Exercise Prescription

Heart Failure
Chronic Obstructive Pulmonary Disease
Peripheral Artery Disease

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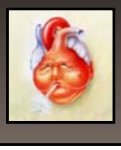
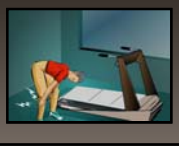
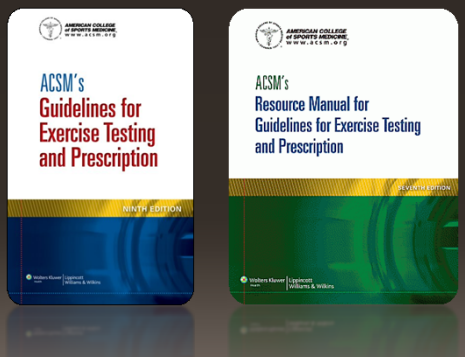
Goals

- Understand basic pathophysiology
  - Rationale for exercise prescription for patients with
    - Heart Failure (HF)
    - Chronic Obstructive Pulmonary Disease (COPD)
    - Peripheral Artery Disease (PAD)





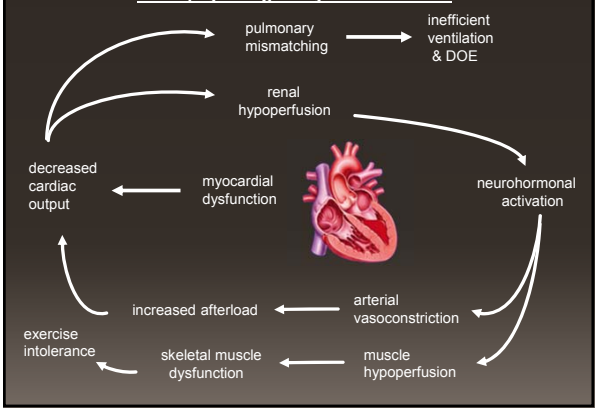


HF Exercise R_x

Heart Failure

- Inability of the heart to pump enough blood to the body's organs to satisfy metabolic needs

Pathophysiologic "Syndrome" of HF



HF: Benefits of Exercise

Central Adaptations

- Peak cardiac output ↑↔
- Resting heart rate ↓↔
- Peak heart rate ↑↔
- Resting ejection fraction ↑↔

Peripheral Adaptations

- SNS at rest & exercise ↓
- Circulating cytokines ↓
- Endothelial function ↑
- Skeletal Muscle Function
  - Capillary density ↑↔
  - Strength ↑↑
  - Endurance ↑↑
  - Oxidative enzyme activity ↑↑

HF: Exercise R_x

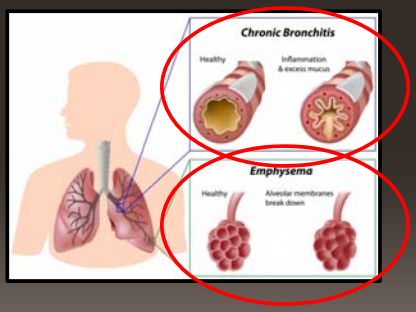
- **Frequency:** 3 d/wk, but preferably on most days of the week
- **Intensity:**
  - 40-80% of exercise capacity based on HRR, VO_2R, or VO_2peak
  - RPE 11-16 on a scale of 6-20
- **Time:**
  - 5-10 min warm-up/cool-down activities including static stretching, and light intensity aerobic activities
  - Goal is 20-60 min/session
  - Increase time by 1-5 min per session
- **Type:** large muscle group activities with an emphasis on increased caloric expenditure

HF: Special Considerations

- Most HF patients are prescribed HR altering medications (β-blockers)
  - RPE and HR responses
- Diuretic therapy is also common
  - Patient's may become volume depleted, have hypokalemia, or demonstrate orthostatic hypotension particularly after bouts of exercise
  - For these patients, the BP response to exercise, symptoms of dizziness or light-headedness, and arrhythmias should be monitored while providing education regarding proper hydration

COPD: Exercise R_x

COPD



COPD: Exercise Benefits

- Occur mainly through adaptations in the musculoskeletal and cardiovascular systems that in turn reduce stress on the pulmonary system during exercise

