UCDAVIS HEALTH | CHILDREN'S HOSPITAL

Epoprostenol use in the NICU setting

Background:

Pulmonary hypertension (PH) is a complex process with multiple causes, including meconium aspiration syndrome, sepsis, bronchopulmonary dysplasia (BPD) and congenital diaphragmatic hernia.Infants with PH have pressures in the right heart and pulmonary artery that are equal to or higher than systemic blood pressure. Increased pulmonary vasculature resistance (PVR) causes deoxygenated blood to shunt from the pulmonary artery through the patent ductus arteriosus (PDA) to the aorta. This right-to-left shunt indicates that deoxygenated blood is bypassing the lungs and being pumped to the body through the PDA or patent foramen ovale (PFO) . Low oxygen, acidosis, and hypercarbia can cause pulmonary arterioles to constrict, which further worsens pulmonary hypertension.

Epoprostenol is a PGI_2 prostacyclin analog that acts as a primary vasodilator of the pulmonary and systemic arterial vascular beds by stimulating cAMP production in the vascular smooth muscle cells. Administration leads to direct vasodilation of pulmonary and systemic arterial vascular beds. It is available as **Flolan™** (stable for 8 hours at room temperature and made with a diluent that is alkaline with pH 10.2 to 10.8 or a more stable pH12 diluent with a higher pH of 12±0.3) or **Veletri™** (stable for longer ~ 24 hours at room temperature with either sterile water or 0.9% sodium chloride as diluent).

Uses:

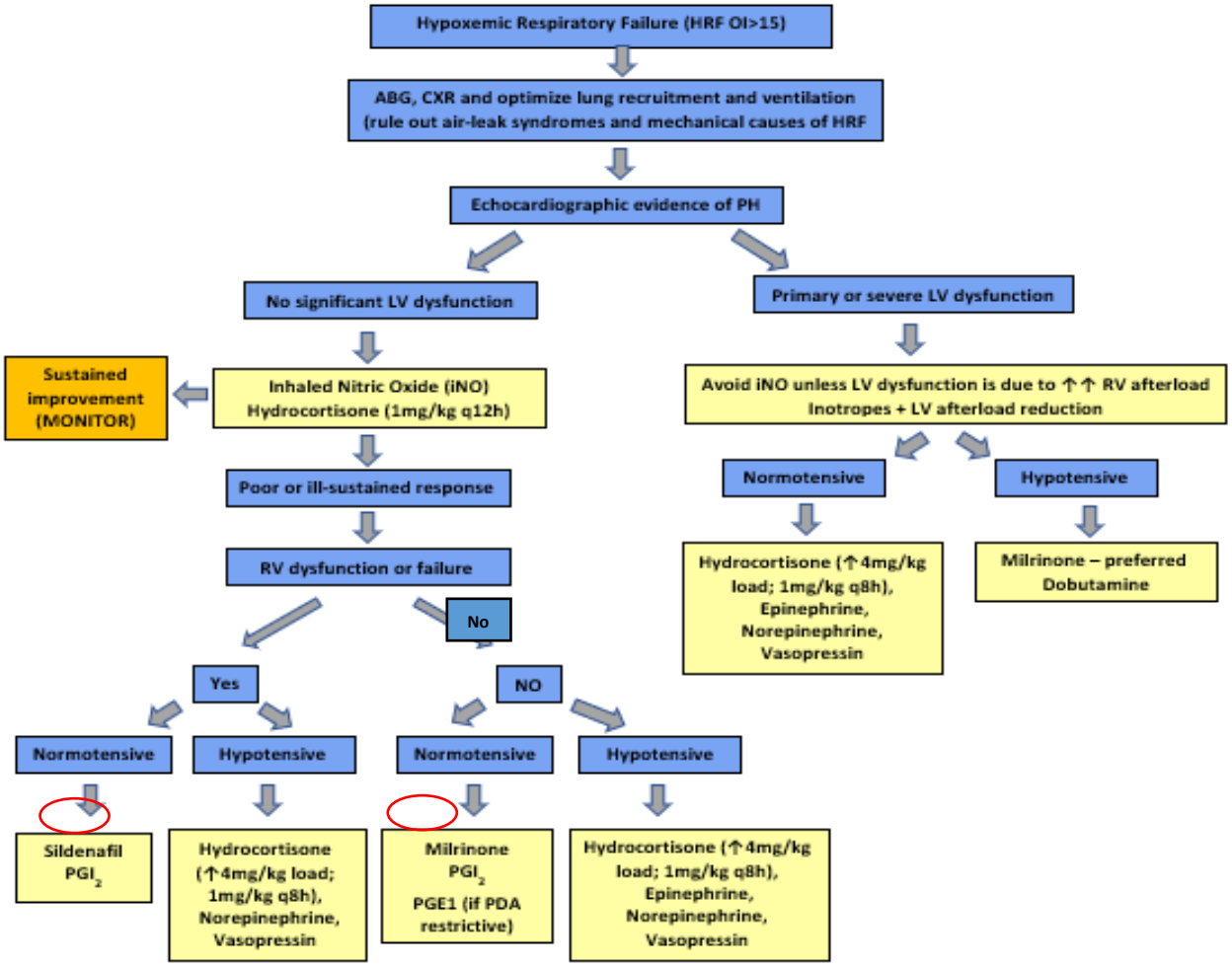
As of October 2024, the NICU will be offering Epoprostenol only for infants with the following:

