Neonatal Clinical Resources

MATERNITY

Christchurch Women's Hospital

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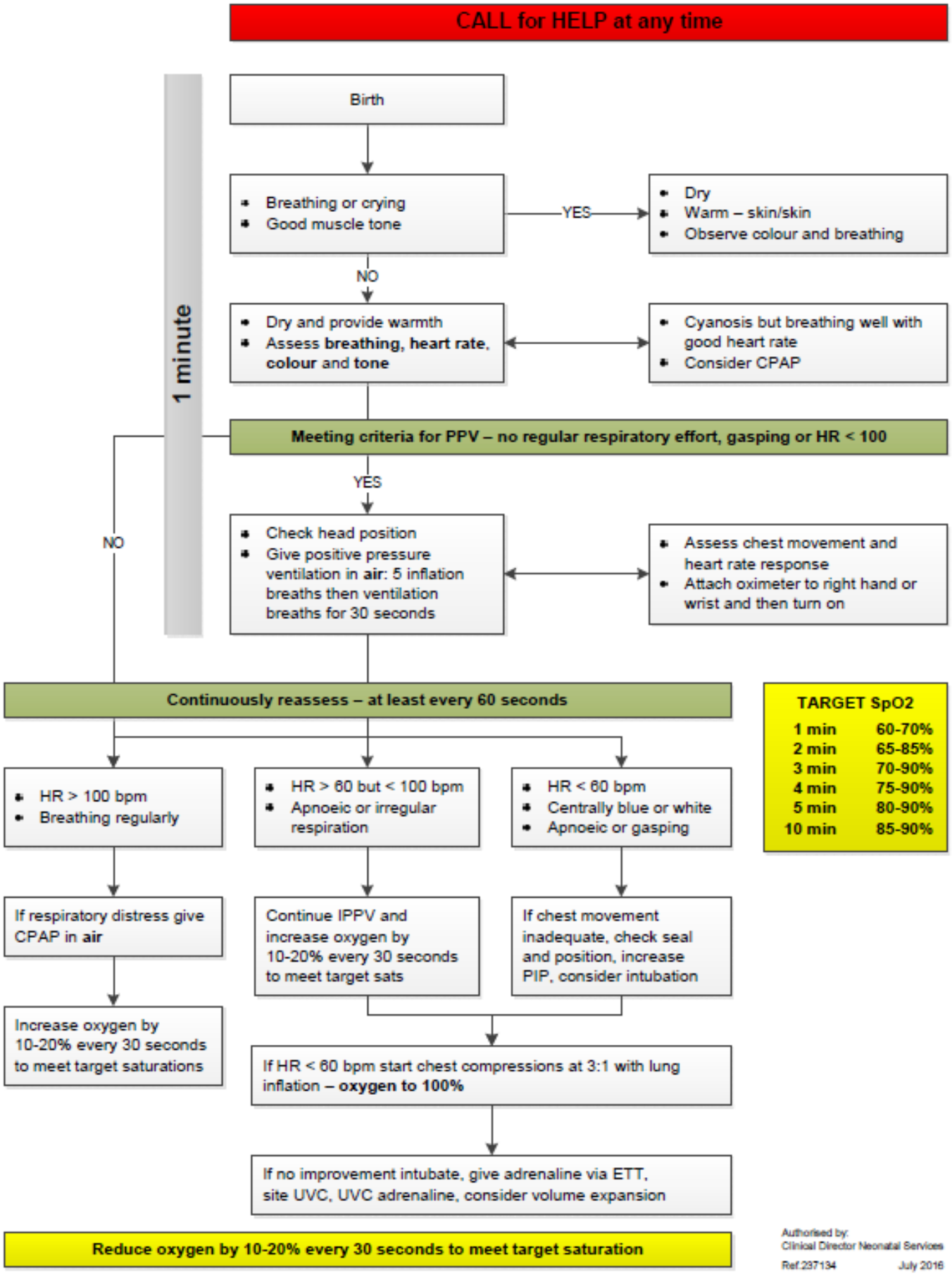
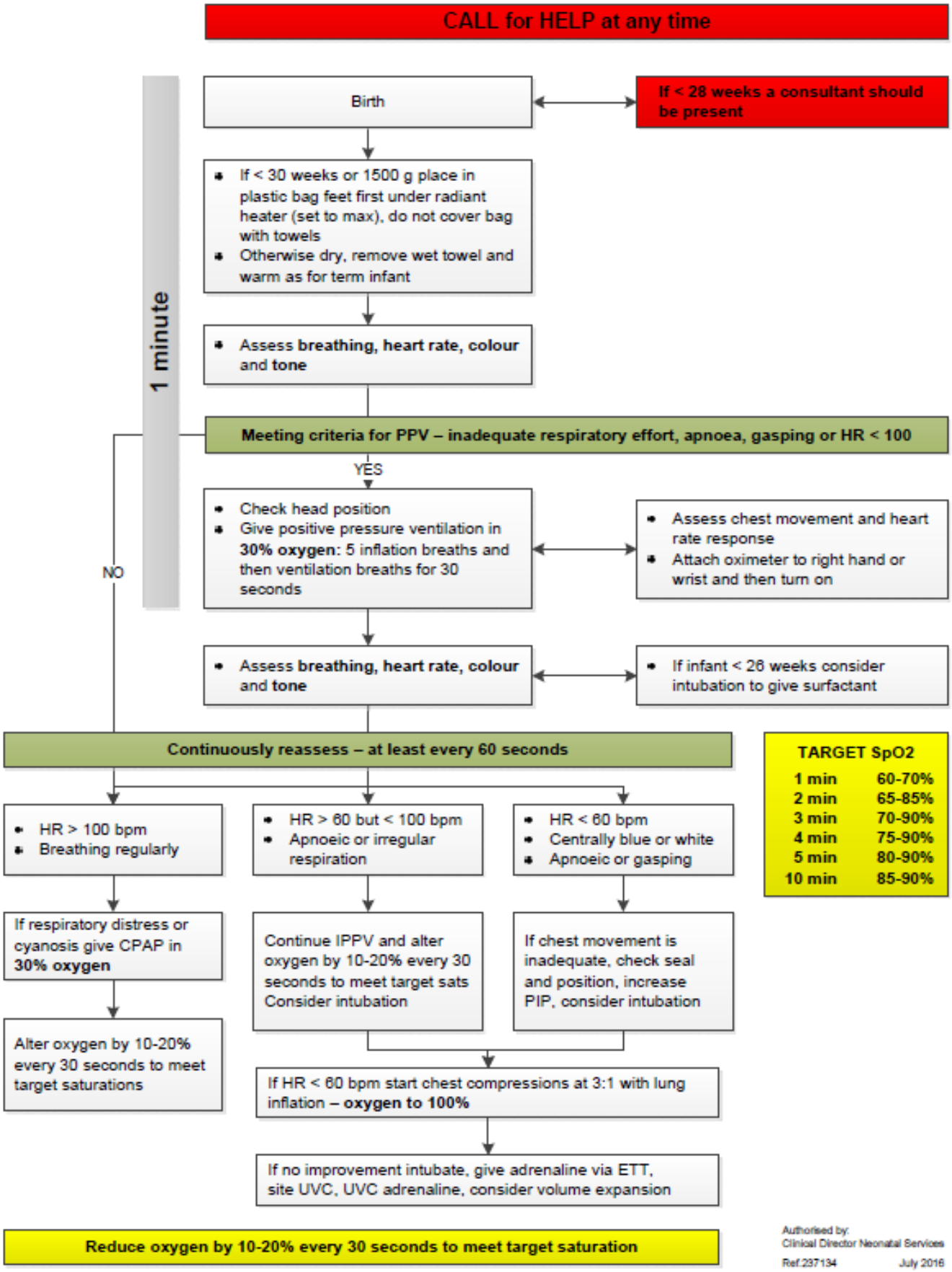
❖ NEWBORN RESUSCITATION ALGORITHMS

