

Document No: 1945381

This is a controlled document. The electronic version of this document is the most up to date and in the case of conflict the electronic version prevails over any printed version. This document is for internal use only and may not be accessed or relied upon by 3rd parties for any purpose whatsoever.

TITLE: Neonatal Subgaleal Haemorrhage Practice Recommendation

1. Statement/Purpose

The guideline outlines a diagnosis and management of newborns with suspected subgaleal haemorrhage (SGH). It also outlines the surveillance of all babies at risk of SGH.

2. Scope

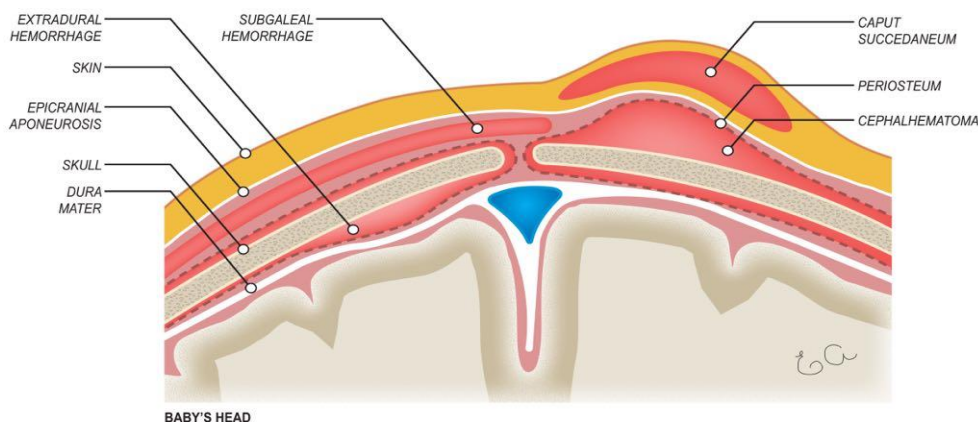
Paediatric RMOs and SMOs, SCBU nursing staff, DHB and LMC midwives.

3. Definitions

A subgaleal haemorrhage (SGH) or subaponeurotic haemorrhage is a rare but life-threatening condition in a newborn baby. It is caused by rupture of the emissary veins, which are connections between the dural sinuses and the scalp veins. Rupture of these veins results in bleeding into the space between the galea aponeurotica and the periosteum, the subgaleal space.

The subgaleal space is a layer consisting of loose connective tissue covering the entire cranial vault. This subgaleal space is not limited by sutures.

As a SGH is not limited to sutures, in contrast to a cephalohematoma (see figure 2), a large amount of blood, up to a baby's whole blood volume, can accumulate into the subgaleal space. Therefore, a SGH in the newborn can lead to serious hypovolemia and is recognised as a rare but life-threatening condition.



Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 1 of 13	

Figure 2: Schematic drawing of the anatomical position of different swellings that can occur on a newborn head. Please note that a cephalohematoma is not crossing suture lines.

4. Incidence

The incidence of SGH has been estimated to be 1 in 2,000 for normal vaginal deliveries with an increase to 1 in 200 for vacuum assisted deliveries. At Lakes DHB the instrumental delivery rate is about 5% of all births with 3.6% being vacuum assisted delivery.

Mortality as a result of SGH has been described to be as high as 17-25% but earlier or better recognition has decreased mortality to 5-14% over recent years. The mean time to diagnosis of a SGH is 1-6 hours after birth.

5. Prompt Diagnosis and Early Aggressive Management

Prompt diagnosis and early aggressive management of SGH can decrease mortality and morbidity.

Vacuum exposure or delivery with vacuum is recognised as the most important risk factor for development of a SGH but a SGH can also develop following spontaneous, forceps or Caesarian delivery.

6. Risk Factors For Development of SGH

Compared to obstetric forceps, the vacuum extractor is easier to apply and has less maternal injuries. However, the vacuum extractor is associated with significantly more fetal injuries, including SGH.

