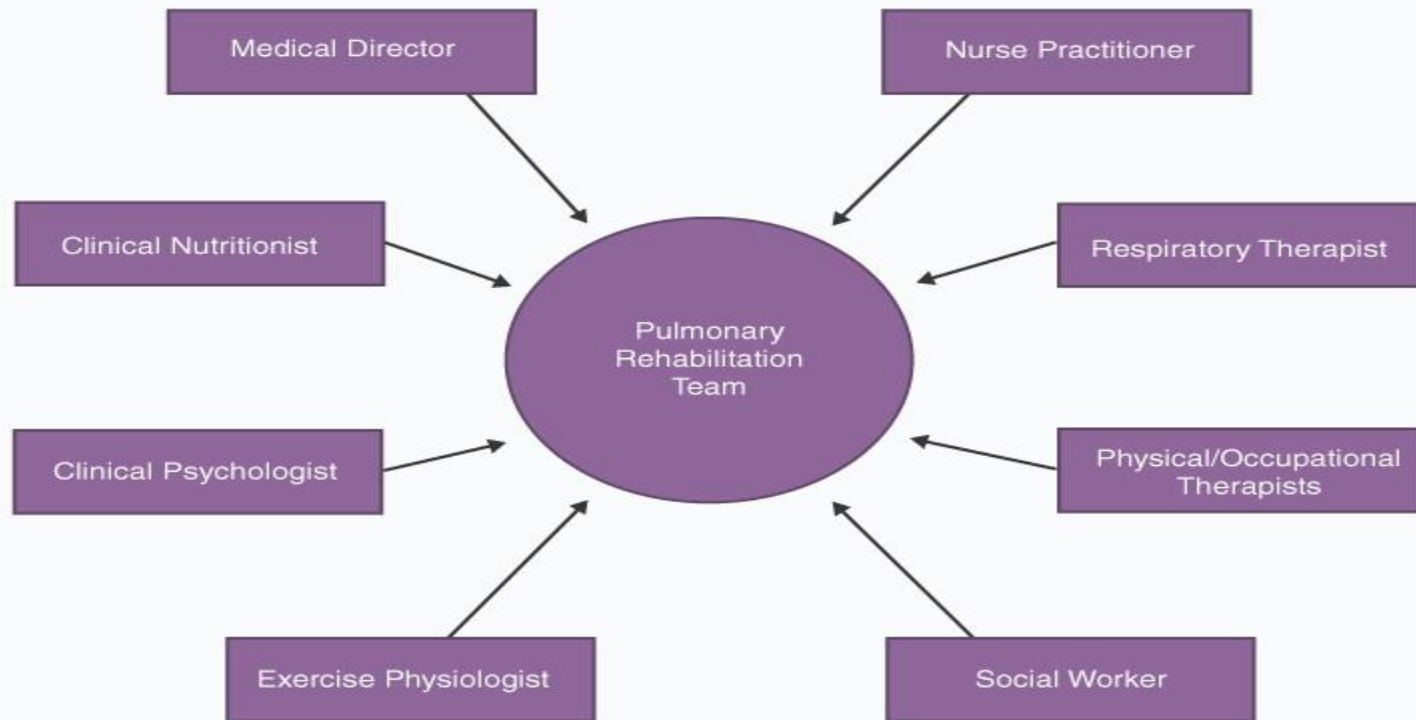
- Emotional stress is a common problem for a patient with chronic lung disease.
- Experts can be brought in to help patients cope with their anxieties and sources of stress.

Structure of a Pulmonary Rehab Program (cont.)

Staffing

- Pulmonary rehabilitation is a **multidisciplinary** endeavor.
- Staff conducting the program should be certified in basic and advanced life support.

Structure of a Pulmonary Rehab Program (cont.)



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Structure of a Pulmonary Rehab Program (cont.)

Facilities

- The facility must be easy to reach, be accessible to public transportation, and have available parking.
- Rooms should be spacious and comfortable with adequate lighting and ventilation.
- A room for counseling is helpful.

Structure of a Pulmonary Rehab Program (cont.)

Scheduling

- Class times need to be scheduled at a time **most convenient for the patients.**
- Traffic patterns, bus schedules, and availability of rides are important factors to consider.

Class size

- The ideal class size is 3 to 15 patients.

Structure of a Pulmonary Rehab Program (cont.)

Equipment (cont.)

- Physical reconditioning equipment is needed.
 - Stationary bicycles, treadmills, rowing machines
 - Pulse oximeter
 - Inspiratory & Expiratory resistance devices
 - Emergency O₂ should be in the room.

Structure of a Pulmonary Rehab Program (cont.)

Box 50-5

Factors Affecting Pulmonary Rehabilitation Program Costs

- Marketing and program promotion
- Number of personnel involved in program facilitation and administration
- Space and utility expenses
- Audiovisual, exercise, and monitoring equipment (purchase and maintenance)
- Production and duplication of course materials
- Patient supplies
- Office supplies
- Refreshments
- Miscellaneous expenses

Structure of a Pulmonary Rehab Program (cont.)

Box 50-7

Evaluation of Rehabilitation Program Outcomes

- Changes in exercise tolerance
- Before and after 6- or 12-minute walking distance
- Before and after pulmonary exercise stress test
- Review of patient home exercise logs
- Strength measurement
- Flexibility and posture
- Performance on specific exercises (e.g., ventilatory muscle, upper extremity)
- Changes in symptoms
- Dyspnea measurement comparison
- Frequency of cough, sputum production, or wheezing
- Weight loss or gain
- Psychological test instruments
- Other changes
- Activities of daily living (ADLs) changes
- Postprogram follow-up questionnaires
- Preprogram and post-program knowledge tests
- Compliance improvement with pulmonary rehabilitation medical regimen
- Frequency and duration of respiratory exacerbations
- Frequency and duration of hospitalizations
- Frequency of emergency department visits
- Return to productive employment

Structure of a Pulmonary Rehab Program (cont.)

Potential hazards

- Cardiovascular abnormalities
- Muscular abnormalities
- Miscellaneous
 - Exercise-induced asthma
 - Hypoglycemia
 - Dehydration