OBJECTIVE:
To give guidance in the implementation and management of Heliox Therapy for spontaneously breathing and mechanical ventilated patients.

SCOPE:
This Policy applies to all Respiratory Therapist directly and indirectly involved in the management of patients receiving Heliox Therapy.

INDICATION:
Airway Obstruction – examples: acute airway swelling associated with radiation therapy and vocal cord dysfunction and the narrowing of airways secondary to severe bronchoconstriction. It is important to note that Heliox is not used to treat an underlying disease but is used to reduce the resistance of the airways and work of breathing until a method is determined to reduce the airways resistance and eliminate the need for Heliox.

EQUIPMENT:
HELIUM TANK - Helium tanks are identified by label. The tanks should be brown with a green or white ring around the top. The tag on the tank will indicate a concentration. MCGHI stocks 80% Helium and 20% oxygen mixture. There are specific regulators for pure Helium versus Heliox tanks. They are not interchangeable. Oxygen flowmeters can’t be used accurately unless the correction factor is used to adjust for the density of the Heliox. The correction factor for Heliox is 1.8: multiply the flowmeter reading by 1.8 to calculate the liters per minute of Helium (example: 10L/M of 100% oxygen = 18L/M of 80/20 Heliox). Tanks are stored in the CMC and the outside storage room. High-pressure regulators are available in both RCS Departments; low-pressure regulators are obtained from the CMC Respiratory Care department.

DELIVERY DEVICE:
SV300 ventilator for mechanically ventilated patients
Non-rebreather mask or other device fitter with a reservoir for spontaneously breathing patients

PROCEDURE:
Respiratory Care Practitioners (RCP) will be responsible for the set-up and the management of Heliox therapy based on the protocol outlined below as customary practice at the Medical College of Georgia Health Inc. All patients requiring Heliox therapy will be brought to the attention of the Lead Therapist and the Manager of Respiratory Care. Heliox Therapy will only be implemented in an ICU or ER. Patients will be closely monitored utilizing continuous oximetry and cardiorespiratory monitoring.

Modes of Delivery:
Spontaneous Breathing
For the spontaneously breathing patient via non-rebreather (NRB): The patient should be placed in an Intensive Care Unit or Emergency Room with oximetry and cardiorespiratory monitoring capabilities. A nasal cannula can be used to deliver additional oxygen if oxygen saturation is low. This will not impede the delivery of Heliox. Obtain an ABG within thirty minutes of the initiation of Heliox therapy to confirm the accuracy of the oximetry reading.
Mechanical Ventilation

For the ventilated patient use only the Siemens SV300 ventilator since research has shown that the SV300 has more accurate delivery of Heliox.

1. Obtain Baseline Values on the following:
   a. ABG
   b. PEEP, Plateau Pressure, PIP and MAP
   c. Observation of chest expansion

2. Set-up Heliox through SV300. Use Pressure Control mode.
   a. Set the Inspiratory pressure to the measured Plateau pressure, use the same respiratory rate, Fio2, PEEP and clinically appropriate I:E.
   b. Ensure ventilator function with a test lung.
   c. Place set-up on patient – paying close attention to chest rise, Plateau Pressure, total PEEP, vital signs, and set alarms appropriately.
   d. Monitor oximeter, and exhaled tidal volume – realize volumes are not accurate but exhaled volumes will reveal a trend.

3. Obtain ABG 30 minutes after Heliox administration.

The Servo uses a screen pneumotachometer. Heliox density is lower than oxygen and air. In a Volume mode, these two factors will result in erroneous volume readings. Volume will be larger than the ventilator indicates. Therefore, Pressure Control is the preferred mode because this mode utilizes pressure not volume. The density of Heliox affects volume and flow measurement no pressure. Maximum Heliox should be administered that will allow for at least 90% arterial saturation’s. As Heliox replaces the oxygen/nitrogen mixture, the exhaled tidal volume will be higher than the set tidal volume. FiO2 delivery can be confirmed with a standard oxygen analyzer without fear of a diluted reading.

In order to determine the success of Heliox therapy, these factors can be seen: In PC, as resistance improves – an increase in tidal volumes and minute ventilation will be observed. It is imperative that resistance, dynamic and static compliance be monitored during Heliox administration via mechanical ventilator.

THEORETICAL FUNCTION:

Helium is an odorless, tasteless, non-explosive and physically inert gas that is one-eighth the density of nitrogen. It has no bronchodilatory effect nor does it have an anti-inflammatory component. Helium is useful in overcoming airway resistance and obstruction. Furthermore, helium-oxygen mixtures reduce turbulent flow, and allow laminar conditions to persist at higher flow rates than nitrogen-oxygen, leading to a reduction the resistive work. A substitution of helium for nitrogen will cause an overall increase in the value of bulk flow, and a concomitant decrease in the associated work of breathing. Heliox improves gas exchange and decrease peak airway pressure by normalizing uneven ventilation and perfusion caused by bronchoconstricted airways.

CAUTIONS:

1. Helium has a high thermal conductivity, and there is a risk of hypothermia when the temperature of the Heliox mixture is lower than 36C; therefore, patients on prolong use need to have their temperature monitored regularly and adjustments made to maintain a normal body temperature.
2. The benefit of Heliox decreases as Fi02 increases. When implementing Heliox therapy, it is critical to utilize minimal oxygen concentrations ≤ 30% in order to maximize the benefit of Heliox therapy. Heliox will improve gas exchange by improving the ventilation-perfusion relationship.

3. Spontaneous breathing patients require a device that can deliver Heliox without allowing the patient to entrain room air. Device must have a reservoir and can’t have large holes for entrainment.

4. Tanks are to be secured in carries at all times. One back-up tank may be placed at patient’s bedside but must be secured in a carrier.

Approved by: ________________________________
Jennifer Anderson, Manager Respiratory Care Services Medical Center            Date