Term (≥ 37 weeks)



Preterm (< 37 weeks)



❖ NEWBORN ASSESSMENT AND DOCUMENTATION

Newborn Observation Chart and Newborn Early Warning Score (NEWS)

- Newborn observations are part of the 0-2 hour and 24 hour newborn assessments completed in the majority of babies by their LMC. We recommend these are documented on the Newborn Observation Chart (Ref.2401230) to provide a single view of clinical information and assist in recognising trends which may indicate a baby's condition has deviated from the norm
- Early warning scores are now part of the standard of care for the Canterbury Health System which is the purpose of the introduction of NEWS as a component of the Newborn Observation Chart. Early warning scores aim to augment clinical decision making in detecting early the deteriorating baby/patient and accessing higher levels of care earlier to improve outcomes
- For some newborns, there are impacts from antenatal risk factors, in-utero growth and intrapartum events that increase the risk for term and near term newborns to show signs of compromise. The gestation group of babies 35-41+ weeks are mostly cared for on postnatal wards from birth. 8-9% of term infants 37 weeks or more are admitted to the neonatal unit but they account for 50-55% of the admissions to NICU's.
- Audit has shown that the babies who transfer from a secondary care facility to a primary facility before 6 hours of age have been identified as a higher potential for retrieval if they have been exposed to sepsis risk, meconium or fetal distress and are included in the NEWS risk factor group

Rationale for Newborn Observations

The key risk factors for newborns needing higher levels of observation and care include:

- Late preterm infants: born at 35 and 36 weeks gestation
  Transition and metabolic adaptation are compromised. They are at higher risk of temperature instability and hypoglycaemia. They are more likely to have poor feeding. Approximately 65-70% are admitted to NICU for part or all of their postnatal stay.
- Babies with risk factors for sepsis at any gestation
  Those at highest risk for postnatal sepsis include: prolonged rupture of membranes before delivery, maternal fever or signs of infection, Group B Strep status, and previous infant with Group B Strep sepsis. Signs and symptoms usually develop in the first 24 hrs. Intrapartum antibiotics reduce the risk when ≥2 doses are given.
- Babies at risk for hypoglycaemia – including babies who are small for gestation age:
  weight < 9th%, babies born to mothers with diabetes, those babies large for dates > 98th%
  Blood sugar < 2.6mmol/L on repeated occasions is associated with adverse neurodevelopmental outcome. High risk groups are identified for early detection. Includes maternal diabetes especially if poorly controlled and requiring insulin. SGA infants are at increased risk of hypoglycaemia, altered post-natal adaptation, including impaired thermoregulation and polycythaemia which further increases the risk of hypoglycaemia.
- Babies who experience fetal distress / intrapartum compromise (including cord lactate > 5.8)
  These babies are at increased risk of respiratory distress, impaired transition and hypoglycaemia.
- **Babies exposed to meconium** (all thick or particulate meconium, or thin meconium where the 5 minute Apgar score is 8 or less, or needed resuscitation/IPPV/CPAP for more than 5 minutes.)
  Meconium aspiration is more common with thick or particulate meconium (16-19% develop respiratory distress) or where the 5 min Apgar was < 9 and resuscitation needed. Symptoms often occur in first 6 hrs.
- Babies whose mother had opioids during labour
  Increases risk of respiratory depression
- In utero growth restriction
  Identified as asymmetric growth percentiles for weight (more than 2 percentile lines below length percentile). Important when associated with other risks, eg. meconium and fetal distress. These babies appear wasted and have little subcutaneous tissue.
- Babies of mothers on beta blockers
  Associated with hypoglycaemia and SGA

Document gestation, birth weight and weight centile (calculated on WHO chart)

SURNAME ..... NHI .....

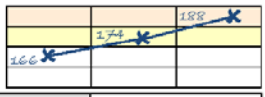
FIRST NAME ..... DOB .....

(or affix patient label)

Te Whatu Ora Health New Zealand

MATATIKI CHILD & YOUTH HEALTH WAITAHA CANTERBURY

...sses to show trend and to ...deterioration sooner. Record number next to cross.



Time of birth:		Gestation:		Birth weight:	kg	Weight centile:	