Well recognized risk factors for development of SGH in a newborn are:

- Vacuum delivery or attempted vacuum delivery, especially if:
 - inappropriate placement of vacuum cup,
 - prolonged vacuum >20 min,
 - 3 or more pulls (i.e. traction during 3 or more contractions),
 - detachment of vacuum cup,
 - performed at < 36 weeks (relatively contra-indicated at < 36 weeks and contra-indicated at < 34 weeks),
- Maternal: Nulliparity
- Fetal: haemophiliac

7. Clinical Manifestations

SGH is a clinical diagnosis with a large, diffuse, fluctuating mass that crosses suture lines and develops in the first hour to hours after birth. **Diagnosis should NOT be delayed by imaging** as prompt action is necessary, and delay awaiting confirmatory tests could be fatal.

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 2 of 13	

- Features
 - APGAR <7 at 5min without asphyxia
 - Haemodynamic instability (increased HR, increased RR or WOB, pallor, prolonged capillary refill, metabolic acidosis, low BP)
 - Anaemia, coagulopathy

- Localised signs
 - Generalised scalp swelling, which is movable, fluctuant or ballotable, crossing suture lines, gravity dependent
 - Examine the supine infant by lifting head forward and using both hands behind the occiput; feel for fluctuance, try to push any swelling forward and if it moves forward freely, this indicates SGH.
 - Displacement of ears, peri-orbital oedema
 - Increased head circumference (late sign as approximately 35 ml of blood is needed to increase head circumference by ~ 1 cm)
 - A 1-cm increase in the depth of the subgaleal space may contain from 40mL to 260mL of blood. 7,8
 - A fluctuant swelling localized to one skull bone (usually the parietal bone) is a cephalohaematoma, and is benign. Pitting oedema suggests a caput succedaneum, also benign.

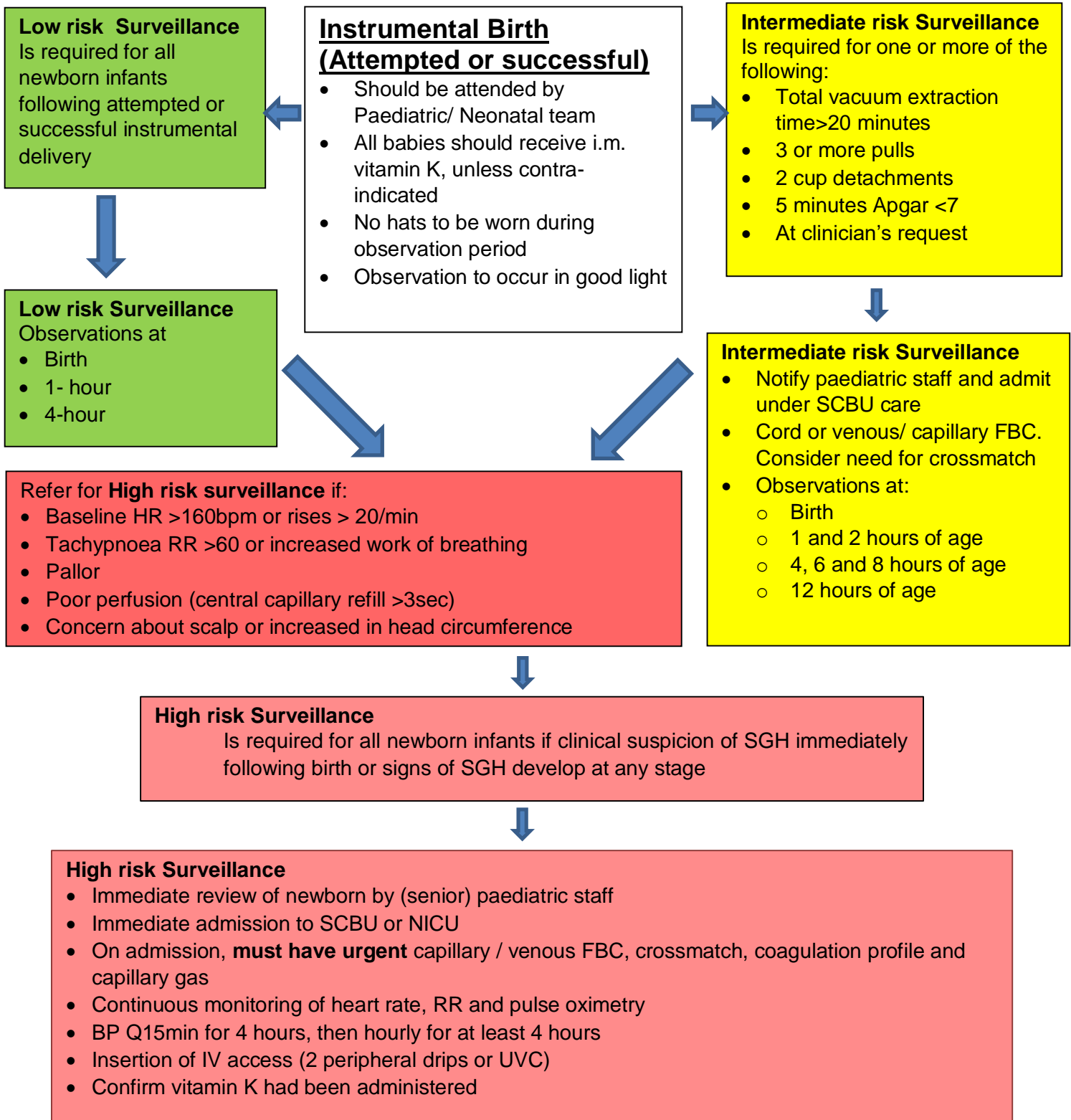
Bleeding into the subgaleal space can lead to significant hypovolemia, anaemia and coagulopathy as a newborn's estimated blood volume is 80mL/kg; therefore, blood loss of 48 ml in 3 Kg baby equals loss of 20% of circulating volume.

