Waikato District Health Board

# Guideline

## Neonatal Subgaleal Haemorrhage – Surveillance and Management

### Guideline Responsibilities and Authorisation

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|---|---|
| **Department Responsible for Guideline** | NICU |
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| **Document Facilitator Title** | Paediatrician / NICU Fellow |
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| **Document Owner Title** | Clinical Director |
| **Target Audience** | Neonatologists; Midland Region Paediatricians and Registrars; NICU Registrars, Nurse Practitioners, Clinical Nurse Specialists and Nurses; Paediatric SHOs; LMCs; Delivery and Postnatal medical and nursing staff |
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### Guideline Review History

| Version | Updated by | Date Updated | Summary of Changes |
|---|---|---|---|
| 1 | Ben McConchie/Jutta van den Boom | November 2021 | New guideline |
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# Neonatal Subgaleal Haemorrhage – Surveillance and Management

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# Neonatal Subgaleal Haemorrhage – Surveillance and Management

## 1 Overview

### 1.1 Purpose

- To outline surveillance for subgaleal haemorrhage after an instrumental delivery
- To describe the management of neonates with confirmed subgaleal haemorrhage.

The New Zealand Newborn Clinical Network Practice Recommendation *Neonatal Subgaleal Haemorrhage Practice Recommendation* (or revised versions of the recommendation) is to be considered as the Waikato District Health Board guideline for clinical management, with local practice emphasis highlighted in section 2.1 below.

### 1.2 Scope

All health professionals working in the Neonatal Intensive Care Unit (NICU), Delivery Suite, and Post-natal ward, also Paediatric SHO attending deliveries and post-natal ward at Waikato DHB, and in the Midland Region.

### 1.3 Patient / client group

Neonates delivered after successful or attempted instrumental delivery are at highest risk of developing a clinically significant subgaleal haemorrhage, particularly after vacuum assisted delivery. However, up to 1 in 2000 neonates delivered by normal vaginal delivery without instrumental assistance may develop a subgaleal haemorrhage.

### 1.4 Procedure

See Starship Children's Hospital Clinical Guideline *Neonatal Subgaleal Haemorrhage – Practice Recommendation*

Please read Starship disclaimer before proceeding further.

### 1.5 Definitions

| | |
|---|---|
| **Confirmed SGH** | A clinically confirmed diagnosis by an NNP or Paediatric RMO or SMO in cases where SGH has been suspected. |
| **NICU** | Newborn Intensive Care Unit |
| **NOC / NEWS** | Newborn Observation Chart / Newborn Early Warning Score |
| **Subgaleal haemorrhage (SGH)** | Bleeding between the galea aponeurotica and the periosteum. It is a large potential space which may hold the entire baby's blood volume |

# 2 Clinical Management

## 2.1 Surveillance

Early recognition of SGH is critical for improving survival and decreasing morbidity. Ventouse assisted birth is recognised as the most important risk factor for SGH, but SGH can develop following any type of birth (e.g. vaginal, forceps or Caesarean section).

Criteria for *"Low Risk Surveillance"* and *"Intermediate Risk Surveillance"* are listed in Appendix A, along with the recommendations for surveillance.

Any newborn under surveillance for a subgaleal haemorrhage who meets criteria for *"High Risk Surveillance"* or is diagnosed with a Confirmed SGH (see 2.2 below) must have **immediate admission to NICU** testing as described in Appendix A.

The recommendations for surveillance described in The New Zealand Newborn Clinical Network Practice Recommendation *Neonatal Subgaleal Haemorrhage Practice Recommendation* have been adapted for use at Waikato Hospital within the NOC / NEWS.

NOC / NEWS should always be used preferentially where available. Alternatively, recording sheet is available from the *Neonatal Subgaleal Haemorrahge Practice Recommendation* for the documentation of surveillance observations.

## 2.2 Diagnosis

SGH is a clinical diagnosis, and diagnosis should NOT be delayed by imaging. Findings include a large, diffuse, fluctuating mass that crosses suture lines and develops in the first hour to hours after birth.

