Neonatal Polycythaemia, management of Full Clinical Guideline Derby & Burton

Reference no.: NIC HA05

1. Introduction

To ensure a standardised approach to the management of neonatal polycythaemia.

2. Aim and Purpose

To enable all medical staff in RDH and QHB who look after babies to identify those at risk of polycythaemia, recognise associated symptoms to provide prompt but consistent management across the trust.

3. Definitions, keywords

Keywords

- Polycythaemia
- Partial exchange transfusion
- Dilutional exchange transfusion

Definition

- Peripheral venous haematocrit ≥65% or Hb ≥220g/L [(1)]
- Capillary blood haematocrit ≥75% or Hb ≥237g/L [(1)]
- NEC: Necrotising enterocolitis
- HCT: Haematocrit
- DIC: Disseminated intravascular coagulopathy
- BWS: Beckwith Weiderman Syndrome

4. Main body of Guidelines

4.1 Causes of polycythaemia and at-risk babies

INCREASED ERYTHROPOIESIS	ERYTHROCYTE TRANSFUSION
Neonatal thyrotoxicosis	Maternal-foetal transfusion
Maternal diabetes	Twin-twin transfusion syndrome
Congenital adrenal hyperplasia (CAH)	Delayed cord clamping
Intrauterine growth restriction (IUGR)	
Postdate pregnancy	
Maternal smoking	
Pre-eclampsia/Pregnancy-induced hypertension	
Chronic or recurrent abruptio placenta	
Syndromic; Trisomy 21, 18, 13, BWS	

4.2 Presentation

Most infants with polycythaemia are asymptomatic, some may be plethoric. Symptoms are generally related to hyperviscosity and include:

- **Respiratory** – respiratory distress, cyanosis with a normal PaO2, tachypnoea, persistent pulmonary hypertension of the newborn (PPHN)
- **Cardiovascular** – congestive cardiac failure, tachycardia, prominent vascular markings on CXR due to plethora.
- **Neurological** – lethargy, irritability, seizures, jittering, poor suck, hypotonia, apnoea, abnormal cry
- **Gastrointestinal** - poor feeding, vomiting, distension, blood in stool
- **Metabolic** - hypoglycaemia due to increased red cell glucose consumption, NEC
- **Hematologic** – jaundice due to increase red cell turnover, thrombocytopenia, DIC
- **Renal** – haematuria, oliguria/anuria, renal vein thrombosis, transient hypertension
- **Skin** – plethora/deep reddish-purple colour, prolong capillary refill

4.3 Screening and detection

There is no evidence to suggest that routine screening for polycythaemia in asymptomatic babies is beneficial.[(2)] For babies with risk factors,

a. *If not already known,* it is reasonable to measure haematocrit in the presence of symptoms or concerns.

b. their feeding should be closely monitored and if any concerns, pre feed blood glucose level should be checked until two consecutive levels > 3 mmol

c. Check serum bilirubin within 24 hours of diagnosis or if clinically indicated.

d. Other tests that may be considered in At-risk babies as clinically indicated include;

- Blood gases to check oxygen level in the blood
- Blood Urea and Creatinine
- Urinalysis

4.4 MANAGEMENT

a) Early identification of at-risk babies: It is imperative to identify possible risk factors in asymptomatic babies incidentally found to have polycythaemia. These babies should be kept well-hydrated (if parenteral preferably with 10% dextrose) and HCT repeated in 6-12 hours. Those with identifiable risk factors who have bloods taken should have their results looked at/chased as soon as possible.

b) Treat underlying cause: If possible, it is most important to treat the underlying cause of the polycythaemia.

c) Hydration: If later than 24 hour of age, apparent polycythaemia may indicate dehydration and fluid replacement (preferably dextrose-containing fluid) may be more appropriate

d) **Partial exchange transfusion:** Polycythaemia is a risk factor for later neurological abnormalities. However, partial exchange transfusion carries no

clear demonstrated long-term benefit and risks of line insertion and increased risk of NEC should be considered. There is no consensus for haematocrit "triggers" for partial exchange transfusion but the following pragmatic approach is recommended:

i. Haematocrit ≥65% but <75% and asymptomatic → adequate hydration
ii. Haematocrit ≥65% and symptomatic → consider dilutional exchange transfusion
iii. Haematocrit ≥75% with or without symptoms → consider dilutional exchange transfusion

4.5 Dilutional (Partial) Exchange Transfusion

1) There is little difference in regard to clinical effectiveness between using plasma and saline. Saline is cheap, readily available and does not carry the associated transfusion infection or reaction risks. Saline is therefore recommended as the preferred partial exchange transfusion fluid.(2)

2) ***Procedure***:

a) Ensure venous or arterial access (ideally UVC/UAC). Can use peripheral access if available.

b) Calculate the Exchange Volume:

$$\frac{\textbf{80 x Weight(kg) x (measured haematocrit\% - desired haematocrit\%)}}{\textbf{measured haematocrit\%}}$$

Where 80 = estimated blood volume per kg and desired haematocrit is typically 55%.

Worked Example:
Baby with measured haematocrit of 70%, Weight = 2kg

Exchange Volume= $\frac{\textbf{80x2x(70-55)}}{\textbf{70}}$ = 35mls

In practice, this is often 20ml/kg as a calculation, double check babies at risk.

c) Use a 3-way tap on the sampling side to take off the aliquots of blood and discard. 10ml (babies > 2.5kg) or 5ml (babies < 2.5kg) should be taken off at a time over 2hours. Clearly document the volumes going in and out on the exchange transfusion chart.

d) Dilute to haematocrit of ~55% using the aliquots.

e) Monitor HR, BP, oxygen sats and RR throughout the procedure. Inspect toes, feet and buttocks for signs of circulatory compromise if using UAC or UVC
Recheck FBC 4 hours after the procedure (2) as well as gas to measure the sodium, ionised calcium and glucose and ensure adequate hydration.

f) During/after this procedure, continue to feed the baby as normal unless there are other concerns.(3)

5. REFERENCES (including any links to NICE guidance)

1. Neonatal polycythemia - UpToDate

2. Consensus Guidelines for Partial Exchange Transfusion for Polycythemia in Neonates

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4. Black VD, Luchenco LO, Luckey DW, et al. Developmental and neurologic sequelae of neonatal hyperviscosity syndrome. Paediatrics. 1982:426-31

5. Rothenburg T. Partial plasma exchange transfusion in polycythaemic neonates. Archives of Disease in Childhood 2002: 86 60-62

6. Dempsey EM and Barrington K. Short and long term outcomes following partial exchange transfusion in the polycythaemia newborn: a systematic review. Archives of Disease in Childhood 2006: 91 F2-F6

7. De wall KA. Bearts W and Offringa M. Systematic review of the optimal fluid for dilutional exchange transfusion in neonatal polycythaemia. Archives of Disease in Childhood 2006: 91 F7- F10

8. https://www.gosh.nhs.uk/health-professionals/clinical-guidelines/manual-exchange-bloodtransfusion-protocol

9. Polycythemia - newborn: MedlinePlus Medical Encyclopedia 2023

10. Polycythaemia in neonates | Safer Care Victoria

Documentation Controls

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SUMMARY NEONATAL POLYCYTHAEMIA CLINICAL GUIDELINE