8. Standards To Be Met

The intensity of neonatal surveillance (level 1, 2 or 3) should be based on the perceived risk of development of a SGH and is dependent on both clinical circumstances and neonatal condition.

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 3 of 13	

Algorithm for Detection and Management of Subgaleal Haemorrhage (SGH) in the Newborn



□

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 4 of 13	

Management of confirmed SGH				
Send for help				
Admit to SCBU/NICU Discuss with level 3 unit within hour of diagnosis Plan for early transfer If available locally, activate Massive Transfusion Protocol or alternatively, follow order and dose of blood products as suggested in ADHB Paediatric MTP (appendix 2). Consider discussion with hematologist				
Airway and breathing				
Continuously monitor RR and pulse oximetry (use newborn early warning trigger and track (NEWTT) if available) Consider respiratory support or intubation and ventilation early				
Circulation				
Insertion of IV access (2 peripheral IV drips or UVC/UAC) Urgent capillary/venous FBC, crossmatch, coagulation profile (PR, APTT, Fibrinogen) and capillary gas Monitor HR continuously (use NEWTT if available) Monitor BP Q 15 min for 4 hours, then hourly for at least 4 hours once stabilised Monitor urine output (aim for > 1 ml/Kg/hour) Volume expansion with 10-20 ml/Kg of NaCL 0.9%, if: Tachycardia > 160 bpm or > 20 bpm above baseline Poor peripheral perfusion or capillary refill > 3 sec Mean blood pressure < 40 mmHg in term infant pH < 7.3 or lactate > 3 Inotropic support may be necessary but mainstay for treatment is volume expansion.				
Blood products and haemostasis				
Confirm vitamin K has been given or administer vitamin K 1mg iv Coagulation profiles should be done but urgency of treatment often precludes waiting for results. RBC transfusion if Hb < 140 g/L but consider transfusing if Hb >140g/l and baby has signs of shock RBC, O neg or type specific, 15 mL/Kg Can be given in 10 min for severe hypovolemia or faster for extreme hypovolemia. If ongoing hypovolemia, bleeding or instability due to SGH either activate Massive Transfusion Protocol , if available locally, or follow order and dose of blood products as suggested below / in ADHB Paediatric MTP (appendix 2). Inform EARLY local laboratory or bloodbank. Transfuse 10 mL/Kg of each in following order: RBC, FFP, RBC, Cryo Administer 0.15 mL/Kg of CaCl 10% or 0.45 mL/Kg of CaGluc 10%. Do NOT administer calcium in same IV line at same time as blood products.				
Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 5 of 13