REMEMBER if condition deteriorates rapidly, call for help via local emergency procedures		Date:						SCORE KEY					
		Time:											
Respiratory rate (min)		80s						2					
		70s											
		61-69						1					
		50-60						0					
		40s											
		30s						1					
		20s											
Work of breathing (WOB)	Increased WOB/recession							2					
	Noisy breathing/grunting												
	Nasal flare							1					
	Normal breathing in air							0					
Temperature °C *If temperature 36.4° and below or 37.6° and above with no other abnormal findings adjust environmental factors and repeat in 1 hour. If still abnormal escalate care*		≥ 38.1						2					
		37.6 - 38						1					
		37 - 37.5						0					
		36.5 - 36.9											
		36 - 36.4						1					
		≤ 35.9						2					
Heart rate (bpm)		180s & above						2					
		170s						1					
		160s											
		150s						0					
		140s											
		130s											
		120s											
		110s											
		100s											
		90s						1					
		80s											
		70s						2					
		60s or below						3					
Colour	Jaundice (under 24 hours)							3					
	Jaundice above phototherapy line							2					
	Mild jaundice below phototherapy line							0					
	Pink/well perfused							0					
	Mottled/dusky/pale/blue – *perform O_2 saturations*							2					
Behaviour / Feeding	Low tone/floppy/ lethargic							2					
	Jittery/irritable							1					
	Normal behaviour							0					
	Feeding concerns *(refer to feeding chart)*							1a					
Parent expresses change/concern	Yes							2					
	No							0					
ALL BABY'S NEWS SUBTOTAL or apply exemption (EX)													
O_2 saturation in air	≥ 95%							0					
	90–94%							1					
	≤ 89%							2					
Blood glucose mmol/L *Record actual result in appropriate range box* Follow hypoglycaemia guideline	≥ 7.0							2					
	2.6–6.9												
	2.0–2.5												
	≤ 1.9												
Blood glucose taken pre or post feed?													
Repeat lactate (mmol/L) *Record actual result in appropriate range box*	≥ 3.1												
	≤ 3.0												
Complete if vacuum, forceps or unsuccessful instrumental delivery. Record head circumference (HC) at birth: cm													
Newborn scalp check	No new bruising/swelling							0					
	Increasing swelling							2					
	Fluctuant boggy mass							3					
	Repeat HC if required	cm	cm	cm	cm	cm		2	cm	cm	cm	cm	cm
TOTAL NEWS or apply exemption (EX)													
Staff initials													

Place a tick (✓) in the box which represents the baby's condition

Saturation recording **only** for babies at risk **or if concerns.** Record actual saturation result in relevant range box.

Blood glucose recordings **only** for babies at risk (see reverse of chart) **or if concerns.** Record actual result in relevant range box. For hypoglycaemia guideline see "When to Use NEWS" on reverse.

Ref.2401230 Authorised by: Clinical Director Neonatal Services and Executive Director of Maternity & Midwifery

Reminder to complete category/risk assessment

Identify any area of risk and all boxes that apply

Note recommendation for blood glucose monitoring when top ups are stopped

Small or large babies are better identified using a growth centiles rather than weight cut-offs such as < 2.5 or > 4.5 kg

NEWS Scoring Key to determine if more frequent observations and/or consultation is indicated.

NEWBORN OBSERVATION CHART / NEWBORN EARLY WARNING SCORE NOC/NI

OBSERVATION REQUIREMENTS

OXYGEN SATS MONITORING (To be performed on either foot until stable)	BLOOD GLUCOSE MONITORING	MINIMUM REQUIRED NEWS OBSERVATIONS (respiratory rate, work of breathing, temperature, heart rate, colour, behaviour, feeding)	COMPLETE RISK ASSESSMENT BELOW FOR **ALL** BABIES
• Perform if concerned about baby or as per regional policy	• Perform if signs or symptoms hypoglycaemia apparent	• At 0-2 and 24 hours post birth • At any time you or parent are concerned about baby	**All babies** Mark with a X all boxes ☐

NOTE: prior to transfer (to a primary unit before 24 hours) a baby with risk factors must have a repeat NEWS of 0