Further clinical manifestations are described in the *Neonatal Subgaleal Haemorrhage Practice Recommendation*.

The diagnosis of Confirmed SGH is made by an NNP, or Neonatal RMO or SMO and necessitates **immediate admission to NICU**, and the management plan outlined in Appendix B.

## 2.3 Management

A newborn with Confirmed SGH must have **immediate admission to NICU** and begin the management plan outlined in Appendix B: Management of confirmed SGH

Large volumes of blood products are sometimes required (as per Appendix C: Waikato DHB Paediatric Massive Transfusion Protocol),

## 2.4 Potential complications

A SGH can lead to serious hypovolaemia with associated diffuse intravascular coagulopathy, which is a potentially life-threatening condition.

# 3 Audit

## 3.1 Indicators

- Full documentation of NOC/NEWS for babies at low and intermediate risk of subgaleal haemorrhage
- Management of Confirmed SGH in accordance with Appendix B

# 4 Evidence base

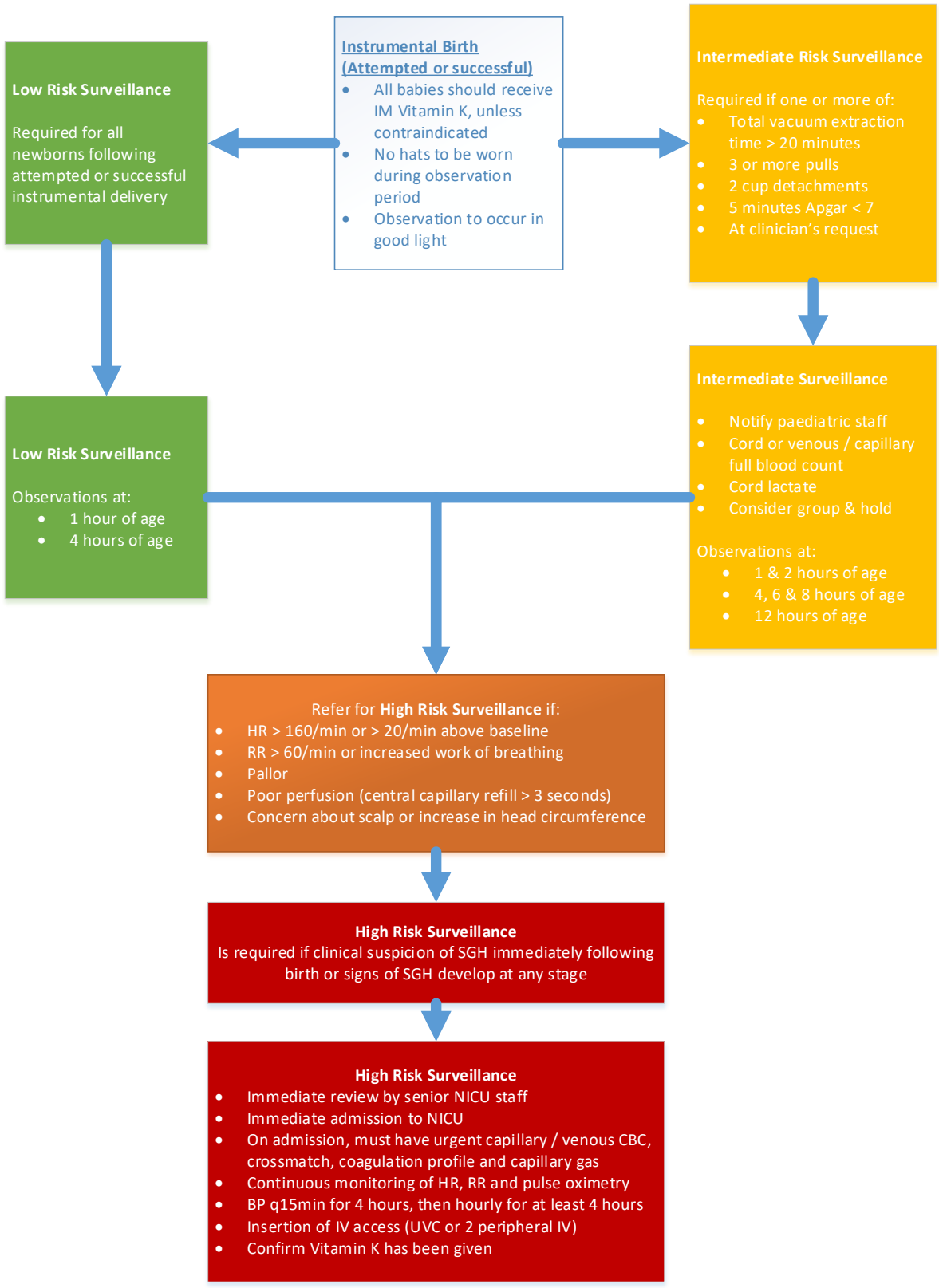
## 4.1 References


- New Zealand Newborn Clinical Network: Neonatal Subgaleal Haemorrhage Practice Recommendation https://media.starship.org.nz/practice-recommendation-for-neonatal-subgaleal-haemorrhage/Neonatal_Subgaleal_Haemorrhage_Oct_2018.pdf
- Legge N, Guaran R. Critical bleeding protocol for infants used for a catastrophic subgaleal haemorrhage. J Paediatr Child Health. 2021 May 27. doi: 10.1111/jpc.15591.


## 4.2 Associated Waikato DHB Documents

- Instrumental Vaginal Birth guideline (Ref. 6168)
- Neonatal Encephalopathy Management guideline (Ref. 1588)
- Admission to Level 3 Intensive Care Nursery procedure (Ref. 4571)
- Massive Transfusion Plan protocol (Ref. 3048)
- Newborn Observation Chart and Newborn Early Warning Score guideline (Ref. 6408)

## Appendix A: Algorithm for the Detection and Management of Neonatal SGH




Observations as per NOC NEWS include HR, colour, perfusion, activity and examination of scalp, all in a good light.
Pulse oximetry is recommended (intermittently) unless High Risk Surveillance when it will be continuous