Transfuse 10 mL/Kg of each in following order: RBC, FFP, RBC, platelets.
Administer 0.15 mL/Kg of CaCl 10% or 0.45 mL/Kg of CaGluc 10%.
Repeat step 1 to 5 if indicated.
Stop transfusing and inform laboratory/bloodbank once clinically stable.

Repeat FBC and coagulation studies every 4 hours until stable.

Aim for INR <1.5, APTT < 40 s, fibrinogen > 1 g/L and platelets > 75 x 10⁹/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.

Consider correction with NaBic 8.4% if pH < 7.3 as coagulation disorders may deteriorate further at a low pH.

Half correction (ml) = BE x weight (Kg) x 0.3

(i.e. BE -10 x 3 kg x 0.3 = 9 mls of NaBic 8.4% diluted with 9 mls of H₂O given over 30 min 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 hyperkalemia can occur.

Check glucose and treat appropriately.

Temperature

Aim for normothermia as each 1 °C drop in temperature leads to 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 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.

9. Related Documentation

- Approximate Coagulation Reference for Newborn (Appendix 1)
- ADHB Paediatric Massive Transfusion Protocol (Appendix 2)
- Documentation of surveillance of babies at risk of Subgaleal haemorrhage (SGH) on postnatal ward and in SCBU (Appendix 3, 4)

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 6 of 13	

10. References

This guideline has been adopted from New Zealand Neonatal Clinical Network Neonatal Subgaleal Haemorrhage Practice recommendation which is available on Newborn clinical guidelines under Starship hospital guidelines

<https://www.starship.org.nz/media/575544/neonatal-subgaleal-haemorrhage-oct-2018.pdf>

Prepared by: Sarka Davidkova

Authorised by: Child Health CQI

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 7 of 13	

Appendix 1: Approximate Coagulation Reference for Newborn

Table 1

Approximate coagulation reference range values in newborns compared with older children and adults^a [1-4]

Test or level	Preterm infant, 30-36 GA, at day 1	Preterm infant, 30-36 GA, at day 30	Term infant, at day 1	Children 1-12 mo	Children 1-5 y	Children 6-10 y	Children 11-16 y	Adults
PT ^a (s)	10.6-16.2	10.0-13.6	14.4-16.4	11.5-15.3	12.1-14.5	11.7-15.1	12.7-15.1	11.5-14.5
aPTT ^a (s)	27.5-79.4	26.9-62.5	34.3-44.8	35.1-46.3	33.6-43.8	31.8-43.7	33.9-46.1	28.6-38.2
Fibrinogen (g/L)	1.5-3.25	1.50-4.14	1.92-3.74	0.82-3.83	1.62-4.01	1.99-4.09	2.12-4.33	1.9-4.3
PFA-100 collagen/ADP closure time (s)			40-92			89 ± 20		
Bleeding time (min)						2.5-13		1-7 [25]
vWF (U/mL)	0.78-2.10	0.66-2.16	0.50-2.87			0.44-1.44		0.50-1.58
Factor II (U/mL)	0.20-0.77	0.36-0.95	0.41-0.69	0.62-1.03	0.7-1.09	0.67-1.10	0.61-1.07	0.78-1.38
Factor V (U/mL)	0.41-1.44	0.48-1.56	0.64-1.03	0.94-1.41	0.67-1.27	0.56-1.41	0.67-1.41	0.78-1.52
Factor VII (U/mL)	0.21-1.13	0.21-1.45	0.52-0.88	0.83-1.6	0.72-1.5	0.7-1.56	0.69-2	0.61-1.99
FVIII (U/mL)	0.50-2.13	0.50-1.99	1.05-3.29	0.54-1.45	0.36-1.85	0.52-1.82	0.59-2	0.52-2.90
FIX (U/mL)	0.19-0.65	0.13-0.80	0.35-0.56	0.43-1.21	0.44-1.27	0.48-1.45	0.64-2.16	0.59-2.54
Factor X (U/mL)	0.11-0.71	0.20-0.92	0.46-0.67	0.77-1.22	0.72-1.25	0.68-1.25	0.53-1.22	0.96-1.71
Factor XI (U/mL)			0.07-0.41	0.62-1.25	0.65-1.62	0.65-1.62	0.65-1.39	0.67-1.96
Factor XII (U/mL)			0.43-0.8	0.2-1.35	0.36-1.35	0.26-1.37	0.14-1.77	0.35-2.07
AT (U/mL)	0.39-0.87	0.48-1.08	0.58-0.9	0.72-1.34	1.01-1.31	0.95-1.34	0.96-1.26	0.66-1.24
α ₂ -Macro-globulin (U/mL)	0.95-1.83	1.06-1.94	0.95-1.83			1.28-2.09		0.52-1.20
Protein C clotting (U/mL)	0.17-0.53	0.21-0.65	0.24-0.4	0.28-1.24	0.5-1.34	0.64-1.25	0.59-1.12	0.54-1.66
Protein S (clotting; U/mL)	0.12-0.60	0.33-0.93	0.28-0.47	0.29-1.62	0.67-1.36	0.64-1.54	0.65-1.4	0.54-1.03

