

Pulmonary Rehabilitation Part Two

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Interventions (RC):

- ▲ Education on RC topics
- ▲ Dyspnea management
- ▲ Pharmacotherapy
- ▲ Oxygen therapy
- ▲ Inspiratory muscle training
- ▲ Exercise training
- ▲ Smoking cessation
- ▲ Sleep assessment and therapy

Learning Objectives:

- ▲ Integrate the following interventions into a pulmonary rehabilitation (PR).
 - ◆ pharmacologic agents
 - ◆ supplemental oxygen therapy
 - ◆ ventilatory muscle training
 - ◆ general exercise training
- ▲ Outline PR for patients with conditions other than obstructive disease.
- ▲ Assess outcomes for PR patients.
- ▲ Explain the implications of special issues associated with PR; such as, patient adherence, ethical issues and social support.

Interventions (non-RC):

- ▲ Occupational therapy
- ▲ Physical therapy
- ▲ Nutritional support
- ▲ Psychosocial support, including end-of-life care
- ▲ Alternative medical support

Rehabilitation Interventions Overview

Initiation of rehabilitation

- ▲ After first exacerbation
- ▲ During intensive care
- ▲ Before and after surgical procedures; e.g., lung volume reduction surgery (LVRS)
- ▲ When the patient is ready

Duration of rehabilitation

- ^6-12 weeks

Medication types for COPD

- ^Immunizations: influenza; pneumococcus
- ^Bronchodilators
- ^Corticosteroids
- ^Combination therapy
- ^Mucolytics
- ^Antibiotics

Pharmacologica
|
Therapy

Bronchodilators

- ^Benefits
 - ◆ decrease airway resistance
 - ◆ decrease hyperinflation
 - ◆ decrease dyspnea - may be due to decreased resistance and/or decreased hyperinflation
 - ◆ note - patients may improve symptoms, although FEV₁ remains unchanged.

Components of COPD

- ^Airflow obstruction - decreased FEV₁
- ^Hyperinflation - increased IC/TLC
- ^Inflammation
- ^Systemic manifestations, due to oxidative stress, immunopathology result in:
 - ◆ decreased free fat mass;
 - ◆ impaired muscle function;
 - ◆ dyspnea; etc.

Bronchodilators

- ^Short-acting beta-agonist (SABA)
 - ◆ albuterol, as needed
 - ◆ all stages

Bronchodilators

- ^ Long-acting beta-agonists (LABA)-
moderate-to-severe COPD
 - ◆ salmeterol (Serevent)
 - ◆ formoterol (Foradil)

Bronchodilators

- ^ Short-acting anticholinergic -
ipratropium (Atrovent)
- ^ Long-acting anticholinergic -
tiotropium (Spiriva)
 - ◆ moderate-to-severe
 - ◆ improves lung function
 - ◆ decreases dyspnea
 - ◆ daily - increases adherence

Bronchodilators

- ^ Long-acting beta-agonists (LABA)-
moderate-to-severe COPD
 - ◆ Indacaterol (Arcapta)
 - ◆ vilanterol- 24H duration only in
combination inhaled DPI

Bronchodilators

- ^ Long-acting anticholinergic
 - ◆ Umeclidinium (Incruse Ellipta)
 - ◆ dry powder inhaler
 - ◆ 18 mcg per dose
 - ◆ duration 24-36 H
 - ◆ effective for COPD

Bronchodilators

- ^ Long-acting beta-agonist
combinations
 - ◆ Breo- vilanterol & fluticasone
 - ◆ Trelegy Ellipta- fluticasone,
umeclidinium, and vilanterol
 - ◆ Anoro Ellipta- umeclidinium,
vilanterol

Bronchodilators

- ^ nonspecific phosphodiesterase
(PDE) inhibitors; e.g., theophylline
 - ◆ high risk/benefit ratio - adverse
effects
 - ◆ low cost
 - ◆ reserved for patients who cannot use
aerosols