• At 1 … obse…	…if signs or …ns hypoglycaemia …t	• At 1 and 4 hours post birth	☐ **Intrapartum IV/IM opioid analgesia or general anaesthesia**
		• At 1 and 4 hours post birth Then • 4 hourly for 24 hours — **+ if birth less than 4 hours post intra-partum antibiotics, stay for 6 hours**	☐ **Maternal GBS/PROM with or without intrapartum antibiotics, or other sepsis risk (suspected or clinical chorioamnionitis, maternal temperature greater than 38°C, previous GBS baby)**
			☐ **Meconium exposure:** • all thick, OR • thin, only if apgar **less** than 9 at 5 minutes or resus needed
• At 1 and 3-4 hours with NEWS observations	• Repeat lactate with pre-feed blood glucose at 3-4 hours postpartum • If glucose 2.6 mmol/L or above and lactate is below 3, **stop** monitoring unless other indication for blood glucose	• Th… • …for 24 hours — …a Primary Unit	**…fetal** …e or all of: …5 mins or …10 mins • apgar **less** than 7 @ 5 mins • cord lactate **greater** than 6 mmol/L
• Once between 12 and 24 hours	• First at 3 hours • Before feeds until a total of 3 consecutive results are 2.6 mmol/L or above • When top-ups discontinued repeat before next 2 feeds	• At 1, 4, 12, 24 hours post birth	☐ **Less than 37+0 weeks**
		• At 1, 4, 24 hours post birth	☐ **Below 10th centile weight on growth chart** ☐ **Above 98th centile weight on growth chart**
			☐ **Maternal diabetes (infant of)**
Observations required: ☐ NEWS, frequency: …… ☐ O_2 sats, frequency: ……		☐ Other: …… frequency: ……	☐ **Other risks/concerns** *eg. limited antenatal care, feeding concern* ……
Instrumental birth – vacuum and/or forceps, including forceps during caesarean section (risk for Subgaleal Haemorrhage)			
• Perform at 4 hours		• At 1 and 4 hours post birth • Head circumference at birth and repeat if head swelling occurs	☐ **Any of the following:** • Total vacuum extraction time **less** than 20 minutes • Up to 3 pulls • No or 1 cup detachment • Attempted instrumental birth
• Perform at 2 and 4 hours or if concerned about baby		• At 1, 2, 4, 6, 8, 12 hours post birth • Head circumference a… and repeat if head sw… occurs • For IMMEDIATE Neonatal/Paed revie… – HR > 160 bpm – Resp > 60 or ↑ WOB	☐ **Any of the following** • Total vacuum extraction time **more** than 20 minutes *Signature:* …… *Pager:* ……

Record escalation of care communication and outcomes in clinical notes

MODIFICATIONS *(completed by Neonatal team only)*

Vital sign *use abbreviation*	Accepted values and modified NEWS	Date and time	Duration *hours*	Initial/surname /contact details
Reason:				
Reason:				
Reason:				

Newborn Early Warning Score (NEWS) – ESCALATION PATHWAY

1	• Repeat in 1 hour, if unchanged notify person in-charge, eg. ACMM, and discuss with Registrar/CNS-ANP/NP
1a	• Reassess feeding as per feeding chart and discuss with snr MW. If no improvement escalate to Registrar/CNS-ANP/NP
2	Requires review within 30 minutes by Neonatal/Paediatric Reg/CNS-ANP/NP
3+	Requires **immediate** review by Registrar/CNS-ANP → **Consider emergency call to Neonatal Team (CWH 777)**

08:30-16:30 page: 5039
After hours page: 5019

Version 14 February 2023

Newborn Assessment 0-2 hours

- Two New Zealand documents provide guidance on the initial newborn examination in the first 2 hours
  - The Well Child Tamariki Ora schedule 2015
  - Consensus statement of the NZCOM and MOH 2012 on Observation of the Mother and Baby immediately after birth.
- It is the **LMC's responsibility** to ensure that the 0-2 hour check is completed and documented on the QMR0044 form including any variances to be considered. If there is no documentation it is assumed to not have been done.
- The newborn assessment undertaken between 0-2 hours is detailed in the **Tamariki Ora Well Child** schedule. Cardio respiratory stability and transition from intrapartum physiology forms a component of this assessment which includes:
  - ✓ respiratory rate (counting for a full minute)
  - ✓ breathing effort
  - ✓ heart rate
  - ✓ central colour and perfusion
  - ✓ temperature
  - ✓ Inspection/review for major anomalies such as cleft palate, anal atresia, syndromes forms another assessment component
- The **NZCOM Statement** identifies that ongoing assessment of the baby includes, but is not limited to reviewing:
  - ✓ colour, heart rate, respiratory rate, temperature, airway integrity and overall condition
  - ✓ tone and activity
  - ✓ ability to breastfeed/feed
  - ✓ It also addresses the importance of observation during the initial skin to skin period.
- After birth the baby needs their risk category to be reviewed and documented. This will dictate when they require NEWS observations and if oxygen saturations and blood glucose monitoring are also required. Refer to document C280106.
- Canterbury has a high transfer rate to complete postnatal care in a primary birthing facility. Documentation of suitability for safe transfer will be enhanced by utilising the observation record chart for the 0-2 examination measures and undertaking a NEWS assessment before transfer.
- We propose that the respiratory rate and effort, heart rate and colour and temperature are recorded on the Newborn Observation Chart for all babies as a standard of care, to document these in one place and in sufficient detail.

