



Nursing and Exercise Physiologist Guidelines for Cardiopulmonary Exercise (CPX) Testing #7

Title: CPX Testing Process for the Cardiovascular Rehabilitation (CR) Program

Responsibility: Cardiovascular Rehabilitation Personnel

Purpose of Guidelines: To ensure proper administration of cardiopulmonary exercise testing for Cardiovascular Rehabilitation patients and outside referrals.

Procedure:

- I. Patients admitted into the UTMC Cardiovascular Rehab program with an order from a physician responsible for their care will also have an order for a CPX test (Appendix A). Outside referrals must have an order with an appropriate diagnosis for CPX testing.
 - A. Prior to testing, staff will review patient's chart to determine any contraindications to exercise testing
 1. See Policy #3364-162-02 Contraindications and Test End Criteria for Cardiopulmonary Exercise Testing for Absolute and Relative Contraindications to Exercise Testing.
 2. The referring physician will be called for any patient that has contraindications to exercise testing.
 - B. Patient Instruction
 1. Patients will be instructed not to smoke, eat, or drink coffee or other beverages containing caffeine for at least two hours prior to the test.
 2. Patients will be instructed to take their medications as prescribed on the day of the test.
 - (a) If a patient does not take medications as prescribed on the day of the test, staff may attempt to reach the referring physician before proceeding with the test.

- (b) If a physician cannot be reached, it will be at the staff's discretion to proceed with the test or not, depending on patient's history and medications. Cardiology fellow may be consulted.

C. Preparing for a CPX test

1. Ensure that the room is clean.
2. Calibrate the CPX machine.
 - (a) The first test of each day requires manual calibration of the prevent flow sensor with a 3 liter syringe.
 - (b) A gas calibration must be done before each subsequent test.
 - (c) If machine will not calibrate, troubleshoot, call UTMC Biomed at 4899, or call MGC Diagnostics Tech Support.
3. Confirm name and date of birth with patient before starting CPX test.

D. Administration of a CPX test

1. Pulmonary Function Testing
 - (a) Patient will perform a series of 3 pulmonary function tests
 - (b) Staff will explain each test clearly to patient and monitor patient for any signs/symptoms of intolerance during testing.
2. 12 lead ECG Prep
 - (a) Identify anatomical landmarks for electrode placement.
 - i. The limb leads are positioned over the right and left infraclavicular region for the arm leads and over the right and left lower quadrants of the abdomen for the leg leads.
 - ii. V1 is placed in the fourth intercostal space just to the right of the sternal border.
 - iii. V2 is placed in the fourth intercostal space just to the left of the sternal border.
 - iv. V3 is placed at the midpoint of a straight line between V2 and V4.
 - v. V4 is placed on the midclavicular line in the fifth intercostal space.
 - vi. V5 is placed on the anterior axillary line and on a horizontal plane through V4.
 - vii. V6 is placed on the midaxillary line and on a horizontal plane through V4 and V5.
 - (b) Shave any hair in the areas that electrodes will be placed.

- (c) Clean area with alcohol wipes.
- (d) Use ECG prep tape to abrade the skin and then place electrodes, checking again for anatomical landmarks.
- (e) Pt. will lie down for 1-2 minutes to obtain resting 12 lead ECG. Staff will evaluate ECG and if there are any concerns will contact the cardiologist in charge of reading ECGs for the day and/or cardiology fellow.
- (f) Staff will take patient's resting supine blood pressure.