## Appendix B: Management of Confirmed SGH

### Send for Help

- Admit to NICU
- Consider early activation of Massive Transfusion Protocol (see Appendix C), see indications under 'Circulation' below
- Consider discussion with Haematologist

### Airway and Breathing

- Continuously monitor RR and pulse oximetry
- Consider respiratory support or intubation and ventilation early

### Circulation

- Insertion of IV access (UVC/UAC or 2 peripheral IV lines)
- Urgent capillary/venous CBC, crossmatch, coagulation profile (PR, APTT, fibrinogen) and capillary gas
- Monitor HR continuously
- Monitor BP q15min for 4 hours, then hourly for at least 4 hours once stabilised
- Monitor urine output (aim for > 1 mL/kg/hour)
- Volume expansion with 10-20mL/kg of 0.9% saline if:
    - Tachycardia > 160/min or > 20/min above baseline
    - Poor peripheral perfusion or capillary refill > 3 sec
    - Mean BP < 40 mmHg in term infant
    - pH < 7.3 or lactate > 3 mmol/L
- Inotropic support may be necessary, but mainstay of treatment is volume expansion

### Blood Products and Homeostasis

- Confirm Vitamin K has been given or administer Vitamin K 1mg (= 0.1mL) IV at a rate of 1mg/minute. A dose of 1mg Vitamin K IM is also recommended at some stage.
- Coagulation profiles should be done but urgency of treatment often precludes waiting for results
- RBC transfusion if Hb < 140 g/L or at any Hb if severe hypovolaemia
  with RBC, O neg or type specific, 15ml/kg
  Can be given over 10 minutes for severe hypovolaemia or faster for extreme hypovolaemia
- If ongoing hypovolaemia, bleeding or instability due to SGH then activate 'Paediatric Massive Transfusion Protocol' (see Appendix C)
- Repeat CBC and coagulation studies every 4 hours until stable

- Aim for INR < 1.5, APTT < 40 sec, fibrinogen > 1g/L and platelets > 75 x $10^9$/L; however, transfusion of blood products should be driven by clinical picture. Therefore, once clinical stability has been achieved further transfusion can be stopped even if coagulation profile hasn't normalised yet.

