GUIDELINE

Polycythaemia

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 outline the causes and management of neonatal polycythaemia

Risk

High viscosity due to polycythaemia can lead to decreased perfusion resulting in multi-organ dysfunction in newborn babies

Background

Polycythaemia is defined as a venous haematocrit **(HCT) > 65% and/or haemoglobin >220 g/L[1].** Incidence in healthy neonates is 0.4 to 5%. Capillary HCT is generally higher than venous HCT which in turn is higher than 'central' HCT (from umbilical vein). Venous samples are preferred over heel prick capillary samples while managing neonates with polycythaemia.

The haematocrit increases after birth, peaks at 2-6 hours of life, then drops slowly to cord blood values at 18 hours, thereafter it stays relatively stable. Polycythaemia occurs as a result of active erythropoiesis or passive transfusion. It is common in twins, especially the second born twin[2]. Polycythaemia can be symptomatic in roughly 50% neonates[3].

Conditions that predispose newborn infants to polycythaemia include the following[3,4]:

- Delayed cord clamping
- Twin to twin transfusions (recipient twin)
- Maternal foetal transfusion

- Prenatal asphyxia
- Intrauterine hypoxia, e.g. SGA (utero-placental insufficiency)
- Maternal diabetes
- Maternal hypertension
- Maternal smoking
- Rare conditions: Beckwith-Wiedemann and Trisomies 13, 18 and 21.

Clinical Features

- Lethargy and poor feeding
- RDS (pulmonary capillary sludging), cyanosis, failure of / delayed transition
- CNS depression ~Tremors, jitteriness, seizures, coma
- Hypoglycaemia (12% to 40%)
- Hypocalcaemia
- Poor renal function (renal vein thrombosis)
- Jaundice
- NEC (mesenteric hypoxia)
- Cardiac symptoms such as tachypnoea, cyanosis, tachycardia, cardiomegaly in up to 50% of plethoric infants
- Abnormal coagulation profile, thrombocytopenia

Treatment

Asymptomatic Polycythaemia: Management of polycythaemia in neonates is controversial (Partial exchange transfusion [PET] vs. conservative management). Previous RCTs have not confirmed any proven benefits of PET in long term outcomes for those with asymptomatic polycythaemia[5]. PET can increase the risk of Necrotising enterocolitis[6]. Currently recommended treatment is supportive care for those with asymptomatic polycythaemia. Conservative management is with liberalisation of IV fluids but watch for hyponatremia.

Symptomatic Polycythaemia: Usually, babies become symptomatic when HCT reaches 70% or above. Occasionally, PET may be required even when HCT is 65% if baby is symptomatic[5,7]. PET should be considered for symptomatic infants with polycythaemia and should be performed as early as possible under intensive monitoring. Partial dilution exchange transfusion (PET) with normal saline reverses the physiological abnormalities and ameliorates symptoms. It also improves cerebral blood flow and hemodynamic parameters but doesn't improve long term outcomes.

It has good short-term hemodynamic stability with improvement in right ventricular systolic, as well as left ventricular systolic and diastolic function[8]. Although PET is generally regarded to be safe, it is associated with few complications (0.5- 3.3%).

Many of these complications are transient, such as bradycardia, apnoea, severe thrombocytopenia, hypocalcaemia and hypokalemia[3]. Recovery is predictable along with appropriate care and monitor.

- The goal is to decrease the haematocrit to 55%.
- The following formula is used to calculate the partial exchange volume[3,5].

Volume to be exchanged (mL) =	[Wt (kg) x 80 x (HCT of patient- Desired HCT)] ÷ HCT of patient

- Example: 3 kg baby who has haematocrit of 70%
- Desired haematocrit=55% [1]
- Volume to be exchanged (ml)= [3x80 x (70-55)] ÷70 = 51 ml
- Aliquots should not exceed 5 mL/kg and should be delivered or removed over 2-3 minutes.
- **Other management:** Carefully monitor babies for hypoglycaemia and thrombocytopenia and treat where indicated.

Related CAHS internal policies, procedures and guidelines

References and related external legislation, policies, and guidelines

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