Bronchodilators

- ▲ **Specific PDE4 inhibitors**
 - ◆ roflumilast (Daliresp)
 - ◆ apremilast (Otesla)
 - ▶ included in Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines for severe COPD
 - ▶ daily tablet
 - ▶ bronchodilator
 - ▶ decreases inflammation
 - ▶ decreases exacerbations

Combined steroid and LABA

- ▲ **Indication** - in addition to tiotropium for severe and very severe COPD
- ▲ **Benefits**
 - ◆ decreased exacerbations - cost effective
 - ◆ improved symptoms and HRQoL
 - ◆ decreased mortality
- ▲ **Preparations**
 - ◆ formoterol/budesonide (Symbicort)
 - ◆ salmeterol/fluticasone (Advair)

Bronchodilator combinations

- ▲ **Moderate-to-severe**
- ▲ **Beta-agonist and anticholinergic** - greater response than either one, alone
 - ◆ formoterol and tiotropium - persistent symptoms
 - ◆ albuterol and ipratropium - intermittent symptoms

Mucolytic agents

- ▲ **Oral n-acetylcysteine (COPD):**
 - ◆ may improve pulmonary function
 - ◆ may reduce risk of hospitalization
 - ◆ effects may be due to antioxidant activity
- ▲ **No evidence supporting nebulized n-acetylcysteine**
- ▲ **No evidence supporting nebulized Pulmozyme for COPD**

Corticosteroids

- ▲ **Oral corticosteroids; e.g., prednisone** - exacerbations
- ▲ **Inhaled corticosteroids (ICS)**
 - ◆ severe-to-very severe COPD
 - ◆ not recommended as monotherapy

Mucolytic agents

- ▲ **Oral mucolytics available outside the U.S.A. (not FDA-approved)**
 - ◆ carbocysteine
 - ◆ ambroxol

Antibiotics

- ^ Indication - evidence of bacterial infection
- ^ Recurrent infections indicate prolonged courses
- ^ Not for routine prophylaxis??

Medications and rehabilitation

- ^ Encouraging adherence
 - ◆ drugs with lesser frequency
 - ◆ memory aids
 - ◆ cheaper drugs
 - ◆ assistance with payment
 - ◆ patient education on expectations
 - ◆ follow-up

Medications and rehabilitation

- ^ Instruction and monitoring medication self-administration is integral to rehabilitation.
- ^ Selection of specific agent(s) should be based on:
 - ◆ patient response
 - ◆ cost
 - ◆ patient's ability to self-administer

Oxygen Therapy

Medications and rehabilitation

- ^ Adherence can be problematic - it does affect outcomes
- ^ Non-adherence may be due to:
 - ◆ memory impairment
 - ◆ cost
 - ◆ perceived difficulty (too much stuff)
 - ◆ perception on ineffectiveness

Indications for O2 therapy

- ^ Manage hypoxemia at rest and during exercise.
- ^ Increase exercise capacity for patients without hypoxemia during high-intensity training.

Benefits of O2 therapy

- ^ Prolongs survival for patients with severe COPD and resting hypoxemia
 - ◆ long term oxygen therapy (LTOT) - ≥ 15 hours/day

Adverse effects

- ^ O2 tissue toxicity - not at minimal FIO2
- ^ O2-induced hypercapnia
 - ◆ caused by V/Q mismatch & Haldane effect
 - ◆ usually during exacerbations
 - ◆ maintain SpO2 <92% to prevent

Benefits of O2 therapy

- ^ Increases endurance during high-intensity exercise
 - ◆ permits greater exercise intensity
 - ◆ decreases respiratory rate
 - ◆ decreases dynamic hyperinflation
 - ◆ decreases leg fatigue
- ^ Prevents nocturnal desaturation

Adverse effects

- ^ Accidents
 - ◆ smoking with O2
 - ◆ cylinder mishaps
 - ◆ liquid O2 spills

Nocturnal O2 therapy

- ^ COPD - may desaturate at night and require more O2
- ^ COPD + OSA (overlap syndrome)
 - ◆ polysomnography needed for suspected patients
 - ◆ managed by OSA guidelines

