# Pulmonary Haemorrhage- Full Clinical Neonatal Guideline – Joint Derby & Burton

Reference no.: NIC RC 13

## 1. Aims and Purpose

To ensure that medical staff have adequate guidance and a standardised approach to management of neonates with pulmonary haemorrhage

## 2. Introduction

Pulmonary haemorrhage or more accurately acute haemorrhagic pulmonary oedema is a life threatening neonatal medical emergency. It occurs in 3%-5% of ventilated preterm infants. It presents with acute haemorrhage from the respiratory tract and is associated with an acute deterioration in respiratory and cardiac function. It should be differentiated from the small amounts of fresh blood that may be seen following repeated suctioning of the airway in intubated infants. Concealed pulmonary haemorrhage should be suspected in at-risk infants with an acute respiratory deterioration, where other causes are excluded.

## 3. Risk Factors

1. Extreme prematurity with respiratory distress syndrome needing ventilation and surfactant
2. Intra Uterine Growth Restriction — especially babies <1500 grams
3. Patent ductus Arteriosus — is an independent risk factor
4. Sepsis and coagulopathy
5. Disorder that causes pulmonary oedema (e.g. fetal hydrops, cardiac failure).

## 4. Management of Pulmonary Haemorrhage

**Key Messages:**

- Avoid removing a patent, in-situ endotracheal tube, as haemorrhage may make subsequent intubation challenge.
- The airway/endotracheal tube may require careful suctioning to maintain patency. This is best done without disconnecting the baby from the ventilator, hence consider in circuit suction.
- Cautious fluid resuscitation is advised, with early introduction of inotropic support to maintain perfusion and blood pressure.
- Consider the use of exogenous surfactant once stable, to treat secondary surfactant deficient lung disease.

**Resuscitation:**

- **Request Urgent Cross Matched Packed Cells and Fresh Frozen Plasma if possible.** *(emergency uncross matched neonatal blood is available in labour ward fridge in Derby if needed)*
- **Airway** Avoid changing an in-situ, patent endotracheal tube in the event of pulmonary haemorrhage. It may be impossible to replace it due to the haemorrhage. Ensure the tube remains patent by careful in-circuit suctioning of the

airway, if needed – preferably without disconnecting the ventilator. A baby whose airway is not secure should be intubated immediately.

- **Breathing** Maintain oxygenation and ventilation - High PEEP (between 6-10 cms of $H_20$), high mean airway pressures and high inspired oxygen concentrations may be needed. Consider High Frequency Oscillatory Ventilation (HFOV).

- **Circulation** Obtain IV access. If there is evidence of poor perfusion (CRT >2s) or hypovolaemia (low MBP), packed cells transfusion or fresh frozen plasma should be transfused. Consider a cautious bolus of saline, if blood products are not immediately available. If this fails to establish adequate perfusion and mean blood pressure remains low, commence inotropic support – dobutamine -10microgram/kg/min. Consider the addition of adrenaline / dopamine if haemodynamically compromised despite correction of volume deficit. Fluid support should be cautious as over-exuberant fluid input may aggravate pulmonary oedema in the presence of a patent ductus arteriosus.

**Stabilisation and Ongoing management**

Urgent investigations:

- Urgent cross match
- Full blood count
- Urea and electrolytes
- Calcium and magnesium
- Blood cultures
- Blood gas
- Clotting profile (including fibrinogen) if further
- Plasma glucose
- Request Chest Xray — once stable (Consider using the Xray tray in the incubator to avoid excessing handling and risk of tube dislodging)

Correct the following as necessary:

- Anaemia – transfuse preferably cross-matched packed RBCs
- Hypoglycaemia – 2.5mls/kg of 10% dextrose
- Electrolyte disturbance
- Metabolic acidosis – consider half correction with sodium bicarbonate
- Clotting disorders – consider FFP 10mls/kg infused over 30 mins or cryoprecipitate (d/w haematologist) and repeat Vitamin K 400mcg/Kg (Max 1 mg)
- Thrombocytopenia – if platelet count <50 transfuse platelets
- Obtain arterial access for continuous blood pressure monitoring
- Frusemide: 1mg/kg IV bolus – if haemodynamically stable
- Exogenous surfactant – Curosurf (Ref Guideline No NICU RC 08)
- Ensure adequate sedation with morphine infusion.
- Muscle relaxants may be needed if requiring high mean airway pressures.
- Broad spectrum intravenous antibiotics – guided by postnatal age, recent positive microbiological cultures and current antibiotic therapy.

## 4. References (including any links to NICE Guidance etc.)


- Pandit PB Surfactant therapy in neonates with respiratory deterioration due to pulmonary haemorrhage. Paediatrics 1995;95;32-36
- Surfactant for pulmonary haemorrhage in neonates Cochrane Systematic Review - Intervention Version published: 03 February 2020
- Prevention and 18-Month Outcomes of Serious Pulmonary Hemorrhage in Extremely Low Birth Weight Infants: Results From the Trial of Indomethacin Prophylaxis in Preterm Khalid Alfaleh, John A. Smyth, Robin S. Roberts, Alfonso Solimano, Elizabeth V. Asztalos, Barbara Schmidt and ; for the Trial of Indomethacin Prophylaxis in Preterms Investigators Pediatrics February 2008, 121 (2) e233-e238; DOI: https://doi.org/10.1542/peds.2007-0028
- Prophylactic intravenous indomethacin for preventing mortality and morbidity in preterm infants Cochrane systematic review , year —-


## 5. Documentation Controls

<table>
<tr><td>Reference Number<br>NIC RC 13</td><td colspan="2">Version:<br>6.0.0</td><td colspan="2">Status<br>Final</td><td>Author: Dr Gitika Joshi<br>Job Title: Consultant</td></tr>
<tr><td rowspan="2">Version / Amendment History</td><td>Version</td><td>Date</td><td>Author</td><td colspan="2">Reason</td></tr>
<tr><td>6.0.0</td><td>Nov 2023</td><td>Dr Gitika Joshi</td><td colspan="2">UHDB guideline in consultation with Neonatal Consultants</td></tr>
<tr><td colspan="6">Intended Recipients: State who the Clinical Guideline is aimed at – staff groups etc.<br><br>All Paediatric Medical Staff, All Paediatric Nursing Staff, Emergency Department Staff</td></tr>
<tr><td colspan="6">Training and Dissemination: Cascade the information via BU newsletter and address training</td></tr>
<tr><td colspan="6">Linked Documents: State the name(s) of any other relevant documents</td></tr>
<tr><td colspan="6">Keywords: Pulmonary haemorrhage</td></tr>
<tr><td colspan="3">Business Unit Sign Off</td><td colspan="3">Group: Paediatric Business Unit Guidelines Group<br>Date: 15th December 2023</td></tr>
<tr><td colspan="3">Divisional Sign Off</td><td colspan="3">Group: Women and Children’s Division<br>Date: 21st December 2023</td></tr>
<tr><td colspan="3">Date of Approval</td><td colspan="3">28/12/2023</td></tr>
<tr><td colspan="3">Review Date and Frequency</td><td colspan="3">Dec 2026 every 3 years</td></tr>
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