**PROTECTeD**
**Prostin for treatment of congenital diaphragmatic hernia**

**Background:** Congenital diaphragmatic hernia (CDH) still remains a condition with considerable mortality. The mortality may be purely attributable to the underlying condition i.e. these babies have such severe lung hypoplasia that they would never survive. However there is a well-recognised phenomenon of the 'honeymoon period' in these patients. Initially the babies can be ventilated with reasonable ventilatory settings leading to optimism for a positive outcome however typically over the next 24-48 hours their condition worsens requiring increasing ventilatory support, inotropes and some go into a downward spiral leading to their demise.

**What causes this?**

**Hypothesis:** All babies are born with varying degrees of lung hypoplasia however after birth pulmonary hypertension develops. When severe this means the right ventricle must pump at supra-systemic pressures for prolonged periods of time. Despite inotropic support this is not sustainable unless the pulmonary hypertension begins to improve.

**What kills babies?**
Much of neonatal management focuses on achieving 'adequate' oxygenation. However babies with complex congenital heart disease can survive with very low oxygen saturations. Foetal haemoglobin is specifically adapted for low arterial oxygen partial pressures. The most important factor in these cardiac patients is not the particular saturation but whether they maintain systemic blood pressure to ensure end organ perfusion. This can be monitored by the serum lactate or Near Infra-Red Spectroscopy (NIRS) tissue saturations.

Throughout foetal life the right ventricle pumps at systemic pressures and in patients with single ventricle morphology this situation continues postnatally. In congenital diaphragmatic hernia when the pulmonary hypertension worsens the right ventricle needs to start pumping at supra-systemic blood pressures. This is not sustainable for long periods. Once the PDA begins to close there is no 'blow-off' for the right ventricle. There are a few reports supporting the use of prostaglandin infusion to maintain ductal patency.

Possible new management strategy

- Permissible hypoxia as long as lactate is not elevated.
- Adopt a ‘cardioprotective’ strategy. Maintain ductal patency with prostaglandin infusion.

Sample size calculation: Aim to show an improvement in survival from 75% to 85%. Need 133 patients in each arm.

Study design: Patients are randomised to receive prostaglandin infusion within 12 hours of admission to ITU in 1:1 ratio if requiring ventilatory support with pressures of PIP >22.

Need to minimise differences- liver up, lung head ratio.

Exclusions: heart defects (may need prostaglandin as part of management)

Possible risks to patients

1) Apnoea- already on ventilator
2) Need another line for access
3) May need treatment for persistent PDA