Providence HEALTH CARE	Department: **Respiratory Services**	Date Originated: July 1996 Date Reviewed/Revised: **October 2010**
POLICY & PROCEDURE	Topic: Critical Care – Nitric Oxide Diagnostic Challenge in the Cardiac Catheterization Lab (Respiratory Therapy) Number: B-00-12-12033	Related Links: B-00-13-12013

APPLICABLE SITES:

St. Paul's Hospital

POLICY STATEMENT:

Nitric oxide gas may be administrated via inhalation upon receipt of an Interventional Cardiologist's order for *diagnostic nitric challenge purposes only*.

Nitric oxide and nitrogen dioxide levels must be continuously analyzed for all patients receiving nitric oxide therapy.

GENERAL INFORMATION and IMPORTANT POINTS:

Nitric oxide may be used in the Cardiac Catheterization Lab to assess for the *reversibility* of pulmonary artery hypertension, which suggests a potential benefit from calcium channel blockers.

The Cardiologist or Cardiac Catheterization Lab staff must pre-book the nitric challenge by informing the Respiratory Services Clinical Coordinator or Practice Leader of the desired date and time for the procedure.

The spontaneous breathing system circuit is a **Demand Flow System** and the following points must be noted:

- Adequate oxygen flow must be provided to meet patient flow demands and prevent accumulation of NO_2
- Anesthesia reservoir bag accommodates variances in patient flow demands – bag must be placed PRIOR to injector module
- Never use a mask with a reservoir directly attached (i.e. rebreather mask) due to increased risk of NO_2 formation
- System must be purged prior to placing mask on patient
- One-way valves ensure no re-breathing of exhaled gases or dilution of nitric oxide

CAUTION:

Never administer nitric oxide with FiO_2 of 0.21! – The addition of nitric oxide flow into the system will dilute the oxygen to less than 20%!

If oxygen flowmeter is turned off, patient cannot get air or oxygen!

EQUIPMENT:

- INOvent nitric oxide delivery system with INOmax nitric oxide metered gas cylinder
- Nitric Challenge kit
  - Inhaled Pulmonary Vasodilator Flowsheet
  - Nitric Oxide Administration Record
  - Nitric Challenge P&P with photo
  - Non-vented hospital full face mask – Fisher & Paykel RT041 (small/medium/large)
  - T-piece (blue) (2)
  - Anesthesia breathing bag reservoir
  - One-way valves (2)
  - 30 cm flex tubing
  - Sample tee with sample line
  - Injector tubing
  - Oxygen tubing
  - 15 mm x 4.5 mm adaptor
  - 15 mm adaptors (2)
  - 22 mm adaptor
- Lead apron and thyroid protector

PROCEDURE:

1. Gather equipment and supplies and perform the initial setup and calibration procedure for the INOvent nitric oxide delivery system.

   NOTE: The manual ventilation system setup and checkout may be omitted for the purposes of a nitric oxide challenge.

2. Assemble the Spontaneous Breathing System circuit as per the photo at the end of this document.

   NOTE: An oxygen flowmeter must be used for this procedure.

3. Ensure that the three different sizes of full face mask are readily available. Assess the patient for the correct size of mask.

4. Attach the desired size of mask to the distal end of the spontaneous breathing system assembly.

5. Set the flow on the oxygen flowmeter to 10 – 15 L/min.

6. Allow the Cardiac Catheterization Lab staff to measure the patient's baseline hemodynamic parameters while on Room Air.

7. Adjust the flowmeter to provide an adequate flow of gas to the patient. Place the mask over the patient face and ensure a comfortable fit that is leak-free. Ensure the reservoir bag remains inflated on inspiration. Do **NOT** initiate delivery of nitric oxide gas at this point.

8. Once the patient is stable on the mask, the Cardiac Catheterization Lab staff will perform a second baseline set of hemodynamic parameter measurements – this is on 100% oxygen.

   NOTE: All INOvent delivery system settings must be documented on the Inhaled Pulmonary Vasodilator Flowsheet with every change in nitric oxide concentration. This includes the following:

   a. FiO_2 (this will be approximately 1.0)
   b. Flowmeter setting
   c. RR
   d. Alarm settings
   e. [NO] ppm (set & measured)
   f. [NO_2] ppm (measured)
   g. Start and stop time of gas delivery
   h. Any significant events during the procedure

9. Initiate delivery of nitric oxide gas at **20 ppm** for approximately 5 minutes. Further measurements of physiological parameters will be performed.

   NOTE: The interventional cardiologist will instruct when to change the nitric oxide concentration.

10. Increase the concentration of nitric oxide to **40 ppm** for 5 minutes. Lab staff will repeat the required measurements.

11. Increase the concentration of nitric oxide to **60 ppm** for 5 minutes. Lab staff will repeat the required measurements.

12. Administration of nitric oxide is terminated upon the physician's direction, or when the measurements have been completed with a concentration of 60 ppm.