Physiological criteria for home O2

- ^ Continuous O2
 - ◆ PaO2 ≤ 55 mm Hg or SaO2 $\leq 88\%$
OR
 - ◆ PaO2 = 56-59 mm Hg or SaO2 = 89%
AND
 - dependent edema from CHF OR
 - pulmonary hypertension
 - ◆ Desaturation within first minute of six minute walk test (6 MWT) - suggested by study

Physiological criteria for home O2

- ^ Nocturnal O2 only - PaO2 \leq 55 mm Hg or SaO2 \leq 88% during sleep OR drop in SaO2 $>$ 5%
- ^ Exercise O2 only - PaO2 \leq 55 mm Hg or SaO2 \leq 88%

Home O2 systems

- ^ Compressed gas cylinder systems
 - ◆ require no electrical power
 - ◆ limited duration
 - ◆ limited portability
- ^ Liquid O2 systems
 - ◆ require no electrical power
 - ◆ long duration (860:1)
- ^ Concentrators
 - ◆ require electrical power
 - ◆ portable units available

Prescription for LTOT

- ^ Prescribe O2 for PaO2 \leq 60 mm Hg or SaO2 \leq 90%
- ^ Add 1 L/min additional during exercise and for rest after exercise OR titrate O2 flow for PaO2 \geq 60 mm Hg or SaO2 \geq 90%
- ^ If the hypoxemia identified during exacerbation, recheck ABGs 30-90D to determine need for LTOT

Home O2 devices

- ^ Standard nasal cannula "nose-hose"
- ^ Reservoir nasal cannula
 - ◆ bolus of O2 during inspiration
 - ◆ conserves O2 supply
- ^ Pulsed flow cannula
 - ◆ O2 flow during inspiration, only
 - ◆ conserves O2 supply
 - ◆ increased comfort (less drying)

Home O2 systems

- ^ Compressed gas cylinder systems
 - ◆ require no electrical power
 - ◆ limited duration
 - ◆ limited portability
- ^ Liquid O2 systems
 - ◆ require no electrical power
 - ◆ long duration (860:1)

Home O2 devices

- ^ Reservoir nasal cannula



Home O2 devices

^ Pulsed flow device



Home O2 devices

^ Transtracheal device (TTOT)



Home O2 devices

^ Transtracheal oxygen therapy (TTOT)

- ◆ aesthetically desirable - psychosocial benefits
- ◆ permits more active lifestyle
- ◆ lesser flow rate - conserves O2
- ◆ can combine with pulse delivery device

Patient education on O2 therapy

^ Topics

- ◆ devices
- ◆ device usage - how & when
- ◆ troubleshooting
- ◆ contacts for devices & supplies

^ Competency-based evaluations

- ◆ knowledge - examinations
- ◆ procedures - performance checklists

Home O2 devices

^ Transtracheal device (TTOT)

- ◆ aesthetically desirable - psychosocial benefits
- ◆ permits more active lifestyle
- ◆ lesser flow rate - conserves O2
- ◆ can combine with pulse delivery device
- ◆ less discomfort - increases adherence
- ◆ treats OSA
- ◆ requires special knowledge and skills
- ◆ requires minor surgery

Patient adherence to LTOT

^ LTOT adherence is 45 - 70%

^ Reasons for non-adherence

- ◆ hassle & expense of supplies
- ◆ limitation of mobility
- ◆ nasal irritation
- ◆ embarrassment
- ◆ fear of dependence

Patient adherence to LTOT

- ▲ LTOT adherence is 45 - 70%
- ▲ Reasons for non-adherence
 - ◆ hassle & expense of supplies
 - ◆ limitation of mobility
 - ◆ nasal irritation
 - ◆ embarrassment
 - ◆ fear of dependence
 - ◆ inadequate communication
 - ◆ perception of no benefit
 - ◆ desire for freedom to smoke