Newborn Assessment 24-48 hours

- A full newborn examination should take place in the first 48 hours – usually from 24 hours age
- This check should occur in the presence of the mother so a history can be obtained and any concerns addressed
- Involves reviewing the maternal notes to check blood and scan results and taking a history from the mother to check for any concerns in pregnancy, family history of newborn problems (heart, hips, kidney diseases)
- Documentation for babies at CWH:
  - Second column on the back of the QMR0044.
  - Page 42 of the Well Child Book should also be filled in to show it has been done.
  - MMPO have a Baby Summary page – if LMC uses this a photocopy should be put in CDHB notes
  - If the QMR 0044 is used the LMC can take a copy for her records.
- Registrars and CNS/ANP to measure oxygen saturations on all babies when doing the full newborn check
- Midwives will check oxygen saturations on selected babies as documented in the NEWS
  - 1 and 4 hrs: intrapartum opioid analgesia, severe fetal distress
  - 1 and 4 hrs and prior to transfer: sepsis risk, meconium exposure
  - 12-24 hrs age: < 37 weeks, < 9th% weight, > 98th% weight or infants of diabetic mothers
- Saturations to be checked on either foot until they are stable and should be ≥ 95%. If they are < 95% recheck sats on the right hand and then if still <95% refer to the Neonatal Team to assess and investigate for a cardiorespiratory cause for lower saturations.

Handy Examination Hints

Top to toe examination

- Often best to listen to the heart before they are undressed and crying
- Have the ophthalmoscope on and at the ready at all times so that if the baby opens their eyes you can easily check the red reflex – impossible to do once they are crying
- Leave the hips until the end as it often makes the babies cry, you need them to be not crying to do the hip exam!

Head

- Size and shape
- Cephalhaematoma or caput
- Fontanelle – size and feel
- Facial features – any dysmorphism
- Ears – not low set or malformed
- Nose – patent nostrils
- Eyes – red reflex, pupil shape normal

Abdomen

- Shape
- Distension
- Umbilical cord healthy
- No umbilical hernia
- Any masses
- Femoral pulses – can be hard to feel, be persistent, easier when baby is quiet
- Testes – descended, undescended, hydrocoele
- Presence of inguinal hernia – rare at newborn exam

Limbs

- All present and correct
- Correct number digits
- Polydactyly, syndactyly
- Palmar creases
- Talipes
- Hips – dislocatable or dislocated

Trunk

- Shape
- Spacing of nipples
- Respiratory distress
- Back

Back

- Spine
- Skin intact
- Any pits or tufts of skin over the spine

Other

- Tone
- Moro reflex
- Cry
- Irritable/Lethargic

Another newborn check should also occur in the first week as described in the Tamariki Ora schedule**.** This is the responsibility of the LMC. We recommend a second check on Day 4 / 5 and the baby is reweighed at this time.

If weight loss is > 7 % review feeding, if > 10% assess clinically and consult with Neonatal (if inpatient) and Paediatrics (Children's Acute Assessment Unit if discharged), if > 12.5% urgent referral to CAA.

Responsibility for the Newborn Assessment

Checks that are the responsibility of the Midwife

- NVD
- Uncomplicated instrumental deliveries
- Caesarean sections (all categories) where the Newborn Observations are normal and there are no additional concerns
- Babies of mothers with diabetes – refer for Neonatal input if there are blood sugar issues as per the guideline
- Breech deliveries – Neonatal team to be consulted if there are concerns about unstable hips for a second opinion and to ensure the hip referral forms are completed but the Neonatal team do not need to complete the full examination and this can be done by the midwife prior
- Babies briefly in NICU for < 4 hours who have normal Newborn Observations
- LMC's are responsible for ensuring that the initial and 24 hour check are completed
- If a midwife is not confident with performing this examination they should seek support from their midwifery colleagues or Neonatal Service ward Reg/CNS who can do the assessment with them.
- They can also seek further training from the midwifery educator at a convenient time.