3. Exercise Protocol

- (a) Before proceeding with the exercise portion of a CPX test, staff will confirm that a physician, cardiology fellow, or nurse practitioner is available in the area in case of emergency.
- (b) Staff will explain protocol thoroughly to patient and give the opportunity for questions.
- (c) Patient will breathe through a small mouthpiece and nose clip or a face mask to measure their breathing during exercise. Before starting the test, the patient will sit for 2 minutes breathing normally to collect baseline information.
- (d) Patient will exercise on a treadmill or stationary bike. Staff will choose a comfortable speed on the treadmill for patient to walk at or a comfortable revolutions per minute (RPM) on the stationary bike. The difficulty will increase every 2 minutes throughout the test either by increasing the level of incline on the treadmill or the tension on the bike. Goal for the test is to last between 6 and 12 minutes or until end points are met.
 - i. End points can include: VO₂ plateau or respiratory exchange ratio criteria is met, ECG changes, patient symptoms, and equipment failure.
 - ii. Patient may request to stop the test at any time.
- (e) Staff will check patient's BP at 2 minute intervals throughout the test.
- (f) Staff will check patient's SpO₂ at 2 minutes intervals throughout the test if ordered by the physician or if staff determine that it is necessary.
- (g) Staff will monitor patient closely for signs/symptoms of exercise intolerance.
 - i. Staff will refer to policy #3364-162-02 Contraindications and Test End Criteria for Cardiopulmonary Exercise Testing.
 - ii. Staff will consult with the physician, cardiology fellow, or nurse practitioner if patient has signs/symptoms of exercise intolerance that are not resolved with rest.
 - iii. If necessary, staff will transport patient to the UTMC Emergency Department.

- iv. In the event of cardiopulmonary arrest, staff will call a Code Blue, UTMC Policy # 3364-100-45-06

4. Cool Down

- (a) After exercise protocol, patient will remain in the area for 8-10 minutes.
- (b) Staff will check patient's blood pressure every 2 minutes to ensure that it returns to pre-exercise level.
- (c) Staff will continue to evaluate patient's ECG and any symptoms during this time.
- (d) If patient feels well and ECG and BP are within normal limits after 8 to 10 minutes, patient will be discharged from the department.

References:

American College of Sports Medicine; ACSM's Guidelines for Exercise Testing and Prescription; Eleventh Edition; 2021.

Reviewed by: Angela Petree, B.S., ACSM-CEP

Initiated: 5/2019

Reviewed: 6/2019, 5/2021

Revised: 6/2021

The University of Toledo Medical Center Cardiovascular Rehabilitation Physician Order

The University of Toledo Medical Center
Henry L. Morse Center
3065 Arlington Avenue
Toledo, OH 43614

Cardiovascular Rehabilitation
Preventative Cardiology
Medical Nutrition Therapy
Cardiopulmonary Exercise Testing
Supervised Exercise Therapy for PAD

Phone
(419) 383-5378
Fax
(419) 383-2966

Last _____ First _____ D.O.B.: NA MR #: _____

Patient Phone: NA

- Phase II Cardiac Rehab Cardiopulmonary Exercise Testing
 Phase III Cardiac Rehab Supervised Exercise Therapy for PAD
 Medical Nutrition Therapy

Cardiovascular Diagnosis: _____ ICD-10 Code: _____

- Stable Angina s/p CABG s/p Valve Surgery CHF Other _____
 s/p PTCA/Stent s/p MI/NSTEMI s/p OHT PAD

Cardiac Risk Factors:

- Family Hx Hypertension Post-menopause Stress Smoking
 Dyslipidemia Sedentary Lifestyle Obesity Diabetes

Exercise Prescription should include the use of the treadmill, elliptical, cycle ergometer, rower, track, Sci-Fit, Nu-Step, weights, and UBE. Time and workload on any modality should be increased by the cardiac rehab staff, according to the patient's tolerance. The patient will begin at an intensity of resting HR +20-40 beats per minute and will be adjusted as needed by the Exercise Physiologist. Exercise should take place up to the 3 days per week for approximately 75 minutes each session. The patient will perform a 6 minute walk test and a cardiopulmonary exercise test during their stay in the program in order to provide an accurate exercise prescription. Please have the patient receive necessary nutrition counseling, diabetic treatment/counseling and risk factor modification, including education, counseling, and behavioral intervention tailored to the patient's individual needs/ITP. I have examined the above-listed patient and have determined that their admission in to UTMC Cardiac Rehab Phase II/III, Cardiopulmonary Exercise Testing, and/or Supervised Exercise Therapy for PAD is medically necessary.

Patient may use SL NTG 0.4 mg as prophylaxis for chest pain prior to exercise or per standing protocol for chest pain during exercise.

Patients with diabetes who are taking an oral hypoglycemic agent or are on insulin for control of their diabetes will have finger stick blood sugars (FSBS) assessed pre- and post- exercise per cardiac rehab guidelines.

Please send this form
to the above address

Physician Name (printed): _____

Physician Signature: _____

Date: _____