Respiratory Therapy: Flolan Administration

I. PURPOSE: Inhaled Flolan (Epoprostenol Sodium) will be administered as a first line therapy in adults in lieu of Inhaled Nitric Oxide as a selective pulmonary vasodilator. Inhaled Nitric Oxide will be a secondary therapy, only after a failed Flolan trial. CVL (cardiovascular lab) and OR (operating room) will be the exception to this process as diagnostic use of Nitric Oxide will be allowed for these cases.

Respiratory Therapists (RT) will administer and wean the dosage of the Inhaled Flolan per the Inhaled Flolan Protocol in order to provide treatment in an effective manner that is beneficial to patient outcomes and optimizes patient care. The protocol will also enable weaning / discontinuance of Inhaled Flolan once a response has been established or when patients do not respond to therapy. This therapy will be used only with patients receiving mechanical ventilation.

II. PROTOCOL: Inhaled Flolan may be administered for the following clinical conditions:

A. Clinical evidence of hypoxemic respiratory failure ($PaO_2 < 55$mmHg with $FIO_2 > 0.60$, OI >25 x 4 hours)

B. Pulmonary Hypertension - Clinical evidence of elevated pulmonary artery pressures (mean PAP > 30 mmHg) or elevated pulmonary vascular resistance

C. Right Ventricular (RV) Failure in absence of valve disease

1. Place patient on 100% FIO_2 for a minimum of 15 minutes.

2. When making multiple interventions (Oscillation, Pressors, Vent Changes, etc), allow these changes to stabilize prior to the initiation of Flolan.

3. Obtain baseline hemodynamic and oxygenation parameters. Obtain baseline arterial blood gas sample prior to the initiation of Flolan. Document Oxygen Saturation, PaO_2 and Pulmonary Artery Pressure in the EMR (if available).

4. An order must be entered for Inhaled Flolan per protocol by the ordering physician.

5. Pharmacy will hand deliver two 50 ml Aerogen syringes of Flolan to the Respiratory Therapist. The medication will be placed in the refrigerator in its light protective cover.

6. Flolan MUST always remain in a light protective cover. Flolan is stable if light protected for 8 hours at room temperature and for 48 hours in the refrigerator.

7. A replacement dose MUST be available to the RT. The replacement dose will remain refrigerated in a light protective cover until ready for use.

8. Once the medication syringe is removed from the refrigerator and set up to be administered to the patient, the Respiratory therapist will notify pharmacy to make and deliver a replacement dose. The Respiratory therapist will ensure that there is always a replacement dose in the refrigerator.

9. Respiratory therapist will follow the Standard Operating Procedure for assembly of the medication administration system.

10. There are two concentrations of flolan.
    a. 30,000ng/ml = 1.5 mg/50 mL
    b. 15,000ng/ml = 0.75 mg/50 mL

11. The patient's ideal body weight will determine which medication concentration should be ordered:
    a. Calculation of IBW for adult patients and as per EMR uses the formula below:
        i. Men: IBW= 50+2.3 x (height (in)-60)
        ii. Women: IBW = 45.5+2.3 x (height (in)-60)
    b. For patients with IBW $\leq$ 60kg, the concentration to be ordered and administered is 0.75 mg/50 mL.
    c. For patients with IBW > 60kg, the concentration to be ordered and administered is 1.5 mg/50 mL. (See addendum III)

12. Once Flolan is initiated, the Respiratory therapist will assess **for a positive response:**
    A-An increase in PaO2 of 20mmHg or 20%
    B-An increase in oxygen saturation by 10% if an ABG is not available
    C-A decrease in Pulmonary Artery Pressure of 20% or greater

13. Obtain ABG within six hours of Flolan initiation.

14. Patient should demonstrate response within SIX hours. In the absence of a positive response after SIX hours, notify MD for further instructions.
    a. If physician chooses to continue Flolan in absence of positive response, then wean flolan as described below.

15. If the patient demonstrates a positive response as outlined above, maintain the patient on that setting and determine readiness to **wean in 24 hours**.

16. Weaning of Flolan and FiO2: at any time during this protocol, the physician may choose to wean Flolan dose at their discretion regardless of FiO2 setting.

    a. Wean FiO2 from 100% by 10% every 2 to 4 hours as tolerated for SpO2 > or = to 90%.
    b. After the initial 24 hour period of positive response, assessment for weaning will occur every 12 hours if FiO2 is = or < 60%.
    c. For the initial weaning, decrease the dose of Flolan to 40 ng/kg/min. If the patient decompensates as evidenced by a drop in saturation > or = to 5% or decrease in PaO2 by 20 mmHg, return dose to previous setting.
    d. After 12 hours if the patient tolerates weaning, the dose can then be decreased to 30 ng/kg/min. If tolerated, continue to wean every 12 hours by 10 ng/kg/min until delivered dose is 10 ng/kg/min.
    e. If patient remains stable for 12 hours on the lowest dose per protocol, 10 ng/kg/min, notify physician for consideration of removal or further instructions.
    f. If at ANY time during a weaning attempt the patient decompensates, increase flolan dose to previous setting prior to weaning attempt.

17. Assess for patient response at the time of every single weaning attempt. Evaluate for patient tolerance and potential decompensation evidenced by a decrease in SpO2 by $\geq$ 5%, increase in

PAP by 20% or a decrease in PaO2 by 20%. If patient demonstrates any one of these, this is considered a failure to wean and the physician should be notified immediately.

18. If there are two successive failed weaning attempts hold weaning for 24 hours before attempting to wean patient again.

19. If patient condition does not improve with administration of Flolan over SIX-hour period, consult with physician at this time for further instructions. This is considered a failed Flolan trial.

III. Addendum:

1. Listed below is the medication administration table for Flolan. The concentration is based on patient weight as mentioned in #11 above. The dose is based on the protocol or by specific physician order. The rate of medication delivery is in ml/hour.

OLOLRMC Flolan Dosing chart

Patient's IBW (kg)	50 ng/kg/min	40 ng/kg/min	30 ng/kg/min	20 ng/kg/min	10 ng/kg/min
Epoprostenol 0.75 mg/50 ml (final concentration 15,000ng/ml) infusion chart					
40	8	6.4	4.8	3.2	1.6
50	10	8	6	4	2
60	12	9.6	7.2	4.8	2.4
Epoprostenol 1.5mg/50 ml (final concentration 30,000ng/ml) infusion chart					
70	7	5.6	4.2	2.8	1.4
80	8	6.4	4.8	3.2	1.6
90	9	7.2	5.4	3.6	1.8
≥100	10	8	6	4	2
Doses are based on patient IBW and should be rounded to the nearest 10kg before using this chart					

$$\text{Infusion Rate (mL/hr)} = \frac{[\text{Dose (ng/kg/min)} \times \text{IBW (kg)} \times 60\ \text{min/hr}]}{\text{Final concentration (ng/mL)}}$$

Concentration of solution:
**30,000 ng/mL = 1.5 mg/50 mL
***15,000 ng/mL = 0.75 mg/50mL