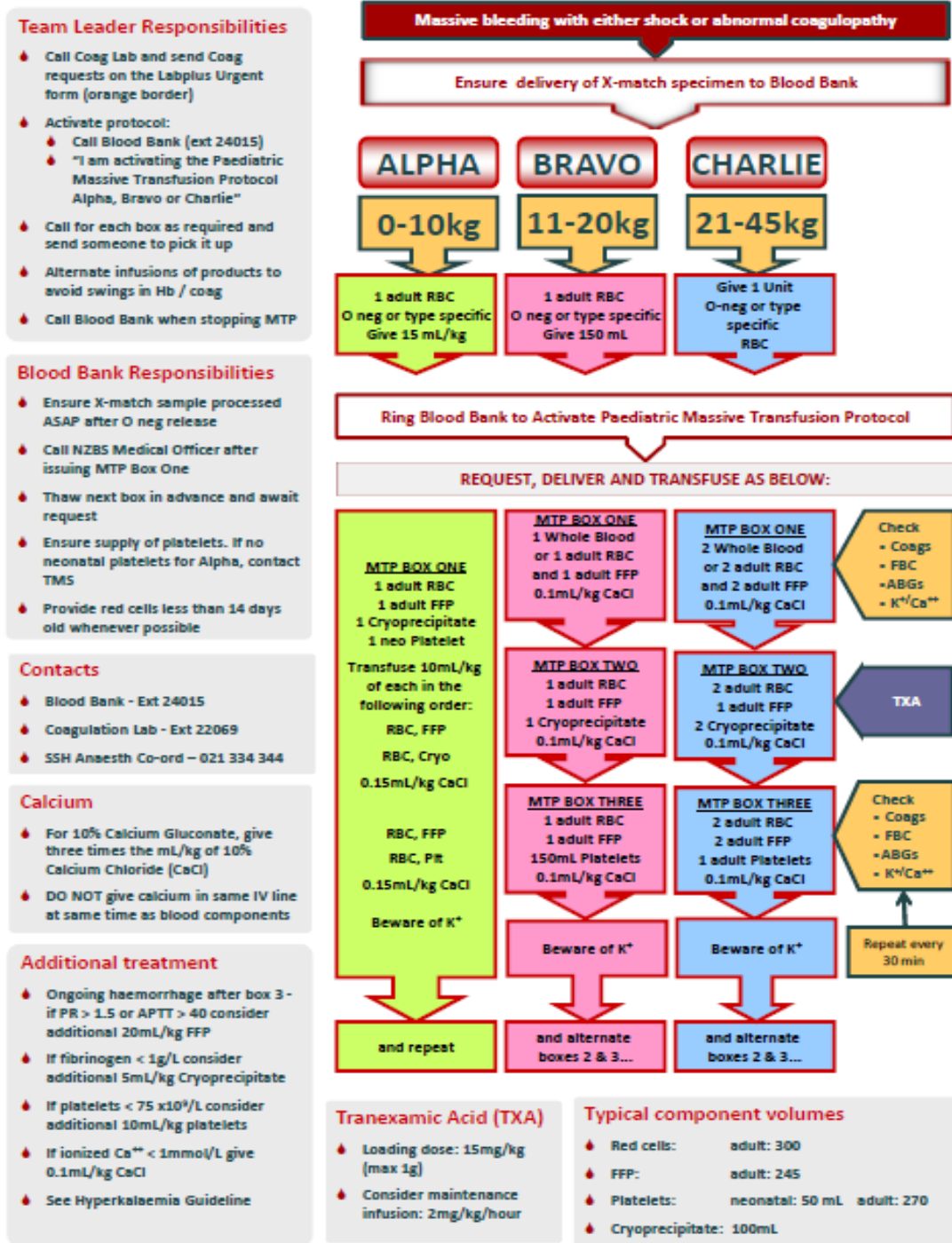
Abbreviations: GA, gestational age in weeks; PT, prothrombin time; aPTT, activated partial thromboplastin time; PFA, platelet function analyzer; ADP, adenosine diphosphate.