Travel with O₂

- ▲ Important enabler for rehab patients.
- ▲ Commercial aircraft pressurized to 8000 ft.
- ▲ O₂ required for patients with:
 - ◆ sea level RA PaO₂ < 73
 - ◆ FEV₁ < 1.5 (maybe)
- ▲ Altitude simulation test may be needed

Methods to improve adherence

- ▲ Instruction on need & benefits
- ▲ Regular follow-up
- ▲ Family instruction & social support
- ▲ Portable delivery systems - small and light

Travel with O₂

- ▲ Check with airline before flight
- ▲ Airline security must be notified
- ▲ Liquid oxygen (LOX) systems may NOT be carried on aircraft (store with luggage)

Methods to improve adherence

- ▲ Instruction on need & benefits
 - ▲ Regular follow-up
 - ▲ Family instruction & social support
 - ▲ Portable delivery systems - small and light
 - ▲ Concentrators - avoid problems with refills and deliveries
 - ▲ TTOT - decreases embarrassment
 - ▲ Smoking cessation, fire safety
- Click for video on smoking with O₂ (1.2 min)
<http://www.youtube.com/watch?v=D7QpSfvyOek>

Travel with O₂

- ▲ Check with airline before flight
- ▲ Airline security must be notified
- ▲ LOX systems may NOT be carried on aircraft (store with luggage)
- ▲ Portable O₂ concentrator is best; but requires approval by airline
- ▲ CPAP devices require external power source
- ▲ Some airlines provide O₂ source for a fee

Pulse oximetry

- ^ Oximeters are available at Walmart, Amazon, etc.
- ^ Two-edge sword - patient requires thorough instruction
- ^ Purposes:
 - ◆ home O₂ monitoring
 - ◆ sleep apnea monitoring
 - ◆ monitoring patients with congenital heart disease
 - ◆ high altitude travel & activities

Concepts

- ^ Weakness - reduced force that is not changed by rest
- ^ Fatigue - reduced force that changes with rest (occurs in normals)
- ^ Strength - maximum force generated (PI_{MAX})

Pulse oximetry

- ^ Insurers recognize oximetry to:
 - ◆ determine appropriate home oxygen liter flow
 - ◆ monitor patients on home ventilators
 - ◆ adjust for change in the patient's condition
 - ◆ wean patients from home oxygen.

Concepts

- ^ Endurance
 - ◆ PI sustainable over time - inspiratory muscles
 - ◆ maximum voluntary ventilation (MVV) - inspiratory and expiratory muscles

Inspiratory Muscle Training

Rationale for IMT

- ^ COPD patients typically have weak inspiratory muscles
- ^ Exercises intend to increase the strength and/or endurance of ventilatory muscles, thereby:
 - ◆ decreasing breathlessness
 - ◆ increasing ventilatory muscle efficiency
 - ◆ increasing exercise capacity - effective, even for normal individuals

Conditions that may benefit

- ^ Asthma
- ^ Heart failure rehabilitation
- ^ Bariatric surgery - preoperatively
- ^ Thoracic restrictive disease
- ^ Failure to wean from mechanical ventilation

Exercise devices

- ^ Threshold resistors (preferred)
- ^ Flow restrictors - patient can reduce load by decreasing flow
- ^ Incentive spirometers - research has found it ineffective

Conditions that benefit

- ^ Selected COPD patients
 - ◆ moderate-to-severe; but, not end-stage
 - ◆ exertional dyspnea
 - ◆ decreased $PI_{MAX} < 80$ cm H₂O (excludes weakness)
 - ◆ motivated - will adhere to training

Exercise devices

- ^ Threshold resistors (preferred)

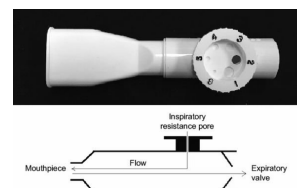


Exercise techniques

- ^ Types
 - ◆ sustained hyperpnea
 - ◆ inspiratory resistance
- ^ Intended goals
 - ◆ strength - high workload, few repetitions
 - ◆ endurance - moderate workload, many repetitions

