

HELIOX ADMINISTRATION WITH HELIOX VAPOTHERM AND AVEA VENTILATOR

What is Heliox?

Helium is a gas that is found in the earth's atmosphere. Heliox is a medical gas that is a combination of helium and oxygen. It is used to improve laminar flow which then improves gas exchange in conditions where airway resistance is increased. It has a lower density than oxygen, therefore the inhalation of heliox results in significantly lower turbulence, particularly in the more distal (lower) portions of the lung. This allows a greater percentage of laminar flow and lower overall airway resistance. It may reduce the work of breathing and improve pulmonary gas exchange efficiency.

Uses

Heliox (Helium/Oxygen) is used to improve laminar flow which then improves gas exchange in conditions where airway resistance is increased. The following conditions may show improvement with heliox: lower airways disorders (severe asthma, bronchiolitis), tracheal obstructions (croup, epiglottitis, foreign body obstruction, tumor), tracheal stenosis or tracheomalacia.

HELIOX VAPOTHERM

Range: 1-40 L/min

Heliox Input: 80/20 (79% Helium / 21% Oxygen)

Oxygen Concentration: 21% – 100%

HELIOX IS ONLY BENEFICIAL WHEN THE FIO2 IS 21-40%.

A FIO2 EXCEEDING >40% IS NO LONGER CONSIDERED BENEFICIAL.

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Equipment

- Heliox Vapotherm (Heliox gauge attached to unit)
- Vapotherm circuit –High or Low flow (Same circuit as regular Vapotherm)
- Heliox tank

CARTRIDGE	CANNULA TYPE	OPERATIONAL FLOW RATES
High Flow	Adult, Pediatric/Adult Small, Pediatric Small*	5-40 liters per minute (LPM)
Low Flow	Premature, Neonatal, Infant, Intermediate Infant, Solo, Pediatric Small*	1-8 liters per minute (LPM)

Setup

- Using the Heliox Vapotherm device, use the appropriate high or low flow circuit.
- Attach heliox gauge to heliox tank.
- Turn cylinder on and ensure that there is no leak and that the gauge is holding steady.
- Ensure you have a full tank (around 2000 PSIG). If the reading is below 500 PSIG, begin steps to replace cylinder. Additionally, always have an extra tank near so the patient does not run out.
- You do not need to calculate anything additional since the Vapotherm Heliox delivery system automatically calculates for you.

Tank Duration

To determine how long an H or K tank will last, we will use the cylinder factor of 2.5.

Formula: Hours remaining= PSIG x Tank conversion factor/flow rate

$$2000 \times 2.5 = 5000 / (1.8) \times 14L = 25L$$

$$5000/25L = 200min / 60 = 3.3 \text{ hours of cylinder duration}$$

HELIOX ADMINISTRATION WITH THE AVEA VENTILATOR

Equipment

80/20 Heliox tank

Heliox regulator and high-pressure hose

Avea Ventilator

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Procedure

- Retrieve Avea ventilator from basement stock room.
- On the ventilator, ensure the heliox hose that is on the back of the ventilator is plugged in. It should already be plugged in since we use the Avea just for Heliox usage only. If the Heliox adapter is not plugged in, disconnect the medical air hose and attach the Heliox adapter (It is attached to the vent).
- Turn cylinder valve of Heliox tank open.
- Ensure you have a full tank (around 2000 PSIG). If the reading is below 500 PSIG, begin steps to replace cylinder. Additionally, always have an extra tank near so the patient does not run out.
- Once Heliox is connected, a green icon is displayed in the bottom right of the touch screen.
- To set the Heliox during administration, set the desired FiO2 and remaining of the breathing gas will be Heliox.

For example:

A set FiO2 of 0.30 will deliver 70/30 Heliox mixture to the patient.

A set Fio2 of 0.35 will deliver 65/35 Heliox mixture to the patient.

A set Fio2 of 0.40 will deliver 60/40 Heliox mixture to the patient.

Vent Settings

The use of Non-Invasive Ventilation with Heliox on the Avea ventilator can be done with the same setup as on the PB 840 or PB 980. The modes on the Avea are like those on the PB 840 or PB 980. On the Avea, you will choose Pressure SIMV which will give you the following ventilator setting choices: RR, Inspiratory Pressure, Inspiratory Time, Pressure Support Ventilation, PEEP, Flow Trigger, Fio2.

If your patient is needing to be transported out of the hospital due to their high complexity and acuity know that there is NO transport team that has the capability to transport on Heliox. Please let the hospitalist or intensivist know this. You may have to take the patient off prior to the transport team's arrival to make sure they're stable to transport without the adjunct therapy.

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Heliox with other modalities

- The use of Heliox with a V60 or Trilogy has been tested to use but has shown inconsistencies with the flow of the Heliox delivery. Therefore, the use of a BIPAP is NOT recommended due to the higher flows required, inconsistency in the delivery of heliox, erratic functionality and the high cost of delivery.
- Although on the Hope nebulizer information packet it has a diagram stating that it has a Heliox adapter port, we do not carry the adapter to hook this up to the Heliox tank.

Note

- Regarding a quiz question in the latest edition of the American Red Cross- Pediatric Advanced Life Support, the use of Heliox as a mode of delivery for a nebulized treatment is not recommended. A journal article published by Moraa et al. (2018) reported that the benefit of Heliox for the treatment of moderate to severe croup appeared to be no better than one or two doses of nebulized racemic epinephrine.
- You should make the patient and family aware that the patient’s speech will sound squeaky once heliox is started due to helium. The patient’s voice will go back to normal once removed.

Charting

Please chart Heliox every time you chart for your Vapotherm or Vent. Heliox information can be found under the Nitric Oxide/Heliox tab, then under the alarm tab chart please chart the following:

Heliox Mixture Daily Charge (Daily Charge)

Heliox Mixture (80/20)

Heliox Tank Pressure

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References

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