Checks that are the responsibility of the Neonatal Team

- Antenatal consultation with the Neonatal Team
- Preterm delivery < 37 weeks
- Congenital abnormality
- An LMC or core midwife can request a review by the Neonatal Team at any time if they have any concerns such as respiratory distress, abnormal exam findings, unstable hips, murmur or antenatal anomalies that need follow-up
- Babies admitted to NICU for > 4 hours.
- Babies admitted to NICU for < 4 hours should be reviewed by the NICU Team but the full baby check may be able to be done by the LMC if there are no ongoing concerns.
- Babies born to mothers with complex mental health issues where it has been identified antenatally by the Mothers and Babies team that Neonatal review would be beneficial

Process to Contact the Neonatal Team

MOH Referral guidelines (2012) identify reasons for referral

At Christchurch Women's Hospital

- If an LMC OR core midwife identifies a problem with a baby at **<u>any time</u>** referral to the **Neonatal Team** can be requested. Pager 5039 (0830-1630 week days),
  Pager 5019 (after 1630 or at the weekend)
- Problems may include: any cardiorespiratory symptoms
  any abnormality found on the 0-2hr and full newborn check
  abnormal hip, heart and eye examination
  anomalies detected in pregnancy where neonatal review is required, eg. cardiac, renal, ventriculomegaly, other
  babies who are being screened for at risk for hypoglycaemia who have a blood sugar < 2.6 mmol/L

At Primary Units and St Georges

- LMC's can refer to Private Paediatricians if available. If this is not an option and there are concerns then a call to the Neonatal Team is appropriate to determine the next steps.
- If the newborn has an **acute** problem then a call to the NICU ACNM via the hospital operator on Pager 5088 or 027 702 1652 should occur promptly as the first point of contact. If the call is for advice only then page 5019 for the Neonatal Reg/NNP

Transfers

The Neonatal Team is often asked to check that a baby is well enough for transfer either to home or a primary birthing facility. For this to occur the following needs to be clarified:

The initial check has been completed and documented by the LMC or midwife

- The baby has had a normal temperature (36.5 – 37.5) recorded between 1-4 hours of age
- The baby has fed well on one occasion as this is a good sign of wellness
- The baby has been reviewed to ensure that the cardiorespiratory status is stable and the baby has transitioned normally

  Remember that babies 37 weeks and 9-25% may need longer before transfer.
- **Prior to transfer to a primary unit before 24 hours of age a baby with risk factors must have a repeat NEWS of 0**

Babies who CAN Transfer LESS THAN 6hrs age if NEWS = 0

- Vaginal delivery with no risk factors
- Non-complex instrumental birth (see definition on Newborn Observation chart)
- Intrapartum analgesia or GA
- Maternal GBS/PROM/Sepsis risk and antibiotics given > 4hrs before birth

Babies who CAN Transfer FROM 6 hrs age if NEWS = 0

- Maternal GBS/PROM/Sepsis risk and no antibiotics or antibiotics given < 4hrs before birth (with 4 hourly observations to continue until 24 hours of age)
- Thick meconium, or thin meconium with Apgars at 5 minutes < 9 (with 4 hourly observations to continue until 24 hours of age)
- Intrapartum fetal compromise if repeat lactate at 3-4 hours is ≤3 mmol/L. However, the whole clinical picture needs to be reviewed with the Neonatal team and the lactate result not looked at in isolation
- Weight > 98th% with no maternal diabetes require 3 normal blood sugars before transfer
- Maternal GDM diet controlled require 3 normal blood sugars before transfer

Babies who CAN Transfer FROM 24 hrs age if NEWS = 0

- Intrapartum fetal compromise if repeat lactate at 3-4 hours is > 3 mmol/L to stay 24 hours even if the lactate normalises subsequently
- Type 1 Diabetics or poorly control Maternal GDM must also have had 3 normal blood sugars
- Clinical chorioamnionitis
- Maternal GA (baby may be ready prior to 24 hours so this indication is maternally driven)
- High risk instrumental category – time > 20 minutes, more than 3 pulls, 2 or more cup detachments, Apgar<7 at 5 minutes.