**Acidosis Treatment**

Aim for pH > 7.3, lactate < 3 mmol/L

- Consider correction with Sodium Bicarbonate 8.4% if pH < 7.3 as coagulation disorders may deteriorate further at low pH
    - Half correction (mL) = *Base Excess* x *weight (kg)* x *0.3*
      (i.e. BE -10 x 3kg x 0.3 = 9 mL of Sodium Bicarbonate 8.4% diluted with 9mL of sterile H20 given over 30 minutes via IV)
- Check blood gas and re-assess if further dose is indicated

**Electrolytes and Glucose**

- Aim for normal ionized Calcium levels (1.1 – 1.35 mmol/L) as ionized Calcium < 0.6 mmol/L leads to serious coagulation disorders
- Check potassium levels as both hypo- and hyperkalaemia can occur
- Check glucose and treat appropriately

**Temperature**

- Aim for normothermia as each 1 °C drop in temperature leads to a 10% decrease in coagulation factor activity

**Other**

- Head bandaging is NOT recommended as it may increase intracranial pressure
- Imaging should await stabilisation of the infant and NOT be used to diagnose SGH
- Imaging by USS, skull X-ray, CT or MRI can be helpful to diagnose complications and co-morbidities such as hypoxic-Ischemic Encephalopathy (HIE), dural tears, sagittal sinus rupture or skull fracture
- Check SBR and treat early with phototherapy as sick babies are at increased risk of kernicterus
- Keep parents informed and obtain consent for blood products transfusion

## Appendix C: Waikato DHB Paediatric Massive Transfusion Protocol

# Paediatric Massive Transfusion Protocol (MTP)

## CRITICALLY BLEEDING CHILD

### Crisis leader responsibilities
**(Should be a registrar or consultant)**

Assign an MTP Coordinator and manage crisis

**(MTP Coordinator must be a clinician)**

### MTP Coordinator responsibilities
Activate and Manage MTP

- Call the operator on **99777**
- For each state "I am activating the Paediatric Massive Transfusion Protocol – Alpha, Bravo or Charlie'
- State **patients name, NHI and location.** The operator will ask additional details as needed
- Send blood request form to Blood Bank with patient's details, weight and MTP clearly indicated on the form
- Use the designated MTP attendants to collect each pack of blood products as required
- Assess patient continuously for the ongoing need for MTP and liaise with the crisis leader
- Make the decision to cancel MTP and inform **both** Blood Bank and MTP attendant immediately
- Complete **and sign** MTP cancellation card and give to MTP attendant to take to Blood Bank

### Blood Bank responsibilities
Ext 94002

- Send MTP cancellation card and Paediatric MTP protocol in pack one
- Notify NZBS medical officer after issuing pack one of MTP

### MTP Attendants responsibilities
Ext 24082

- Collect first pack from Blood Bank
- Display MTP green sticker on your person where visible
- Keep some form of patient ID with you
- Collect packs **ONLY** as instructed by MTP Coordinator ***OTHERWISE STAY*** with the patient until MTP cancelled
- Return completed and signed cancellation card and any unwanted blood products back to Blood Bank
- **DO NOT** put green/white bags in red boxes

### Additional treatment thresholds

- Ongoing haemorrhage after pack 3 – if INR > 1.5 or APTT >40 consider additional 20ml/kg FFP
- If ionized $Ca^{++}$< 1 mmol/L give 0.1ml/kg CaCl
- If fibrinogen < 1.5g/L consider additional 10ml/kg Cryoprecipitate
- If platelets <75x$10^9$/L consider an additional 10ml/kg of Platelets

