

Providence Health Care	Department: Respiratory Services	Date Originated: September 2003 Date Revised: December 2008
PROCEDURE	Topic: <u>Critical Care</u> – Heliox Gas Therapy and Mechanical Ventilation (Respiratory Therapy) Number: B-00-12-12047	Related Links: B-00-12-12035

APPLICABLE SITES:

St. Paul's Hospital

GENERAL INFORMATION:

Helium-oxygen gas mixtures (Heliox) have a lower density than that of oxygen and nitrogen. As a result, Heliox may be able to reduce airways resistance and work of breathing in patients with airway narrowing secondary to inflammation, bronchoconstriction, and/or partial mechanical obstruction. This effect is most pronounced with higher concentrations of helium (Heliox 80:20), but may still be present in concentrations as low as 60% helium (Heliox 60:40). Below 50% helium, the reduction in density offers no additional benefit over conventional gas mixtures.

In mechanically ventilated patients with acute asthma or COPD, Heliox gas may decrease dynamic hyperinflation by reducing airway resistance, thereby improving gas exchange and reducing the associated hemodynamic compromise.

Heliox therapy is only supportive; therefore it has no curative or permanent corrective properties. Any interruption in therapy may cause an immediate return of original symptoms unless the primary problem has been corrected.

The AVEA ventilator is the ventilator of choice for delivery of Heliox gas mixtures to mechanically ventilated patients. The AVEA ventilator uses a SMART connector that will automatically adjust for the low density properties of Heliox; all volumes (numeric and graphic) are corrected for accurate display.

EQUIPMENT:

- AVEA ventilator with circuit and humidifier
- Heliox 80:20 cylinder with a minimum of 1000 psig pressure
- Heliox regulator for AVEA ventilator with high pressure gas hose

NOTE: The AVEA ventilator is calibrated for use with an 80:20 Heliox concentration only. Do **NOT** use a 70:30 Heliox concentration, as this will alter the FiO₂, flow, and volume calculations.

PROCEDURE:

1. Obtain physician order for Heliox gas therapy.

2. Record the current ventilator settings including:
 - a. Peak pressure
 - b. Plateau pressure
 - c. Total/Set/Auto PEEP
3. Obtain arterial blood gas if a recent sample has not been drawn.
4. Disconnect the patient from the ventilator and have an assistant manually ventilate the patient prior to changing the Heliox SMART connector.
5. Turn the ventilator **OFF** and disconnect the high pressure air tube from the gas source.
6. Disconnect the high pressure air SMART connector at the back of the ventilator by unscrewing the dial at the inlet.
7. Attach the Heliox SMART connector by screwing it into the inlet.

NOTE: The AVEA internal oxygen analyzer can **NOT** be disabled when the Heliox SMART connector is attached.

8. Connect the high pressure gas hose from the Heliox tank to the SMART connector and turn the Heliox tank **ON**.
9. Turn the ventilator **ON** and reconnect the patient to the ventilator. The patient should initially remain on the same ventilator settings as previous to the initiation of Heliox.
10. To set the helium/oxygen mixture during administration, set the desired FiO_2 – the balance will be helium.
11. Record the current ventilator settings including as per step 2.
12. Document the Heliox concentration in one of the blank spaces on the flowsheet.
13. Adjust the ventilator settings to account for any observed reductions in air trapping and autoPEEP.
14. Continue any prescribed therapy for airway inflammation or bronchoconstriction, as Heliox has no anti-inflammatory or bronchodilator properties.

NOTE: Monitor the heater humidifier performance carefully during Heliox gas therapy. Helium has significantly greater thermal conductivity as compared to nitrogen/oxygen gas mixtures; therefore heat transfer from the patient may affect the duty cycle of the heated wire circuit, which may cause alarm situations and/or increased condensation in the circuit. It may be necessary to decrease the set temperature setting on the humidifier or change to non-invasive mode.