PERSISTENT PULMONARY HYPERTENSION OF THE NEWBORN (PPHN)

A. General Points:

1. PPHN is characterised by pulmonary hypertension and extrapulmonary right to left shunting across the foramen ovale and ductus arteriosus.
2. It is associated with meconium aspiration syndrome, hypoplastic lungs, transient tachypnoea of the newborn, congenital pneumonia, neonatal sepsis (especially Gp B streptococcal sepsis), structural lung abnormalities (eg: congenital diaphragmatic hernia’s) and hyaline membrane disease. It may also be primary or idiopathic.
3. Pulmonary vasoconstriction is exacerbated by hypoxia, acidosis and hypercapnia.
4. Hypoxia exacerbated by intrapulmonary shunting with atelectasis.
5. Diagnosis is one of exclusion of cyanotic congenital heart disease or severe lung disease (PPHN may co-exist with lung disease).
6. Most patients in PICU with PPHN will be those referred for consideration of ECMO or babies with congenital diaphragmatic hernias (see separate protocol for CDH).

B. Investigations:

1. CXR.
2. Arterial gases (pre and post ductal samples can be useful).
3. ECHO – for exclusion of congenital cyanotic heart disease and also useful to assess myocardial function and severity of PPHN.
4. Routine blood work (FBC with differential, U and E’s) and blood culture.

C. Management Aims:

1. Adequate oxygenation and systemic blood pressure.
2. Lower pulmonary vascular resistance resulting in reversal of right to left shunting.
3. Minimise barotrauma.

D. Management:

1. Intubate, ventilate and oxygenate.
2. Ventilation: Servo 300, pressure control mode. Initial settings: inspiratory time 1 second, PEEP 6-10, pressure control (above PEEP) 15-20, rate 20-25. FiO2 100%. If difficulties consider PRVC in paralysed patient. If requiring peak inspiratory pressures > 28-30 consider using the oscillator.
3. Aim for a PaO2 of 8-12 and a PaCO2 of 5-7kpa.
4. Adequate sedation with morphine infusion and intermittent diazepam.
5. Initial paralysis with pancuronium. Regular review of need for paralysis.
6. Pulmonary vasodilators. Inhaled nitric oxide (iNO) is the vasodilator of choice. Consider in consultation with consultant. Start at 20 ppm and reduce to 5 ppm as tolerated. If initiation doesn’t result in a > 20% improvement in oxygenation it should be stopped.

7. Normotension. Aim to keep mean blood pressure above 45 mmHg in term infants. Start with volume, followed by dopamine or dobutamine of 5-10 mcg/kg/min. Low dose adrenaline may also be required.

8. If acidotic consider use of sodium bicarbonate 1-2 mmol/kg boluses to improve pH. Aim for pH > 7.35-7.45.