Exercise devices

- ^ Flow restrictors - patient can reduce load by decreasing flow



Exercise devices

- ▲ Powerbreathe device



Intermission

Exercise prescription

- ▲ Frequency ≥ 5 days/week
- ▲ Duration 30 min/day, continuous or divided into two sessions
- ▲ Intensity $> 30\%$ initial PI_{MAX} (adjusted as tolerated)

**General Exercise
Training**

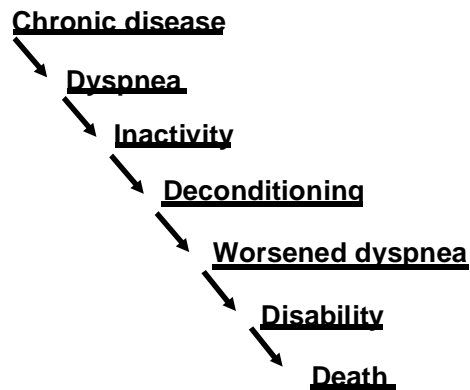
Measured outcomes

- ▲ PI_{MAX}
- ▲ Dyspnea; e.g., by BDI/TDI indexes
- ▲ Health status; e.g., by SGRQ
- ▲ Exercise performance; e.g., by 6 MWD

Physical reconditioning exercises

- ▲ Rationale - to reverse the effects of inactivity that are due to dyspnea
- ▲ The most important factor in pulmonary rehabilitation for symptomatic respiratory disease
- ▲ Beneficial to almost everyone, except:
 - ◆ pure cardiac pump failure
 - ◆ degenerative neuromuscular diseases

Chronic disease cascade



Regimen benefits

- ^ Aerobic training
 - ◆ high-intensity exercise - exercise at levels near individual peak capacity produces greatest physiological benefit; however,
 - ◆ both low and high-intensity exercises produce clinical benefits

Benefits of reconditioning exercises

- ^ Increased maximal oxygen uptake ($VO_{2\text{MAX}}$)
- ^ Increased muscle strength and endurance
- ^ Improved muscle coordination
- ^ Increased muscle mass, decreased adipose tissue
- ^ Improved sense of well-being
- ^ Improved chance of survival (possibly)

Exercises

- ^ Leg exercises
 - ◆ walking
 - ◆ treadmill walking
 - ◆ cycle ergometer
 - ◆ stair climbing
- ^ Arm exercises
 - ◆ arm ergometer
 - ◆ weights
 - ◆ elastic resistance bands

Regimen benefits

- ^ Aerobic training - increases endurance
 - ◆ lower extremities
 - ◆ upper extremities
- ^ Strength training - increases muscle strength and muscle mass
 - ◆ lower extremities
 - ◆ upper extremities

Exercise prescription

- ^ Developed by:
 - ◆ MD, and/or
 - ◆ Physical therapist (PT) - essential for targeting muscle groups for strength training and/or
 - ◆ Exercise physiologist and/or
 - ◆ RCP

Exercise prescription

- ▲ Implemented by:
 - ◆ PT and/or
 - ◆ RCP and/or
 - ◆ Rehab RN

Maintenance program

- ▲ Training effects can be lost after one month without exercise
- ▲ Maintenance programs
 - ◆ Home exercise program
 - ◆ Monthly outpatient exercise program

Exercise implementation

- ▲ Recommended frequency and duration - 3 times/week; 8-12 weeks??
- ▲ Increase intensity as tolerated
- ▲ Monitoring
 - ◆ pulse oximetry - SpO2 and heart rate
 - ◆ respiratory rate
 - ◆ reported dyspnea

Adjunctive therapeutics

- ▲ Supplemental oxygen
- ▲ Noninvasive positive pressure ventilation (NPPV)
 - ◆ better than O2? (small study)
 - ◆ nocturnal - effects carry over to day time
 - ◆ during exercise
 - ▶ uncomfortable
 - ▶ unwieldy