13. Upon discontinuation of the nitric oxide, **ensure that the INOmax cylinder is turned OFF completely** to avoid unnecessary gas charges ($99.00/hour).

14. Remove soiled components from the INOvent system and spontaneous breathing circuit. Discard the single-use items.

    NOTE: The anesthesia breathing bag reservoir is NOT disposable and should be sent to SPD for reprocessing.

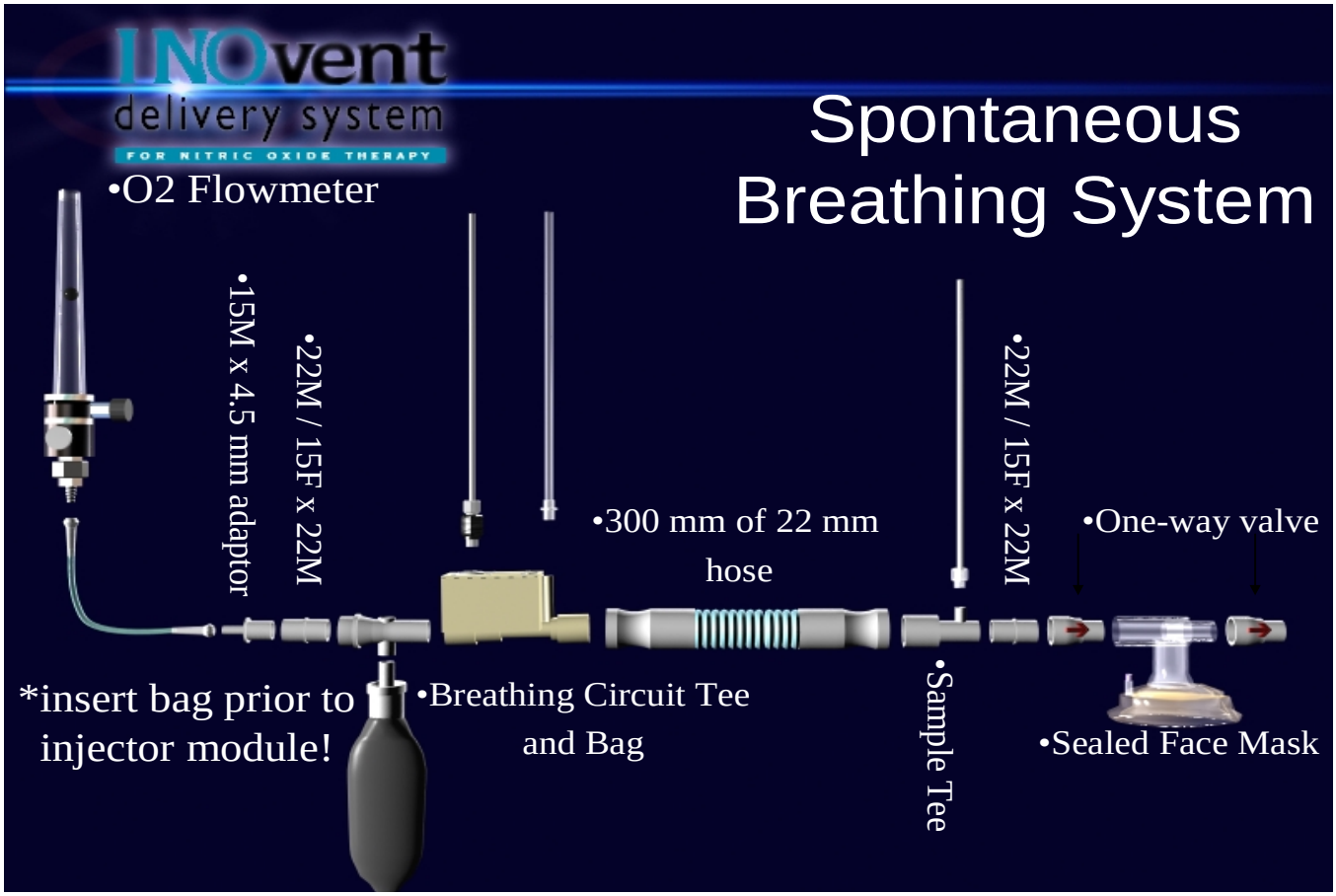
15. Surface-wipe the INOvent.

16. Recircuit the INOvent delivery system and perform calibrations. Place in the ventilator storage area. Change the INOmax nitric oxide cylinder if the gauge reads < 500 psi.

Ensure the cylinder is OFF and the red locking pin has been inserted under the meter.

17. Restock the nitric challenge kit as follows

NOTE: Full face mask must be non-vented (denoted by the blue elbow) – kept in Katmandu



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3. *INOvent delivery system Operation and Maintenance Manual – IKARIA INOvent Application Update #6.* http://inomax.com/assets/pdf/app-updates/Update6_circuit_connections.pdf