



## **Nursing policy For Care of a Child on High Frequency Oscillation Ventilation (HFOV)**

All nursing staff should read this policy to familiarise themselves of relevant areas prior to taking over care of a child requiring high frequency oscillation ventilation (HFOV) in PICU.

### **Standard**

- Only qualified nurses who have satisfactorily completed the paediatric intensive care orientation programme, competency booklet and are fully competent with the oscillator, may independently care for an infant/child on HFOV.
- All nurses must use this policy in conjunction with care of the ventilated child policy as this forms the foundation of all care on invasive ventilation.
- Any concerns or marked changes in the patient's condition should be reported immediately to medical staff and the nurse in charge.

### **High Frequency Oscillation Ventilation**

- High frequency Oscillation is an established treatment for both neonatal and paediatric acute lung injury, which allows effective oxygenation and ventilation whilst minimizing ventilator induced lung injury.
- This form of ventilation delivers small tidal volumes to the infant/child at fast frequencies ( rates around 600 breaths per minute).
- Both inspiration and expiration are active, maintaining recruitment achieved through the application of a constant mean airway pressure, therefore reducing the likelihood of gas trapping and preventing CO<sub>2</sub> accumulation.
- The use of the small tidal volumes causes less stretch and shear injury and alveolar over distension.
- The actual mechanism of gaseous exchange is not entirely understood, but by having a constant high mean airway pressure (MAP), recruitment of previously unventilated alveoli becomes possible.

## Indications for HFOV

Patients sometimes seen on PICU requiring this support:

- ARDS
- Pneumonia
- Bronchiolitis
- Smoke inhalation
- Septic patients, requiring high volume fluid resuscitation and capillary leak process

## Equipment

- The two machines used on the unit are the **Sensor Medics 3100A** and **3100B**, they operate by having a constant flow of fresh gas introduced into the system distal to a diaphragm which is vibrated by a motor.
- The frequency and amplitude of the vibration of the diaphragm determine the frequency and amplitude of oscillation.
- The **3100B** is sufficiently powered to ventilate patients above 35kgs.
- Inline suction is also required as disconnection from the HFOV will cause derecruitment of the alveoli. Use the same calculation for inline suction catheters as normal suction catheters; these are kept in the CSSD room in sizes 6,8,10fg

## Assessment of a patient requiring HFOV

Parameters that are routinely adjusted with HFOV include

- Fraction of inspired oxygen
- Mean airway pressure
- Amplitude (delta p) – the difference between high frequency positive and negative pressures.
- Frequency- measured in Hertz
- Percent inspiratory time
- Chest Wiggle
- ET Tapes, are they secure?

These parameters should be documented every hour on the observation chart.

Any changes should be noted in red pen.

Hourly observations should also include HR, BP, Pulse Oximetry, sedation score, equal and continuous vibrations of the chest wall. Changes in pitch and rhythm of delivered breaths.

Signs and symptoms of pneumothorax

- Decreased chest vibrations (LACK OF WIGGLE)
- Increased oxygen requirements
- Increased CO<sub>2</sub>
- Asymmetrical chest movements
- Late signs, bradycardia, hypotension, severe hypercarbia or acidosis

Obtain Arterial Blood Gas 30 minutes after initiation of therapy and after ventilation changes.

Chest X-ray at least 30 minutes after initiation of therapy to evaluate lung inflation.

- Notify medical/nursing teams if the following occur:
- Vital signs outside the doctors order parameters
- Absence of chest vibrations
- Rising CO<sub>2</sub> on blood gases
- Falling oxygen saturations
- Increase in oxygen requirements
- Agitation
- Sign/symptoms of pneumothorax

### Caring for a patient requiring HFOV

- Co-ordinate cares so that ventilation is not interrupted unnecessarily
- Reposition every 4-6 hrs or/as condition dictates. This should be done by 2 nurses to avoid disconnection of ventilator and kinking /dislodgement of endo tracheal tube
- Suction via the closed inline suction as required. Disconnection for physiotherapy only on consultants request.
- To be nursed on a repose mattress to relieve pressure areas
- Prone positioning may be requested by consultant to maximise oxygenation and ventilation
- Keep circuit humidified but free from water condensation as this impairs oscillation
- Administer analgesics, sedation and paralytics as required according to unit protocol
- Verify ventilator alarms at beginning of shift and after alterations
- Assessment of the ET tapes each shift and retaped with medical awareness.
- Tubing should be kept as straight as possible and patients head above the oscillator tubing to avoid water running down into the ET tube.
- Nurse the patient at 30 degree bed tilt.

## Parents/caregivers

Explain in understandable terms how HFOV differs from normal ventilation and reasons why their child has been commenced on this therapy

The need for sedation, analgesia, paralysing agents

Why they cannot hold their child whilst on this therapy, but can talk to and touch their child to provide comfort

Allow/encourage parents to verbalise their anxiety, fears and concerns

## **REFERENCES**

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Davies, J. Hassell, LA. Childrens Intensive Care, A nurses survival guide. 2007. Churchill Livingstone