Exercise prescription table

Upper Limb Training

- Endurance exercise (eg, arm ergometry)
- and/or
- Resistance exercise (ie, free weights and elastic bands)
- Task-specific training of muscles involved in functional living

Flexibility Training

- Stretching of major muscle groups
- Balance training and stretching to increase range of motion (eg, modified yoga for whole-body stretching with coordinated breathing)
- Frequency
 - 2-3 times per week

Spruit MA, Singh SJ, Garvey C, et al. An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med*. 2013; 188 (8): e13-e64.
Chris Garvey et al. Pulmonary Rehabilitation: Exercise Prescription in Chronic Obstructive Pulmonary Disease: Review of Selected Guidelines. An official statement from the American Association Of Cardiovascular And Pulmonary Rehabilitation. *JORP*. 2016;75-83

Adjunctive therapeutics

- ▲ Heliox
 - ◆ low density gas decreases WOB
 - ◆ collective evidence does not support effectiveness with PR
- ▲ Neuromuscular electric stimulation (NMES) - low voltage stimulation of motor nerves
 - ◆ increases recovery of muscle strength
 - ◆ more research needed
 - ◆ muscles without exercise??

Rehabilitation for Miscellaneous Conditions

Conditions that may benefit

- △ Restrictive conditions
 - ◆ pulmonary fibrosis
 - ◆ sarcoidosis
 - ◆ ARDS survivors
 - ◆ collagen vascular diseases
 - ◆ thoracic restriction; e.g., kyphoscoliosis

Conditions that may benefit

- △ Obstructive conditions
 - ◆ asthma
 - ◆ cystic fibrosis
 - ◆ diffuse bronchiectasis

Conditions that may benefit

- △ Neuromuscular disease; e.g., Guillain-Barre syndrome
- △ Pulmonary vascular disease - pulmonary hypertension
- △ Lung cancer
- △ Recovery from thoracic surgery:
 - ◆ transplants
 - ◆ lung volume reduction surgery (LVRS)

Conditions that may benefit

- △ Obstructive conditions
 - ◆ asthma
 - ◆ cystic fibrosis
 - ◆ diffuse bronchiectasis

Non-COPD programs

- △ Same goals as for COPD
 - ◆ improve HRQoL
 - ◆ increase exercise capacity
- △ Different program content
 - ◆ instruction on different medications
 - ◆ disease-specific physical and occupational therapy
 - ◆ exercises focusing on different muscle groups

Asthma program

^ Patient groups

- ◆ adults, including pregnant women
- ◆ children (K+)
- ◆ parents

^ Instructional delivery

- ◆ certified asthma educator
- ◆ computer-based programs
- ◆ asthma camps

Cystic fibrosis program

^ Education topics

- ◆ lung clearance techniques
- ◆ medications & self-administration techniques
- ◆ nutrition
- ◆ infection control

Asthma program

^ Educational topics

- ◆ asthma pathophysiology
- ◆ asthma triggers
- ◆ early warning signs
- ◆ PEF monitoring
- ◆ medications & self-administration techniques

Cystic fibrosis program

^ Exercise precautions

- ◆ may require supplemental O₂
- ◆ avoid hot environments - sweating
- ◆ maintain hydration with electrolytes
- ◆ maintain nutrition

Asthma program

^ Exercise

- ◆ warm up - important
- ◆ self-monitor for exercise-induced bronchospasm
- ◆ submaximal exercises
 - aerobics
 - walking
 - yoga

Restrictive lung disease

^ Education topics

- ◆ disease pathophysiology
- ◆ energy conservation
- ◆ oxygen therapy
- ◆ relaxation techniques
- ◆ medications
- ◆ nutrition
- ◆ breathing retraining - pursed lip breathing????

