Implications for Interval Training in Patients with COPD

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Learning Objectives

• Review physiology of COPD
• Review basic concepts of interval training
• Discuss evidence supporting use of interval training for patients with COPD
• Discuss specific interval training protocols that can be utilized for patients with COPD
COPD Physiology

- Chronic inflammation of lungs
- Results in narrowing of small airways
- Decreases lung recoil
- Reduced ability for airways to remain open during expiration
- Air trapping, hyperinflation, and progressive airflow limitations
- Struggle with expiration\(^1\)
Risk Factors

• Cigarette smoking
• Exposure to air pollution
• Exposure to dusts and chemicals\textsuperscript{1}
Clinical Presentation

• Chronic coughing
• Dyspnea
• Barrel chest appearance
• May utilize tripod position or pursed lip breathing
• Struggle getting air out\(^1\)
Diagnostic Testing

- Auscultation reveals prolonged expiratory phase and may include wheezing and rhonchi
- Lowered FVC and FEV1
- FEV1/FVC less than .7
- Decreased PaO$_2$ and SpO$_2$
Pharmacological Management

- Corticosteroids
- Bronchodilators (SABA/LABA)
- Mast cell stabilizers
- Combination Therapies (LABA & Corticosteroid)
Interval Training

- Allows high power outputs from peripheral muscles without overloading cardiorespiratory capacity.
- We get the benefits of higher intensity exercise with a more stable pattern of cardiorespiratory response.
- Patients with COPD can endure longer training bouts with less symptoms\(^3\)
Beauchamp et al. 2010

• Systematic review of 8 RCT’s and 388 patients (mean 67 y/o) comparing interval and continuous training
• Inclusion criteria: clinical diagnosis or FEV1/FVS<80% predicted
• Avg Protocol: 20-45 minutes at 50-80% max intensity with varying bouts of on/off time
• Outcome measures: constant power test, 6/12MWT, CRQ, HAD, and other physiological measures
• Interval training was found to be equally as effective as continuous training for all outcome measures
Kortianou et al. 2010

- Literature review of 68 studies examining effectiveness of interval training in patients with COPD
- Protocol: 3-4 x week, 30 seconds on/off ranging from 20-90 minute sessions
- Examined dypsnea, leg pain, and tolerance to exercise intensity and duration
- Can nearly triple total exercise duration with fewer symptoms, promoting better compliance
Guadalupe-Grau et al. 2017

- RCT examining the short and long term effects of HIIT on 9 patients with COPD (mean 84 y/o)
- Exclusion criteria: dementia, smoking, non-medically controlled HTN, stroke in last 6 months, <80 y/o
- Protocol: Two 45 minute sessions per week for 9 weeks
- Outcome measures: BP, RHR, FVC, FEV$_1$/FVC, 6MWT, 30m walking speed, leg/chest press 1RM
- Results: significant improvements in everything but BP and RHR$^4$
Rodriguez et al. 2016

- Non randomized prospective trial comparing CVD effects of HIIT and continuous training with 29 patients with COPD (avg 68 y/o)
- Inclusion criteria: COPD with no oral steroid use or rehab protocol within 12 months of study
- Protocol: Three 1 hour sessions per week for 8 weeks
- Outcome Measures: chronotropic response/HR recovery, VO$_2$ peak, Wpeak, Borg measures
- Results: HIIT and continuous training significantly improved CR and HR recovery in patients with autonomic dysfunction.
Protocols to Use in the Clinic

• Advised by Kortianou et al.
• Initially three 15-20 minute sessions per week
  30 second exercise/30 second rest at 80% peak capacity
• Progress to 30-90 minute sessions and increase exercise intensity by 5-10% peak capacity
• Reach intensities up to 150% of baseline max work load as long as patients rate perceived dypsnea as moderate on modified Borg scale
• Modification:
  - 20/40 second exercise-rest interval
  - Use 10 point Borg scale to describe intensity
  - Leg discomfort: 5-6 Borg
  - Dypsnea: 3-4
Clinical Pearls

• Suggest pursed-lip breathing during rest periods to increase TV and reduce RR
• Monitor patient response early and educate on target workload
• Teach patients to perform taxing ADL’s (stairs/uphill walking) at interval mode consisting of short bouts of activity lasting such as 15/15 rest to exercise
• Give written instructions to patients for practice at home
In Conclusion... The take home message

• Interval training is a promising rehab approach for the most severely impaired patients with greater dyspnea sensations, dynamic hyperinflation, atrial hypoxemia, and lower exercise capacity.

• Allows for better tolerance to exercise and increased compliance with physical therapy programs.
References