- ***Infants already on Epoprostenol and being transferred from the PICU to the NICU***
- ***Infants with chronic conditions and after discussion with the PH Team***

Indications:	Contraindications:

- Newborns 30 weeks of gestation or older with clinical or echocardiographic evidence of PH
- Inadequate response to inhaled nitric oxide, sildenafil, milrinone, and/or bosentan
- Potential disease states
  ○ Bronchopulmonary dysplasia
  ○ Congenital diaphragmatic hernia
  ○ Persistent pulmonary hypertension of the newborn
  ○ Meconium aspiration syndrome
	- Left-sided cardiac obstructive lesions
	  ○ Hypoplastic-left heart syndrome
	  ○ Aortic stenosis
	  ○ Bicuspid aortic valve
	  ○ Coarctation of the aorta
	  ○ Interrupted aortic arch
	- Congenital heart disease with ductal dependent systemic blood flow
	  ○ Hypoplastic-left heart syndrome
	  ○ Critical aortic stenosis
	  ○ Coarctation of the aorta
	  ○ Interrupted aortic arch
	- Severe left ventricular heart failure
	- Thrombocytopenia < 50K (Can consider treatment once platelets are corrected)
	- Active bleeding

	- Systemic Hypotension (systolic pressure < 55 mm Hg, diastolic pressure < 25 mm Hg, mean blood pressure < 35 mm Hg despite vasopressor use)



Medication Information:

The Pulmonary Hypertension team must be consulted for all patients on Epoprostenol

- Once removed from the medication fridge,
  - Flolan™ is only stable at room temperature for 8 hours. Once removed from the refrigerator the syringe/bag expires in 8 hrs.
  - Veletri™ is stable for 24 hr. at room temperature. Once removed from the refrigerator the syringe/bag expires in 24 hr.
- If the patient is not on inhaled nitric oxide (iNO), it should be available in-line for use if an unplanned Epoprostenol infusion interruption occurs.
- Given the short half-life of Epoprostenol (3 – 5 minutes), abrupt discontinuation of the infusion will likely

result in an increase in pulmonary vascular resistance and pulmonary artery pressure.

- Epoprostenol must be administered through a dedicated lumen. Never stop or interrupt the Epoprostenol infusion.
- A central line is required, but a PIV may be used in emergency situations pending emergent central line placement
- No other medications may be infused through the Epoprostenol lumen
- Only normal saline or an Epoprostenol diluent can be used as a chaser fluid – no heparin
- To avoid accidental bolus, once the chaser rate is started, it can only be modified by an Attending
- Do not flush or draw blood from the Epoprostenol lumen
- Line occlusion supplies must be in the top patient drawer at all times: 10 mL syringe, 10 mL normal saline flush (2), 3 mL syringe, alcohol prep pads

Medication Doses:

The Pulmonary Hypertension team must be consulted for all patients on Epoprostenol

Starting Dosage	Titration Dosage	Max Dosage
1 – 2 ng/kg/min	1 – 2 ng/kg/min	30-40 ng/kg/min

- Based on clinical status, titrations may occur every 30 – 45 minutes but only at the direction of the pulmonary hypertension Attending

Patient Monitoring:

The infant must remain on cardiac and respiratory monitoring at all times.

- **Initiation:**
  Obtain baseline vitals
  Obtain baseline height and weight
  Vitals every 15 minutes x 4, then hourly if stable
- **Rate change:**
  Vitals every 15 minutes x 4, then hourly if stable
- **Maintenance:**
  Vitals every hour
  Document site assessment hourly
  Document infusion rate (pump rate verify) hourly

Features of Rebound Pulmonary Hypertension:

- Increased Oxygen requirement
- Increased splitting between pre- and post-ductal oxygen saturations
- Low cardiac output
- Echocardiographic evidence of increased right ventricular pressures, Interventricular septal position, tricuspid valve regurgitant jet velocity, pulmonary valve insufficiency jet velocity, direction of intracardiac shunt
- Elevated BNP (brain natriuretic peptide)
- Extreme sensitivity to routine care such as suctioning, position changes, diaper changes, etc.
- Peripheral edema
- Shortness of breath

- Cough (in older children)
- Cyanosis
- Chest pain (in older children and adults)

Side Effects:

- Cardiovascular: flushing, hypotension, tachycardia, bradycardia, and chest pain.
- Hematologic: thrombocytopenia.
- Dermatologic: rash and urticaria
- Neurologic and Neuromuscular: dizziness, jaw pain, headache, and foot/leg pain
- Gastrointestinal: nausea, vomiting, diarrhea, abdominal pain, and decreased appetite
- Line complications: line/equipment malfunction, CLABSI, line occlusion, site pain, and site induration

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