

VUMC Multidisciplinary Surgical Critical Care Service

Inhaled Epoprostenol (Flolan®) Guidelines

Purpose: To provide guidance on administration and weaning of inhaled epoprostenol.

Overview

Inhaled Epoprostenol is used for treatment of pulmonary artery hypertension (PAH). Pulmonary hypertension is elevated pulmonary artery pressures described by endothelial cell proliferation and vasoconstriction the small pulmonary arteries. This can eventually lead to right sided heart failure. Many things can cause pulmonary hypertension including but not limited to idiopathic etiology, genetics, drugs, left sided heart disease, COPD, pulmonary embolism, acute respiratory distress syndrome, and septic shock (Poms 2011, Buckley 2010).

Epoprostenol is prostaglandin I₂ (also referred to as prostacyclin) and is a potent vasodilator that reduces pulmonary artery pressures. It also has anti-inflammatory, antithrombotic, and antiproliferative properties. Inhaled epoprostenol may be an option in the short-term management of PAH in patients with acute critical illness. Risks during dosing adjustments and abrupt discontinuation of the drug include pulmonary edema, hypoxia, and rebound pulmonary hypertension; therefore care must be taken when properly weaning this medication (Buckley 2010).

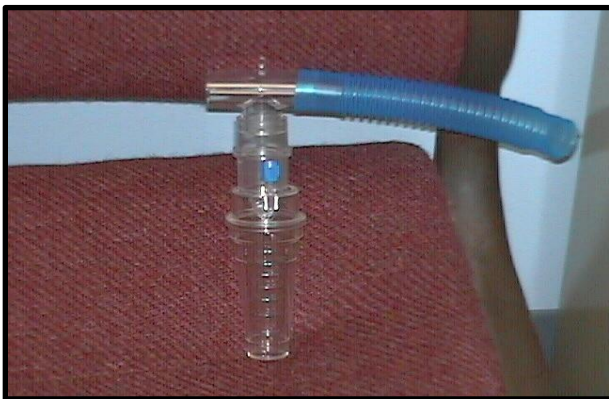
Inhaled Epoprostenol for Mechanically Ventilated Patients

Equipment:

1. Low flow flowmeter



2. Mini heart nebulizer set-up



Special Instructions:

- Remove heat moisture exchanger (HME)
- If a heater is being used, turn OFF the heater function and use a pass over humidification device. Too much humidity in the circuit will dilute the inhaled drug significantly.
- Double filter expiratory port of ventilator. Then, rotate back one to front and discard front filter every 2 hours.

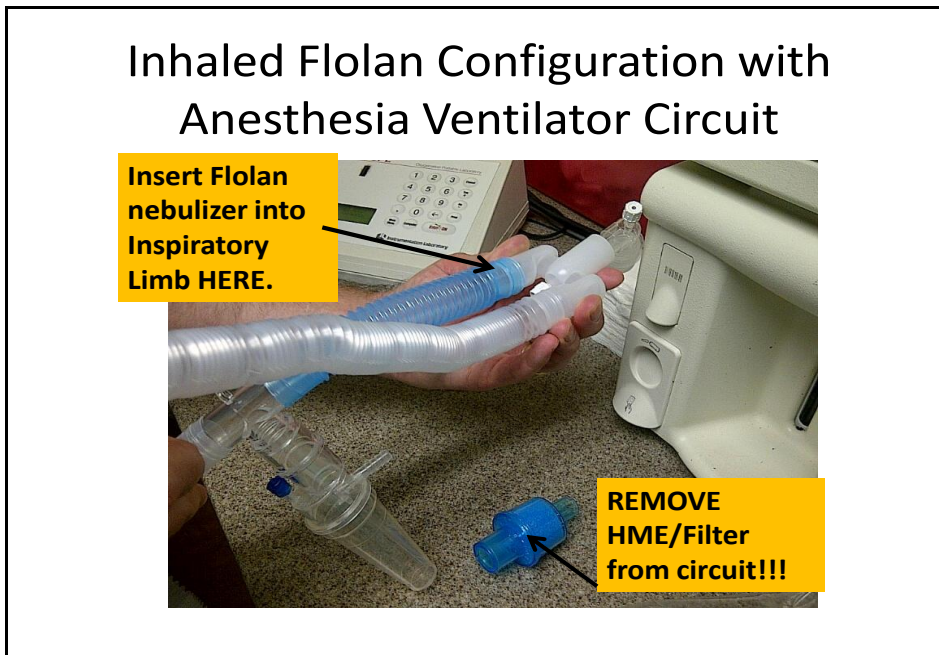
- Do not turn flow off to nebulizer in order to measure parameters on the ventilator. If the epoprostenol is abruptly stopped, significant hypoxia can develop due to the short half-life of the medication.

Procedure:

1. Verify physician’s order for inhaled epoprostenol in HEO/Wiz.
2. Pharmacy will mix the epoprostenol and place it in a light protected syringe. Syringe will contain 1500mcg/48mL. This dose is approximately equivalent to 50 nanograms/kg/min.
3. Obtain mini-heart nebulizer set up and low flow flowmeter from the SICU blood gas lab.
4. Assemble nebulizer at bedside and place set up in the ventilator circuit.
5. Add 30 mL of epoprostenol mixture to the nebulizer reservoir and set flowmeter as follows:

Dosage	Flow
50 ng/kg/min	2 lpm
25 ng/kg/min	1 lpm
12.5 ng/kg/min	0.5 lpm

6. Wait 30 minutes and re-measure parameters.
7. Adjust alarms as needed on ventilator.
8. Ventilator should be checked every 2 hours and epoprostenol refilled as necessary.
9. Document in Mediserve “Continuous Medication Administration” template every 2 hours.