Restrictive lung disease

- ^ **Exercise training**
 - ◆ may not tolerate
 - ◆ may not benefit - desaturate with exercise
 - ◆ supplemental oxygen may be required
 - ◆ NPPV may be required

**Special
Issues**

Neuromuscular disease

- ^ **Education topics**
 - ◆ pathophysiology
 - ◆ medications
 - ◆ cough assist; e.g., mechanical in/ex sufflator
 - ◆ NPPV devices & procedures

Issues

- ^ **Outcome assessment**
- ^ **Patient adherence**
- ^ **Ethical & end-of-life issues**
- ^ **Social & recreational support**

Neuromuscular disease

- ^ **Exercise training - condition specific**
 - ◆ strength and endurance training
 - ◆ ventilatory muscle training
- ^ **Exercise precautions**
 - ◆ some patients do not benefit; e.g., spinal/bulbar muscular atrophy
 - ◆ avoid IMT in patients with hypercapnea

Outcome assessment

- ^ **Components**
 - ◆ Clinical
 - ◆ Behavioral
 - ◆ Health
 - ◆ Service

Outcome assessment

^ Clinical component

- ◆ overall management
 - BODE index
 - ADL assessment
- ◆ exercise testing and training
 - maximal & submaximal exercise test
 - heart rate
 - SpO2

Outcome assessment

^ Clinical component

- ◆ strength & flexibility training
- ◆ nutrition & weight management
 - body mass index
 - nutritional biochemical markers
- ◆ psychosocial management
 - mood
 - cognitive function
- ◆ smoking cessation

Outcome assessment

^ BODE index for survival prediction

Prognosis:

To predict COPD mortality : BODE Index

Variable	Points on BODE Index			
	0	1	2	3
FEV1 (% predicted)	≥65	50-64	36-49	≤35
6-Minute Walk Test (meters)	≥350	250-349	150-249	≤149
MMRC Dyspnea Scale	0-1	2	3	4
Body Mass Index	>21	≤21		

Outcome assessment

^ Behavioral component

- ◆ overall management
 - knowledge and self-care actions
 - medication adherence
 - supplemental O2 adherence
- ◆ exercise testing & training
 - exercise compliance
 - energy expenditure

Outcome assessment

^ BODE index for survival prediction

^ Approximate 4-year survival rates based on the BODE index point system above is as follows:

- ◆ 0-2 points: 80%
- ◆ 3-4 points: 67%
- ◆ 5-6 points: 57%
- ◆ 7-10 points: 18%

Outcome assessment

^ Behavioral component

- ◆ breathing retraining - effectiveness
- ◆ bronchial hygiene - mucus clearance
- ◆ nutrition & weight management
 - diet & exercise adherence
 - physical activity logs

Outcome assessment

- ^ Behavioral component
 - ◆ breathing retraining - effectiveness
 - ◆ bronchial hygiene - mucus clearance
 - ◆ nutrition & weight management
 - diet & exercise adherence
 - physical activity logs
 - ◆ psychosocial management
 - coping mechanisms
 - social support network
 - ◆ smoking cessation - stage of change

Patient adherence

- ^ Reasons for non-adherence
 - ◆ forgetting
 - ◆ inadequate communications from physicians/other caregivers
 - ◆ medication side effects
 - ◆ perception that interventions do not work
 - ◆ cost of medications
 - ◆ inconvenience

Outcome assessment

- ^ Health component
 - ◆ healthcare utilization
 - ◆ adverse events during sessions
 - ◆ HRQoL
- ^ Service component
 - ◆ patient satisfaction
 - ◆ performance measures
 - cost per patient
 - program cost
 - completion rate

Patient adherence

- ^ Measures to improve adherence
 - ◆ reminders - telephone, e-mail
 - ◆ enhanced physician communications
 - ◆ set realistic goals for exercise
 - ◆ establish rewards for desirable behaviors
 - ◆ focus on positive outcomes
 - ◆ telemonitoring - there's an 'app'

Patient adherence

- ^ Extent of problem
 - ◆ 50% of all patients adhere to treatment recommendations
 - ◆ 37% of patients with lung disease adhere to treatments
- ^ Components of problem
 - ◆ medications
 - ◆ oxygen therapy
 - ◆ exercise
 - ◆ NPPV

