GUIDELINE

Patent Ductus Arteriosus (PDA)

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this disclaimer

Aim

To provide guidance on the clinical management and follow up of infants with a Patent Ductus Arteriosus (PDA) and treatment to open a Ductus Arteriosus (DA) in pulmonary hypertension of the newborn

Risk

Failure to provide consideration to the treatment and management of a ductus arteriosus may lead to suboptimal outcome.

Background

The DA is a large vessel that connects the main pulmonary trunk with the descending aorta. In utero pulmonary resistance remains high and only 7-10% of the combined cardiac output is directed through the right and left pulmonary arteries. The bulk of the right ventricular output travels through the ductus arteriosus maintaining flow in the descending aorta and hence placental perfusion.

At birth a series of complex changes occur as an orchestrated continuum. With the first breath pulmonary capillaries open and resistance to pulmonary blood flow drops. This leads to further reduction in right sided pressures and directs the right ventricular output through the pulmonary circulation.

As systemic pressures start to exceed pulmonary pressures, blood flow through the ductus arteriosus reverses and oxygenated blood from the systemic circulation flows into the pulmonary circulation. Final functional closure occurs by 24 hours of age in around half of healthy full-term infants but may be considerably delayed in the premature infant.

Presentation

- A DA is usually clinically silent over the first couple of days of life. Echocardiography may however reveal a significant left to right shunt with reverse flow in diastole in the major blood vessels, ductal steal.
- As pulmonary vascular resistance continues to drop the left to right shunting will increase, and the DA may become clinically apparent with a cardiac murmur and increased pulse pressure.
- Continuing patency of the DA may lead to later heart failure and respiratory symptoms. Occasionally, a widely patent DA can lead to acute cardiac failure, ductal steal with impaired cardiac output, resulting in poor peripheral perfusion, metabolic acidosis, and shock.

Treatment

- The clinical management of the DA remains debated despite several hundred publications and many clinical trials.
- The ductus is likely to close without treatment in the majority of infants >28 weeks. For those infants' consideration of a review of the duct can be considered based on clinical findings such as wide pulse pressure, signs of cardiac failure or murmur.
- For infants <28 weeks echocardiography in the first 24 hours can be considered to guide decision making. Treatment of the DA can be considered in infants with increasing L to R shunt with no sign of closing or restriction in the PDA balanced with the estimated risk in the patient for side-effects. Serial echo's can be used to guide decision making.
- DA in near-term or term infants or in association with an anatomical/structural anomaly should be managed in conjunction with paediatric cardiology.
- Infants with a haemodynamically significant DA should be regularly reviewed for evidence of cardiac failure, and if present, consideration should be given to treating the DA medically, medically manage symptoms (generally through fluid restriction with or without diuretics) or surgical closure in consultation with cardiology.

Principles of Management

The NSAID available in this unit is Ibuprofen. Paracetamol can be considered as an alternative when Ibuprofen is considered to have more side-effect risk than benefit.

Monitoring of treatment response:

A. Monitoring of side-effects for the chosen medication is as per the drug monograph
B. Echo monitoring for response to treatment
   - A repeat echo can be performed after 3 days of ibuprofen to monitor for response and aid decision making re length of course.

- Repeat echo at the conclusion of treatment course is recommended and a further course of treatment can be considered based on a holistic review of the patient's clinical condition.

Surgical Ligation

Surgical ligation of the premature infant DA is only considered on a case-by-case basis and after consultation with cardiology.

Ductus arteriosus and pulmonary hypertension

In infants with raised pulmonary pressures (hypoxic respiratory failure, significant R to L shunting across a DA a patent ductus arteriosus may help relieve pressure on the RV and should not be closed. Consideration should be given to maintaining DA patency in these circumstances with Alprostadil-(Prostaglandin E1). Use of iNO may also potentiate DA patency. NSAIDs or paracetamol are contraindicated while on NO.

Related CAHS internal policies, procedures, and guidelines
Neonatal Medication Protocols: • Alprostadil-(Prostaglandin E1) • Ibuprofen • Paracetamol

References and related external legislation, policies, and guidelines

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