^a Actual reference ranges vary between laboratories and for different reagents and assays.

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 8 of 13	

Appendix 2: ADHB Paediatric Massive Tranfusion Protocol (MTP) (Lakes DHB follows this guideline)


ADHB Paediatric Massive Transfusion Protocol (MTP)



Paediatric MTP version 7 final

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 9 of 13	

Appendix 3.


 <p style="font-size: 8px; margin-top: 5px;">LAKES DISTRICT HEALTH BOARD</p>	Patient Label here			
<h3 style="margin: 0;">Low risk surveillance of babies at risk of subgaleal haemorrhage in maternity unit</h3> <ul style="list-style-type: none"> Applies to all babies following attempted or successful instrumental delivery For babies at intermediate risk, please refer to Paediatrics for SCBU admission for intermediate risk surveillance . See over for risk criteria 				
Age	Birth (hh:mm)	1 h	4 h	Urgent Paediatric review if:
Heart rate (beats per min) <i>Write value in box</i>				HR > 160bpm or rise of >20 bpm
Respiratory rate (breathes /min) <i>Write value in box</i>				RR > 60 bpm
Work of breathing increased <i>(yes/no)</i>				Work of breathing increased (any)
Saturation (%) <i>Write value in box</i>				Saturation < 92%
Colour <i>circle box</i>	Normal	Normal	Normal	Pale or Extremely pale ++
	Pale	Pale	Pale	
	Pale ++	Pale ++	Pale ++	
Perfusion: central capillary refill time (*see below) <i>Circle box</i>	< 3 sec	< 3sec	< 3	Perfusion > 3 sec
	>3sec	> 3sec	> 3sec	
Scalp check <i>circle box</i>	Normal	Normal	Normal	Any increase in scalp swelling
	Increasing swelling	Increasing swelling	Increasing swelling	
	° Fluctuant boggy mass	° Fluctuant boggy mass	° Fluctuant boggy mass	
Record Head Circumference at birth & repeat if swelling occurs. <i>Write value in box</i>	HC (cm):	HC(cm):	HC(cm):	
Completed by Name:				
Signature:				
Role:				
Referred to (if reqd):				
Time (hh:mm)				
*to check perfusion – press on babies sternum for 5 seconds and assess time for colour to return *Fluctuant defn: unstable, changeable, yields to pressure by palpating fingers				