**Recommend using TEG to guide needs**

### Calcium
For 10% Calcium Gluconate, give three times the ml/kg of 10% Calcium Chloride

**DO NOT** mix calcium and blood in same IV line

### Tranexamic Acid (TXA)
Loading dose: 15mg/kg (max 1 gm)

Consider maintenance infusion: 2mg/kg/hour

### Additional contacts:
Coagulation lab – Ext 98459 – Pager 20073

Duty anaesthetist – Mobile 23322

### Designate a Crisis Leader
Ensure delivery of X-match specimen to Blood Bank

Request urgent blood

| ALPHA | BRAVO | CHARLIE |
|---|---|---|
| 0-10 kg | 11-20kg | 21-45kg |
| 1u whole blood Plasma Reduced O Neg | 1u adult RBC O Neg or type specific | 1u adult RBC O Neg or type specific |
| Give 15ml/kg | Give 150mls | Give 1 unit |

Massive bleeding with either shock or abnormal coagulopathy

**Activate MTP Coordinator role**

### Activate MTP
Ring the operator on **99777** and state you are activating an **MTP**

Send blood request form to Blood Bank with **patient ID, weight and 'MTP' clearly indicated**

Operator to check patient has received appropriate RBC for weight

If **yes,** Blood Bank will send MTP pack one for Alpha, Bravo or Charlie

If **no,** Blood Bank will send RBC as per Alpha, Bravo or Charlie

### REQUEST, DELIVER AND TRANSFUSE AS BELOW:

| ALPHA 0-10kg | BRAVO 11-20kg | CHARLIE 21-45kg |
|---|---|---|
| **MTP PACK ONE**<br>1u Adult RBC<br>1u Cryoprecipitate<br>1u Adult FFP<br>1u Neonatal Platelet | **MTP PACK ONE**<br>1u Adult RBC (give all)<br>1u Cryoprecipitate (5ml/kg)<br>CaCl 0.1ml/kg<br>Check coags, FBC, $K^+$/Ca | **MTP PACK ONE**<br>2u Adult RBC (give both)<br>2u Cryoprecipitate (5ml/kg)<br>CaCl 0.1ml/kg<br>Check coags, FBC, $K^+$/Ca |
| Transfuse 10ml/kg of each in the following order:<br>A: RBC, Cryo, RBC, FFP, CaCl 0.15ml/kg<br>B: RBC, FFP, RBC, Platelets, CaCl 0.15ml/kg<br>*Alternate* A and B | **MTP PACK TWO**<br>1u Adult RBC (10ml/kg)<br>1u Adult FFP (10ml/kg)<br>1u Cryoprecipitate (5ml/kg)<br>CaCl 0.1ml/kg<br>Consider TXA | **MTP PACK TWO**<br>2u Adult RBC (10ml/kg)<br>2u Adult FFP (10ml/kg)<br>2u Cryoprecipitate (5ml/kg)<br>CaCl 0.1ml/kg<br>Consider TXA |
| Consider TXA<br>Beware of $K^+$<br>Check coags, FBC, ABG's, $K^+$/$Ca^{++}$<br>Recommend TEG use | **MTP PACK THREE**<br>1u Adult RBC (20ml/kg)<br>1u Adult FFP (10ml/kg)<br>1u Adult Platelet (5ml/kg)<br>CaCl 0.1ml/kg<br>*Alternate* packs 2 and 3<br>Beware of $K^+$<br>Check coags, FBC, ABG's, $K^+$/$Ca^{++}$<br>Recommend TEG use | **MTP PACK THREE**<br>3u Adult RBC (20ml/kg)<br>2u Adult FFP (10ml/kg)<br>1u Adult Platelet (5ml/kg)<br>CaCl 0.1ml/kg<br>*Alternate* packs 2 and 3<br>Beware of $K^+$<br>Check coags, FBC, ABG's, $K^+$/$Ca^{++}$<br>Recommend TEG use |

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