Exercise Progression for the Cardiac, Pulmonary & PAD Patient

Thomas P. Mahady MS CSCS CCRP
Hackensack University Medical Center
Hackensack Meridian Health
Learning Objectives

• The Art of Exercise Prescription.
• Benefits of Exercise
• The “Goal” of prescribing exercise.
• Review of the FITT-VP principle.
• Progression of exercise for the cardiac patient.
• Progression of exercise for the pulmonary patient.
• Progression of exercise for the PAD patient.
• Resistance Training Progression
• Self Directed exercise and progression.
• Conclusion
• Question & Answer
The “Art’ of the Exercise Prescription” is the successful integration of exercise science with behavioral techniques that result in long-term exercise program compliance and the attainment of the individual’s goals.
The Exercise Prescription (ExRx) requires the constant modification of the FITT-VP variables in accordance with the observed individual responses & adaptations of the patient.
Benefits of Exercise

Increasing physical activity is recognized as a desirable lifestyle modification for improving cardiovascular health.

Exercise may reduce atherosclerotic risk factors:

- hypertension
- hyperlipidemia
- hyperglycemia
- obesity
Benefits of Exercise

Other benefits may also include:
- Improved ischemic tolerance
- Improved endothelial function
- Slower disease progression
- A reduction in total mortality (20%) & cardiac mortality (26%)
- A decrease in depression symptoms
- Increase in long-term independence
- Increase in quality of life
The Goals of the Exercise Prescription

Improved cardiac performance at rest and during exercise

- Improved exercise capacity (aerobic, muscular strength)
- Improved activities of daily living (work)
- Angina-free exercise tolerance
- Improved muscular adaptations
Basic Principles of the Exercise Prescription

- **Specificity of training**
  - Physiologic adaptations are specific to the stimulus (exercises performed)
  - Progressive overload (chronic adaptations)

- **De-training**
  - Prevention of the loss of previously acquired exercise training adaptations because of inactivity
The primary effect of aerobic exercise training is to increase maximal exercise capacity or VO$_2$max by increasing maximal SV and maximal A-V O$_2$ Δ.

The magnitude of the increase depends on multiple factors:
- age
- prior level of conditioning
- characteristics of the training regimen
- genetic factors.
Recommendations for Exercise Prescription

It is recommended that the exercise prescription be tailored to each individual. This includes:

- the patient’s physical condition
- personal health needs
- personal interests (golf, hiking)
- personal goals (weight loss, glycemic control)
- familial and social needs
- occupational needs
Components of the Exercise Prescription

- The FITT-VP
  - Frequency
  - Intensity
  - Time
  - Type
  - Volume
  - Progression
Components of the Exercise Prescription

Frequency of Exercise

Exercise frequency is usually 3 times per week and advanced over time to 5-7 times per week. Frequency is highly dependent on a patient's condition.

- Fitness/ Tolerance
- Commitment
- Diabetes

Cardiopulmonary fitness may be maintained with as little as 2 sessions per week.
Components of the Exercise Prescription

Intensity of Exercise

Intensity is the relative vigor of the activity:

- VO$_2$, heart rate, caloric expenditure, watts, or resistance
- MET Values
- Rating of Perceived Exertion
  (e.g., 11-14 on Borg 6-20 scale)
Components of the Exercise Prescription

Time or Duration

The time participating in physical activity.

- Goal: 20 to 60 min of activity per day
- Time accumulation may be continuous or intermittent
- The duration of a training session is often influenced by the exercise intensity.
- Longer the exercise durations demand lower exercise intensities.
Components of the Exercise Prescription

Type or Mode of Exercise

- walking, biking
- Resistance training (fixed equipment, bands)
- Modes of equipment available.
Components of the Exercise Prescription

**Volume of Exercise**

- Volume is the product of frequency, intensity and time.
- The volume of exercise or PA is directly correlated with the magnitude of the health & fitness benefits.
- Computing the volume of activity allows one to quantify the **total load** placed on the body from all stimuli.
- Volume of exercise is an integral component in the acute & chronic cardiopulmonary adaptations of the patient.
Components of the Exercise Prescription

Volume of Exercise

MET-min/week is a great quantifier of a person’s total volume of exercise.

500 to 1000 MET-min/week is associated with lower rates of CVD and mortality.
Components of the Exercise Prescription

Volume of Exercise

A person walking on the treadmill at 3.0 mph (3.3 METS) for 20 min. 3X/ week would be accumulating 198 MET-min/ week.