Ethical & end-of-life issues

- ^ After acute exacerbations of COPD
 - ◆ median survival = 2 years
 - ◆ readmission within 6 mo. = 50%
- ^ Pulmonary rehabilitation patients are receptive to end-of-life planning, assisted by rehabilitation educators

Ethical & end-of-life issues

- ^ Patients want information; e.g.:
 - ◆ nature of disease process
 - ◆ role and limitations of treatments
 - ◆ prognosis for survival and QoL
 - ◆ planning for future care, including exacerbations

Social & recreational support

- ^ Support for BBC
 - ◆ home care, durable medical equipment (DME) companies
 - ◆ American Lung Association
 - ◆ hospital - social services department
- ^ Location for meetings
 - ◆ must be accessible
 - ◆ must accommodate special needs

Ethical & end-of-life issues

- ^ Discussions on advance planning
 - ◆ are improved by ambulatory setting
 - ◆ are improved by skilled communicators
 - ◆ should incorporate a team-based approach (including lawyer)

Social & recreational support

- ^ Publicity for meetings, especially the first one, is necessary
- ^ Monthly meeting days/times - midweek, midday
- ^ Meetings provide:
 - ◆ name tags & introductions
 - ◆ speakers - stimulating
 - ◆ beverages, snacks

Social & recreational support

- ^ Purposes:
 - ◆ decrease anxiety
 - ◆ decrease loneliness, sense of isolation
 - ◆ improve self-image
 - ◆ extend benefits of PR program
- ^ Patient support group; e.g., Better Breathers Club is an instrumental medium.

Social & recreational support

- ^ Organization - patient board of directors
- ^ Funding
 - ◆ no dues
 - ◆ fundraising activities
- ^ Social events - aim for fun:
 - ◆ birthdays
 - ◆ holidays
 - ◆ picnics
 - ◆ group trips

Social & recreational support

- ▲ Encourage wellness & physical activities during, or as the events, e.g.:
 - ◆ walks
 - ◆ swimming outings
 - ◆ dancing
 - ◆ aerobics
 - ◆ cooking classes
- ▲ Encourage social networking; e.g., Facebook, etc.

Summary & Review

- ▲ Respiratory muscle training
 - ◆ conditions that benefit - selected COPD patients
 - ◆ strength & endurance
 - ◆ exercise prescription
 - ◆ exercise techniques
 - ◆ exercise devices
 - ◆ measured outcomes

Summary & Review

- ▲ Pharmacotherapy - lesser frequency gets greater adherence
 - ◆ immunizations
 - ◆ bronchodilators
 - ◆ corticosteroids
 - ◆ combined medications
 - ◆ mucolytics

Summary & Review

- ▲ General exercise training
 - ◆ rationale - reverse effects of inactivity
 - ◆ benefits - increased exercise capacity
 - ◆ regimens - aerobics, strength training
 - ◆ exercises - legs and upper extremities
 - ◆ prescription
 - ◆ implementation
 - ◆ adjuncts - NPPV, O₂, heliox, NMES

Summary & Review

- ▲ Oxygen therapy
 - ◆ indications
 - ◆ benefits of LTOT - prolonged survival & increased exercise endurance
 - ◆ physiologic criteria
 - ◆ prescription
 - ◆ home O₂ systems & devices - competency-based education
 - ◆ travel with O₂

Summary & Review

- ▲ PR for non-COPD
 - ◆ conditions that may benefit
 - ◆ goals - same as for COPD
 - ◆ program content - specific for disease and patient
 - ◆ programs for:
 - ▶ asthma
 - ▶ cystic fibrosis
 - ▶ restrictive lung diseases
 - ▶ neuromuscular diseases

Summary & Review

^ Special issues

- ◆ outcome assessment - matrix
- ◆ patient adherence, including improvement methods.
- ◆ ethical and end-of-life issues - advance planning
- ◆ social & recreational support - better breathers

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