COPD Exercise R_x

- **Frequency:** at least 2-3 d/wk
- **Intensity:**
  - 60% VO_2peak determined from exercise testing
  - 80% of maximal walking speed determined from the 6 min walk test
- **Time:** at least 20-30 min/d
- **Type:** aerobic activities using large muscle groups such as walking and/or cycling.
- **Progression:** After the first month, if the Ex R_x is well tolerated, greater health/fitness benefits may be gained by increasing the intensity to ~70% VO_2peak, the time of each exercise session to 40min/d, and frequency to 5 d/wk

Supplemental Oxygen

- Indicated for patients with P_aO_2 ≤55 mm Hg or a $\%S_aO_2$ ≤88% while breathing room air at rest and/or exercise

Physician Order for Outpatient Pulmonary Rehab Phase II/III

O_2 Prescription

O_2L @ rest: _____ O_2L @ exercise: _____

Keep Oxygen Saturation level ≥ _____%

✓ May wean the patient off their oxygen

Keep Oxygen Saturation level ≥ _____%

Special Considerations

- Use of short-acting bronchodilators may be necessary before or after exercise to prevent or treat exercise-induced bronchoconstriction
- Individuals on prolonged treatment with oral corticosteroids may experience peripheral muscle wasting and may benefit from strength training
- Exercise in cold environments or those with airborne allergens or pollutants should be limited to avoid triggering bronchoconstriction in susceptible individuals.

Inspiratory Muscle Training

- Frequency: A minimum of 4-5 d/wk
- Intensity: 30% of maximal inspiratory pressure measured at functional residual capacity
- Time: 30 min/d or 2, 15 min sessions/d

PAD Exercise R_x

Peripheral Artery Disease (PAD)

- Series of disorder in which blood flow through non-coronary arterial beds is impaired
- Most commonly affects the femoral, popliteal, tibial, iliac, abdominal aorta, renal, and mesenteric arteries

PAD: Benefits of Exercise

- Increases peripheral blood flow via collateral circulation, reduced blood viscosity, and/or regression of disease
  - Decreases amount of muscle ischemia during exercise
- Improvements in
  - Peak exercise capacity
  - Walking efficiency
  - Claudication time and severity

PAD: Claudication Pain

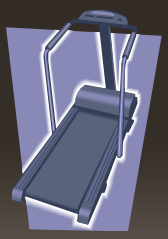
- Grade 0: No pain
- Grade 1: Definite discomfort or pain, but only of initial or modest levels
- Grade 2: Intense pain from which the patient's attention can be diverted
- Grade 3: Intense pain from which the patient's attention cannot be diverted
- Grade 4: Excruciating and unbearable pain

Exercise Testing

- Determine symptom limited functional capacity
- 2 indicators of functional capacity are used:
  - Time or distance to onset of claudication pain (initial claudication distance)
  - Time or distance to maximal claudication pain requiring test termination (absolute claudication distance)
- These indicators help
  - Determine exercise prescription
  - Assess efficacy of treatment
  - Progression of disease

Exercise Testing

- Graded Protocol
  - Fixed speed 2 mph
  - Every 2 min 2% grade ↑or
  - Every 3 min 3.5% grade ↑



PAD Exercise R_x

- **Frequency:** weight bearing aerobic exercise 3-5 d/wk
- **Intensity:** Moderate intensity that allows the patient to walk until he or she reaches a pain score of 3 (i.e., intense pain). Between bouts individuals should allow ischemic pain to subside before resuming exercise
- **Time:** Intermittent bouts of 10 min. Accumulate a total of 30-60 min/day. Some patients may only be able to accumulate 15 min/day, gradually increasing time by 5 min/day biweekly
- **Type:** walking, arm and leg ergometery. Cycling may be used as a warm-up but should not be the primary type of activity.

Special Considerations

- The optimal work to rest ratio has not been determined for individuals with PAD. This may need to be adjusted for each patient
- A cold environment may aggravate the symptoms of intermittent claudication; therefore, a longer warm-up may be necessary
- Encourage patients to STOP SMOKING if they are current smokers
- For optimal benefit, patients should participate in a supervised exercise program for a minimum of 6 months
  - These programs have demonstrated improvements in pain free walking of 106-177% and 64-85% in absolute walking ability.

Resistance Exercise

Closing Thoughts

- Motivating patients to exercise
  - Educate patient about respective disease
  - Communicate expected symptoms from exercise
  - Goal setting
  - Provide updates on progress (i.e., symptoms, walking distance, exercise time, fatigue scale)

Thank You