High Frequency Oscillatory Ventilation (HFOV)

**Indications:**
- Failure of conventional ventilation
- Air leak syndromes (pneumothorax, and PIE)

**Initial Settings:**

**Amplitude:** (25%-100%)
- Start with amplitude of 50%, and then adjust the amplitude in increment of 10% to get an adequate chest wall vibration and Tv of 2ml/kg
- Be cautious as Tv of more than 2 m/kg are potentially harmful

**Frequency:** (5 Hz-15 Hz)
- Start with frequency of 10 Hz.
- Preterm infants maybe managed at 15 Hz, and term infants are often best managed at 10 Hz

**MAP:** (6-25 cm)
- Starting MAP should be 2 cm H2O above that used on CMV
- in case of air leak start with MAP 1-2 cm H2O below MAP on CMV
- if starting immediately on HFOV use MAP of 8-10cm H2O
- MAP should be increased in 1-2 cmH2O every hour until adequate oxygenation is achieved. Once the baby stable in an FIO2<30%, the MAP should cautiously reduced in 1-2cmH2O every 2-4 hr as allowed by the oxygenation
Obtain an early blood gas and adjust settings as appropriate and obtain CXR to assess inflation

<table>
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<th>Poor Oxygenation</th>
<th>Over Oxygenation</th>
<th>Under Ventilation ↑PCO2</th>
<th>Over Ventilation ↓PCO2</th>
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<td>Increase FiO₂</td>
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<td>Increase Amplitude</td>
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<tr>
<td>Increase MAP (1-2cmH₂O)</td>
<td>Decrease MAP (1-2cmH₂O)</td>
<td>Decrease Frequency (1-2Hz) if Amplitude Maximal</td>
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**Frequency changes:**
- Lower frequency leads to increase total I.T (I.T should be 33% and can be decreased to 30% in air leak) and increase Tv that improve alveolar ventilation

**Amplitude changes**
- Higher amplitude will increase Tv

**Oxygenation:**
- If not oxygenating, increase MAP by 2 cmH₂O every hour until oxygenation improved or lung become hyper inflated (> 9 ribs)
- If not oxygenating with lung hyperinflation, you can decrease frequency to increase I.T
- If oxygenating adequately with hyper inflated lung, immediately decrease the MAP by 1-2 cm H₂O every 2-4 hr until lung volume return to normal
**Chest Radiography:**

- Initial chest radiograph at 1-2 hrs to determine the baseline lung volume on HFOV (normal inflation if R hemi-diaphragm at the 9th rib)

- A follow-up chest radiograph in 6 hours is recommended to assess the expansion.

- Thereafter repeat chest radiography with acute changes in patient condition.

**Weaning from HFOV:**

- Wean parameters in the following order:
  - Decrease FIO2 to < 30%
  - Decrease MAP in 1-2 cm H2O till 8-9 cm H2O steps as allowed by blood gas and oxygenation
  - Don’t wean the frequency

- MAP should be reduced before FIO2 in case of:
  - over-inflation (> 9 ribs)
  - air leak syndrome
  - reduce MAP in 1-2 cmH2O till 8-9 cm H2O

- Consider switching to conventional ventilation when: MAP < 10 cm H2O, amplitude of 25 and satisfactory blood gas

**Suctioning**

- Suction is indicated for diminished chest wall movement indicating airway or ETT obstruction or if there are visible/audible secretion in the airway

- Avoid in the first 24 hours of HFOV, unless clinically indicated.

- Increase FIO2 following the suctioning procedure

- MAP maybe temporarily increased 2 cmH2O until oxygenation improved
References:

4. RPA Newborn Care Guidelines 2006
5. Newborn Service Clinical Guideline 2010

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updated in September 2013