Inhaled Epoprostenol for Spontaneous (not on mechanical ventilation) Patients

Equipment:

1. Flowmeter (0-15 lpm)
2. Continuous nebulizer set-up, Hope Nebulizer
3. Blue corrugated tubing

4. Aerosol face mask

Special Instructions:

1. The pharmacy will prepare solution that will deliver the specified dose when nebulized at a rate of 50 mL/hr.
2. Initial recommended dose is 50 nanograms/kg/min. Other dosing options are 25, 12.5, and 6.25 nanograms/kg/min.
3. The nebulizer's output at a flow of 10-15 LPM is approximately 50 mL/hr.
4. Fill the nebulizer up to 200mL. This will provide the patient with approximately a four hour supply of inhaled epoprostenol.

Procedure:

1. Verify physician's order for inhaled epoprostenol in HEO/Wiz.
2. Pharmacy will prepare medication in a normal saline 250mL irrigation bottle.
3. Obtain nebulizer set-up, blue tubing, aerosol mask, and flowmeter.
4. Assemble nebulizer at bedside.
5. Fill nebulizer to 200mL and run nebulizer at 15 LPM.
6. Run the nebulizer at 15 LPM on an air and oxygen blender set at the desired FiO₂.
7. Do not let the nebulizer run out of medication.

Monitoring:

- Monitor patient every 2 hours: SpO₂ and respiratory rate.

Documentation:

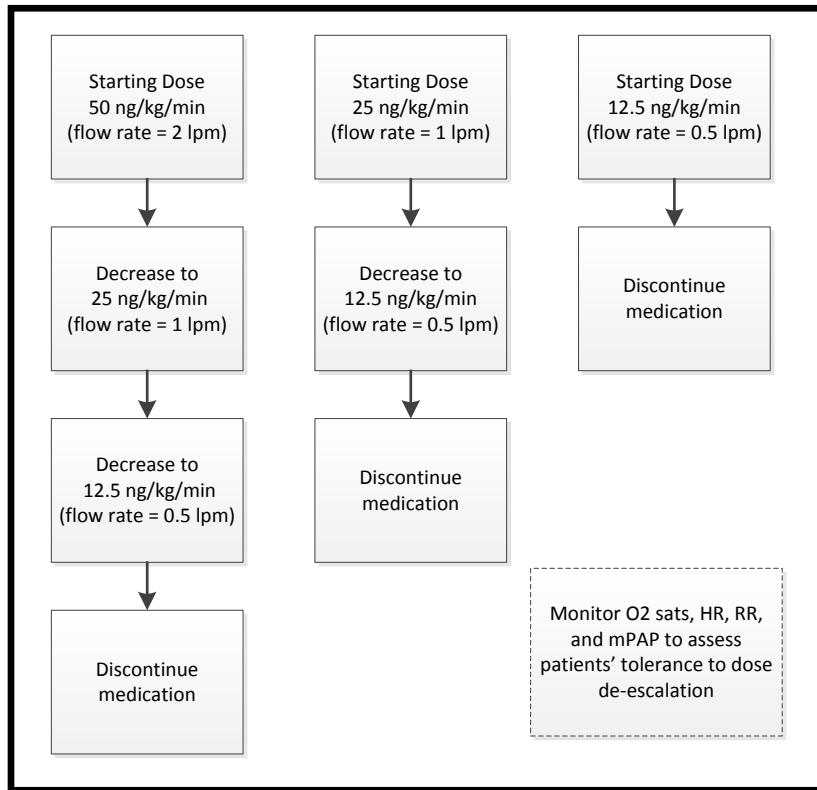
- Document in Mediserve using the template called "Continuous Aerosol Medication."

Procedure for weaning epoprostenol:

Epoprostenol should be weaned in a stepwise fashion as described below.

NOTE: If the patient shows any adverse effects from weaning the medication, a physician should be notified and appropriate action taken. This may require restarting the epoprostenol at the smallest effective dose.

- If the medication dose is 50 ng/kg/min, decrease flow to 1 lpm to drop dose to 25 ng/kg/min. If the medication dose is 25 ng/kg/min, decrease flow to 0.5 lpm to drop dose to 12.5 ng/kg/min. If the medication dose is 12.5 ng/kg/min, the medication can be discontinued.
- Oxygen saturations, mPAP, heart rate, and respiratory rate should be monitored to assess the patients' response.
 - a. If the patient tolerates the decreased dose with no significant changes in the parameters listed above, then the flow rate may be decreased again.
 - b. If the patient does not tolerate the decreased dose, notify physician.
- Once the patient tolerates the lowest possible flow rate of 0.5 lpm (dose of 12.5 ng/kg/min), then the flow can be turned to zero and the nebulizer removed from the circuit.



References:

1. Poms A, Kingman M. Inhaled Treprostinil for the Treatment of Pulmonary Arterial Hypertension. Critical Care Nurse 2011; 31(6): e1-e10.
2. Badesch DB, Abman SH, Simonneau G, et al. Medical Therapy for Pulmonary Arterial Hypertension: Updated ACCP Evidence-Based Clinical Practice Guidelines. Chest 2007; 131(6):1917-28.
3. Buckley M, Feldman J. Inhaled Epoprostenol for the Treatment of Pulmonary Arterial Hypertension in Critically Ill Adults. Pharmacotherapy 2010; ;30(7):728–740.

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