3.3 METS x 20 x 3 = 198 MET-min/ week
Components of the Exercise Prescription

Progression (Rate of Progression (ROP)) for the Cardiac Rehabilitation Patient

- Is one of the more artful aspects of the exercise prescription (intensity of exercise is the only other more important aspect of exercise prescription).

- ROP is dependent on the individual’s health status, present fitness, adaptation, adherence and goals.
Components of the Exercise Prescription
The Rate of Progression

ROP

- The initial phase of training should emphasize “starting low & going slow”.
- A conservative initial phase of training reduces risks associated with cardiovascular & structural complications.
- Allows the patient to adopt & adhere to the program.
The Rate of Progression

**Initial Prescription**

- Light to moderate intensity.
  - RPE of 9 to 11
  - 2 to 3 METS (Light activity)
  - 3 to 5.9 METS (Moderate activity)
  - 55 to 70% of HRmax (if available)
  - 10 to 30 minutes of activity as tolerated.
The Rate of Progression

Initial Progression

Focus on increasing the duration of the activity as part of the initial progression.

General Guidelines: 5-10 minutes every 1 to 2 weeks for the first 4 to 6 weeks as tolerated.
The Rate of Progression

ROP Guidelines:

Following the initial phase of progression, exercise intensities may be increased:

- Continue to titrate durations (30-60min.)
- Increase the RPE 11-14 up to an RPE of 16
- Increase exercise intensity of .5 to 1.0 METS/ week
- An increase of 5-10% MET-min./ week
- Frequency, intensity, or duration should not increase by more than 10% each week.
The Rate of Progression

Guidelines for the patient with Peripheral Artery Disease

The FITT-VP principles of exercise training also apply to the patient with PAD.

While walking interval type training elicits an improvement in walking distance & symptoms, optimal work/rest ratios have not been determined and are highly individualized and self-directed.

Encourage the PAD patient to work up to 15 min. of total activity with suggested progressions of 5 min./day bi-weekly.
The Rate of Progression

Guidelines for the pulmonary patient with Chronic Obstructive Pulmonary Disease

The FITT-VP principles of exercise training may also apply to the patient with COPD.

There does not exist any evidence based guidelines for the specific application of the FITT-VP principle for the COPD patient.

Resistance training is the most potent intervention for the COPD patient considering the muscle dysfunction associated with the disease.
The Rate of Progression

Guidelines for the pulmonary patient with Chronic Obstructive Pulmonary Disease

Aerobic training: higher intensity aerobic activities of short duration seem to yield the greatest benefit.

Intensity guidelines are similar to those of older adults and the cardiac rehabilitation patient.

Thus, a rehabilitation program that increases the ability to perform physical activity with a lessened sensation of dyspnea is a primary goal in the rehabilitation of the COPD patient.
Benefits of Resistance Training

- Improved muscular strength and power
- Improved muscular endurance
- Improved flexibility
- Improved body composition
- Reduced risk of falling
- Reduced effort for ADL
- Reduced skeletal muscle fatigue
- Improved bone mineral density and content
- Improved glucose tolerance
FITT Principle for Muscular Strength or Endurance

F = frequency of exercise (1-3 d/wk)(non-consecutive days)
I = 60% to 80% of 1RM
T = one to three sets of 8-12 repetitions per set
T = Free weights, Bungy cords, fixed equipment, body weight

Volume = resistance (LBS.) x repetitions x sets
Progression = Relative load increases of 2.5% to 10%
The Rate of Progression

Resistance Training Guidelines

- RPE 11 to 14
- Initial resistance should allow 12 to 15 repetitions
- 60% to 80% of the one-repetition maximum
- 8 to 10 different exercises
- Two or three sessions per week
The Rate of Progression

2-for-2 rule:

A conservative method that can be used to training loads.

If the patient can perform two or more repetitions over his or her assigned repetition goal in the last set in two consecutive workouts for a given exercise, weight should be added to that exercise for the next training session.
Take Away Message

The incidence of major cardiovascular complications during outpatient cardiac exercise programs, among a mixed group of patients after percutaneous coronary intervention (PCI) or cardiac surgery, or those with other coronary and non-coronary conditions, has been estimated to be one in 50,000 participant-hours.

While the safety of the patient is of paramount importance, so is the maximization of their training.

The benefits far outweigh the risks!
Thank You!

Any Questions!


References


