Subject: Assessment of Functional Capacity
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The Dr. Dean Ornish Program for Reversing Heart Disease has historically required a maximal exercise stress test for both coronary heart disease (CHD) and risk factor modification populations upon Program entry for the primary purposes of diagnostic value, safe patient management, and exercise prescription. A post-program maximal exercise stress test is recommended to measure change in functional capacity for health outcomes data analysis.

Although the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) recommends the use of an exercise pretest and posttest for the analysis of outcomes, insurance carriers do not reliably cover graded exercise stress tests performed to guide exercise prescription. Referring physicians are hesitant to order serial exercise testing (pre/post intervention) because of inconsistent insurance reimbursement. And physician coverage in regard to patient safety has also made standardized and serial testing more difficult in the cardiac rehabilitation setting.(1-2)

Literature review

Decades of exercise testing for the diagnostic and prognostic evaluation of patients with known or suspected CHD has provided a large body of data on the usefulness of functional capacity assessment in this population.(3-4) A standard exercise test is considered the initial diagnostic evaluation of choice for the evaluation of disease severity in people who have established disease to assess residual inducible ischemia, threatening ventricular arrhythmias and for prognosis.(5)

Careful evaluation of the patient’s medical status and symptom-limited exercise testing prior to participation in a cardiac rehabilitation Program is essential for baseline assessment of functional capacity, risk stratification of patients with and without known cardiovascular disease (CVD), and to design a safe and effective exercise prescription.(1,3-4,6) Re-evaluation is recommended if symptoms or changes in clinical condition warrant.(1) Serial testing may be useful in revising the exercise and activity prescription, evaluating medical therapy and/or improvement in functional capacity over time, and for providing patient feedback for educational and motivational purposes.(1,3,5-7) Obtaining consistent data for comparison is fundamental.(1) Testing parameters should include assessment of heart rate and rhythm, symptoms, ST-segment changes, hemodynamics, perceived exertion, and exercise capacity.(1,4)

Exercise is associated with an increased risk of a cardiovascular event. The risk of an adverse event for people with CAD during exercise is 60-100 times greater.
than during usual activity – and higher in post MI patients or patients with malignant arrhythmias. However, safety of exercise testing is well documented and overall risk is low.(1)

Although exercise training is safe and effective for cardiac patients, all patients should be stratified for the risk of occurrence of cardiovascular events during exercise training.(5) The two key elements of preventing exercise-induced complications are appropriate screening and risk stratifying patients before they begin an exercise program.(1) Moreover, risk stratification is an additional clinical tool to help determine an appropriate level of medical supervision.(5) Guidelines have been provided for determining when a medical evaluation and diagnostic exercise test are appropriate, and when physician supervision is recommended. (1,5,8-9)

A frequent consideration in the assessment of functional capacity is whether to perform maximal or submaximal testing. Where maximal testing provides the only accurate determination of aerobic capacity and cardiovascular stability, submaximal testing may be more appropriate in situations such as fitness assessments, or when a physician is physically absent from the premises. Submaximal testing usually relies on a formula of the work rate achieved at a given submaximal heart rate relative to an age-predicted maximal heart rate to estimate maximal aerobic capacity.(3) Submaximal tests can be useful for making activity recommendations, adjusting the medical regime, identifying the need for further testing or interventions, and may be useful for risk stratifying patients.(5)

Submaximal assessments may be done with telemetry during a regular exercise session using modest increases in treadmill or cycle ergometry in patients who are stable and who have been participating regularly in a supervised exercise program. The submaximal evaluation is a useful alternative to maximal testing when assessing HR and BP response to graded exercise (i.e., when medications have been changed). If symptoms or abnormalities were present during previous exercise testing or training, the submaximal test should be terminated below the point at which the symptoms/abnormalities were observed. This submaximal evaluation may be supervised only by staff designated by the medical director in patients actively enrolled in the supervised exercise Program.(1)

Limitations associated with estimating MET levels have been described. The estimate is less accurate when patients with cardiovascular or pulmonary disease are tested, is more accurate when more gradual protocols are used, and overestimated when the patient is allowed to hold onto the handrails.(3)

The selection of an appropriate exercise test protocol for assessing functional capacity is important when aerobic capacity is estimated.(3) The purpose, desired outcomes and characteristics of the individual being tested are considered when choosing a protocol. Exercise protocols are selected according
to estimated functional capacity based on age, physical fitness, and underlying
disease. (1,5) Because exercise test protocols with large stage-to-stage
increments generally have a weaker relationship between measured aerobic
capacity and work rate, testing protocols with only modest increases in treadmill
elevation at a constant speed are recommended (such as Balke-Ware, and
Naughton). Also, functional capacity can be accurately determined with the use
of a protocol in which small increments in work rate occur at intervals of 10 to 60
seconds (e.g., the exercise tolerance test or ETT, a protocol using a 10-minute
test with 1-minute stages; Simms et al). The chosen protocol should be tailored
to the patient to produce a fatigue-limited exercise duration of 8 to 12 minutes.(3)
Generally, protocols with larger increments (Ellestad, Bruce) are better suited for
screening younger or more physically active people. Whereas, Naughton or
Balke-Ware are preferable for the older or deconditioned, and patients with
chronic disease. (1,5)

Alternative field tests, such as the 6-minute walk test, can be done both before
and after cardiac rehabilitation without insurance coverage or requiring the
presence of a physician. But it only measures distance walked in 6 minutes
rather than physiological parameters used as indicators of aerobic capacity for
exercise prescription. (2) At this time, timed-walk tests should not be considered
an equivalent substitute for treadmill/ergometry exercise testing. (3)

Although the event rate is relatively low regardless of the patient population
studied, complications resulting from exercise testing occur. Therefore, the Dr.
Dean Ornish Program for Reversing Heart Disease requires that exercise test
supervisory personnel are familiar with the clinical guidelines for exercise testing
outlined in detail by the ACSM and AACVPR, the indications for the use of such
testing, and the signs and symptoms of and clinical responses to adverse events
to minimize patient risk. (3) Sites are expected to perform exercise staff
competencies and quality initiatives for cardiac rehabilitation that meet State
regulatory compliance and accreditation standards.

Patient safety during exercise is created by:

1. Matching clinical status and medical status with contraindications to
   exercise
2. Following ACSM/AACVPR/AHA risk stratification guidelines
3. Maintenance and calibration of exercise equipment
4. Maintenance of emergency equipment
5. The establishment of an emergency plan
6. Regular practice of the emergency plan
7. ACLS certification of supervising staff
8. Evidence of appropriate training and credentials (1)
Summary

1. All participants in the Dr. Dean Ornish Program for Reversing Heart Disease must be risk stratified according to ACSM, AACVPR and AHA guidelines for determining the need for medical referral and diagnostic testing, exercise testing protocol for evaluating functional capacity, and when physician supervision and cardiac event monitoring are required.

2. Submaximal testing should not be used to evaluate new symptoms, or to evaluate suspicious findings in a patient’s current medical history.

3. Even though exercise testing may not be recommended for low risk individuals interested in participating for prevention purposes, a submaximal exercise test may be useful for designing a safe and effective exercise prescription.

4. Because no set of guidelines for exercise testing, prescription and participation covers all situations that arise, the Medical Director of each site will provide supervision and oversight in these matters.
References