CREATIVE COMMONS COPYWRIGHT - cc-by6-nc-sa-4.0

DO NOT WRITE IN THIS BINDING MARGIN


EDMS # 1945381 Version: 3.0 Date:

Lakes District Health Board Woman, Child & Family	Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.	Document Number: 1945381
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021
	Version: 3.1	Page: 10 of 13

CREATIVE COMMONS COPYWRIGHT - cc-by6-nc-sa-4.0 DO NOT WRITE IN THIS BINDING MARGIN Version: 3.0 Date: EDMS # 1945381	 LAKES DISTRICT HEALTH BOARD	Patient Label here
<h2 style="margin: 0;">Babies at risk of subgaleal haemorrhage following birth</h2>		
<p>Low risk</p> <ul style="list-style-type: none"> Is required for all newborn infants following attempted or successful instrumental delivery <p>Low risk Surveillance</p> <ul style="list-style-type: none"> Can be cared for in Maternity Observations (as per chart over) <ul style="list-style-type: none"> Birth 1- hour 		
<p>Intermediate risk</p> <ul style="list-style-type: none"> Is required for one or more of the following: <ul style="list-style-type: none"> Total vacuum extraction time > 20 minutes 3 or more pulls 2 cup detachments 5 minutes Apgar < 7 At clinician's request <p>Intermediate risk Surveillance</p> <ul style="list-style-type: none"> Notify paediatric staff and admit under SCBU care Cord or venous/ capillary FBC. Consider need for crossmatch Observations (as per chart over) <ul style="list-style-type: none"> Birth 1 and 2 hours of age 4, 6 and 8 hours of age 12 hours of age 		
<p>High risk Surveillance</p> <ul style="list-style-type: none"> Is required for all newborn infants if clinical suspicion of SGH immediately following birth or signs of SGH develop at any stage Requires urgent admission to SCBU 		
<p>PLEASE NOTE: This form is to be used for babies at low risk of subgaleal haemorrhage. Use in conjunction with Lakes DHB Neonatal Subgaleal Haemorrhage Practice Recommendation EDMS #</p>		

Lakes District Health Board Woman, Child & Family	Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.	Document Number: 1945381
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021
	Version: 3.1	Page: 11 of 13

Appendix 4.

 <p>LAKES DISTRICT HEALTH BOARD</p>	Patient label here
--	--------------------

Surveillance of newborns at intermediate risk of Subgaleal haemorrhage in SCBU

- Admit to SCBU initially, if baby stable, can be with mum on the perinatal ward in between observations, observations to be done in SCBU/ SCBU staff
- Record all data at birth, then at 1 hr, 2, 4, 6, 8 and 12 hours of age

Age	Birth	1 h	2 h	4 h	6 h	8h	12 h	Urgent Paediatric review if:
Heart rate (bpm)								Heart rate > 160bpm or rise of >20 bmp
Resp rate (bmp)								Resp rate > 60 bmp
Work of breathing increased (yes/no)								Work of breathing increased
Saturation (%)								Saturation < 92%
BP (MAP)								If MAP<40
Colour	<ul style="list-style-type: none"> • Normal • Pale • Pale ++ 							Pale or Extremely pale ++
Central Capillary refill time	< 3 sec > 3 sec							Perfusion > 3 sec
Lactate- at 1hr, 4 hrs or as required		mmol/l	mmol/L					Lactate > 3mmol/L
Scalp (check HC at birth and if swelling increases)	<ul style="list-style-type: none"> • HC(cm) • Normal • Increasing swelling • Boggy fluctuant mass 							Abnormal exam Urgently if SGH
Completed by Name: Sig: Role:								
Referred to: at: (hh:mm)								

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 12 of 13	

Lakes District Health Board Woman, Child & Family		Key Word(s): neonatal, infant, subgaleal, haemorrhage, bleeding, CH. Child health, SCBU.		Document Number: 1945381	
Authorised by: Child Health CQI	Issue Date: November 2019	Review Date: November 2021	Version: 3.1	Page: 13 of 13	

Processed By: Nicola McDonald