

RESPIRATORY SERVICES

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PROCEDURE

TITLE: Pulmonary Diagnostics: HiFiO2
Cardiopulmonary Exercise Test

(Respiratory Therapy)
NUMBER: B-00-12-12127

RELATED DOCUMENTS:

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SITE APPLICABILITY:

ST. PAUL'S HOSPITAL

GENERAL INFORMATION:

Cardio-Pulmonary exercise testing (CPX) is performed in the Cardiology Department of St. Paul's Hospital under close supervision of a Cardiologist. A Respiratory Therapist performs testing with an ECG technician present to assist in cardiac and hemodynamic monitoring.

The CPX lab services many clinics and physicians including the Pacific Lung Health Centre and the many heart clinics at St. Paul's Hospital (Healthy Heart, Pre-Heart Transplant, Pacific Adult Congenital Heart, Heart Function, etc.).

CPX testing is performed for the following reasons:

- To obtain an objective assessments of a subject's Functional Capacity
- To determine a subject's Fitness Level
- To determine a subject's Level of Impairment
- To determine the Cause of Impairment (pulmonary, cardiac, circulatory, obesity, deconditioning, or malingering)
- To determine appropriate Methods of Intervention

CPX tests generally take 45 minutes to complete. For patients on supplemental oxygen, CPX testing can be performed on oxygen (HiFiO₂). The fraction of oxygen provided approximates the patient's supplemental oxygen prescription.

INDICATIONS:

- Evaluation of exercise tolerance
- Evaluation of undiagnosed exercise intolerance
- Evaluation of patients with respiratory diseases/symptoms
- Preoperative evaluation
- Exercise evaluation and prescription for pulmonary rehabilitation
- Evaluation of impairment/disability
- Evaluation of lung, heart, and heart-lung transplantation

CONTRAINDICATIONS:

- Acute MI
- Unstable Angina
- Uncontrolled Arrhythmias causing symptoms
- Syncope
- Active endocarditis
- Acute myocarditis
- Symptomatic severe aortic stenosis
- **Uncontrolled Heart Failure**
- Acute PE
- Thrombosis of lower extremities
- Suspected dissecting aneurysm
- Uncontrolled Asthma
- Pulmonary Edema
- Room Air desaturation at rest <85%
- Respiratory Failure
- Acute non-pulmonary disorder that may affect exercise performance or be aggravated by exercise
- Mental impairment leading to inability to cooperate

EQUIPMENT:

- Sensor Medics Vmax Metabolic Cart
- Cycle Ergometer
- Pulse Oximeter
- 12 lead ECG machine
- Blood pressure monitor
- Crash Cart
- Microgard Filter
- Nose Clip
- Silicone Mouthpiece
- Mass Flow Sensor

Specific HiFiO₂ Equipment:

- Oxygen and Air Cylinders
- Blender/Flow meter
- Oxygen tubing
- Reservoir Bag with Hose
- IV Pole
- Hans-Rudolf Valve

PROCEDURE:

- 1. Check the patient for contraindications to CPX testing prior to starting. Leave the patient on their oxygen while conducting set up.
- 2. Input patient data as you would a normal CPX (see RTD7314 for details).
- 3. Complete Spirometry. (See RTD7300 for details).
- 4. Assemble the necessary HiFiO₂ equipment needed as seen here:



- 5. Once in the metabolic protocol set up screen, change the valve deadspace from 0.05L to **0.130L** to account for the addition of the Hans Rudolf Valve (0.08L). Make sure to return the deadspace value back to 0.05L when the test is completed.
- 6. Change the text screen to CPX $HiFiO_2$ so the FiO_2 can be titrated and monitored during testing. This can be

- done in the metabolic protocol set up screen or once the test starts.
- 7. Turn the oxygen and air tanks on simultaneously as well as the flow meter to start filling the reservoir bag prior to attaching the patient. This will allow time to flush the system of air and fill it with the blended oxygen mixture.
- 8. Place the patient on the bicycle as you would a normal CPX and attach the Hans-Rudolph valve from the HiFiO₂ system to the mass flow sensor.
- 9. Start the patient on the FiO₂ concentration that is equivalent to the LPM that the patient uses for exercise. Titration can occur once in the baseline screen.
- 10. Select St. Paul's CPX (as you would a normal CPX) and toggle into baseline to observe the delivered FiO₂. Titrate as needed.
- 11. Complete the CPX as per the normal protocol, omitting IC's during testing.
- 12. Print both the "St. Paul's Tabular" and the "HiFiO2 exercise" metabolic edit pages in 20 second intervals to ensure FiO₂ measurements are documented in the final report.

REFERENCES:

- 1. Instructional Manual
- 2. ATS/ACCP Statement on Cardiopulmonary Exercise Testing. Am J Respir Crit Care Med Vol 167. pp 211-277, 2003.

REVIEWED BY:

1. RRT