Babies who CAN Transfer from Day 3 if NEWS = 0

- <9th % for weight and ≥ 37 weeks gestation

Babies who CAN Transfer from Day 4 if NEWS = 0

- Premature babies <37 weeks gestation

Transfers from NICU to the Postnatal Ward

This is a guideline and there needs to be an element of flexibility around:

- the acuity of the Delivery Suite, NICU and Postnatal on a daily basis
- the individual clinical situation
- the best situation for the baby and family to avoid separation wherever possible

Communication

- ISBAR form to be completed by NICU staff and to document the expected management on the postnatal ward including the requirement for observations or length of antibiotic course
- NICU staff to contact Postnatal Ward Clinical Coordinator to discuss the potential transfer
- Baby's NICU red notes folder to transfer to the postnatal ward with the baby and to be returned to NICU after discharge

General

- Maintaining temp 36.5-37.5 in a cot
- If a baby is < 2.3 kg they will be admitted to NICU at birth, however, if the baby is stable as per the criteria below then discuss on day 3 if the baby can transfer to the postnatal ward to be with the mother. Rare to transfer a baby back to postnatal ward if < 2.2 regardless of performance
- Infants who are now well can complete their antibiotic course on the postnatal ward
- Observations will be required 4 hourly for 24 hours if the baby had been on CPAP or oxygen or is on antibiotics. The need for these to be continued past 24 hours to be discussed with the Neonatal team.

Respiratory

- Not requiring oxygen
- Respiratory rate < 60/min
- If respiratory rate is 60-70/min but effortless and not impacting on feeding and needing no specific NICU treatment transfer should still be considered

- NEWS score of 1 for respiratory rate 60-70/min can be an accepted variation that needs to be documented in the ISBAR handover and maternity multi-care pathway to highlight that the respiratory rate has been recognised and will be reviewed daily.
- Babies who receive CPAP in delivery suite but this is stopped on or shortly after admission should return to their mothers as soon as possible
- Babies who have short term CPAP/oxygen for 1-2 hours and then have transitioned well
  - 2-4 hours of sats monitoring in NICU off respiratory support
  - maintaining sats ≥ 95% in air
- Babies who required CPAP/oxygen for >2hours
  - at least 6 hours of sats monitoring after coming off respiratory support
  - maintaining sats ≥ 95% in air

Feeds and Blood Sugars

- Babies who have short term CPAP < 2 hours should have one breastfeed prior to transfer but this may not always be able to occur in NICU depending on the mothers mobility postpartum
- If the baby was on iv fluids/NG feeds these need to have been halved or stopped for at least 6 hours prior to transfer and the baby to have fed twice with 2 pre-feed sugars > 2.6 mmol/L
- If top ups are required then a specific feeding plan should be documented prior to transfer

NICU Team Prioritisation of Neonatal Reviews on Postnatal Ward

- When covering the postnatal ward print off a patient list in the morning from Floview
- The babies that need a check have a flag in the NICU section on Floview
- Make contact with the maternity co-ordinator (pager 5128) and/or maternity discharge facilitator (pager 5034) on arrival on the ward to discuss prioritisation of workload
- There is a handover book that sits beside the patient board on Level 5 and is a place to document any babies that need further review or tests followed up
- It is imperative to use this as a way of communication to maintain continuity of care as there are a number of staff covering the postnatal ward during the week and weekends.
- Midwives or GP's may contact the postnatal staff member for assistance with organising follow-up hip scan, renal scans and prophylactic antibiotics if the baby was not born at Christchurch Women's. It is easier for us to arrange the tests and this ensures they will get appropriate follow-up if needed.
- Before referring babies to consultants in other specialities we prefer that you discuss the abnormality you have found with the neonatal paediatrician on call or on service. Referrals to clinics or for investigations should always take place in the context of a full discussion with the parent(s) and notification of the GP and/or LMC.
- Electronically sign off the results of all babies reviewed by the Neonatal Team on the postnatal wards on a daily basis and at discharge

Transfers In

- Babies born at a birthing unit are to transfer in to CWH Maternity if they are:
  - Preterm <37 weeks or,
  - Term ≥37 weeks but <3rd % for birthweight

- Babies born at a birthing unit may stay at the birthing unit if they are:
  - Term ≥37 weeks and 3-10th % for birthweight
  - As long as they are able to have newborn observations, blood sugar monitoring, 3 hourly feeds with feeding support and a weight at 72 hours as described in the section below
  - If they are <2500g then we would recommend supplementation with Vitamin D (for all) and Fe (if breastfed)

Maternity Babies for Daily Neonatal Review

Criteria

1. Preterm babies <37 weeks
2. 37^{+0}-37^{+6} weeks with birthweight <10th%
3. ≥ 38 weekers with birthweight <3rd%

- Approximately 40% of babies born at 35 weeks and 70% of babies born at 36 weeks gestation remain on the postnatal ward (CWH audit 2013) and do not require admission to the neonatal unit.
- 37 weekers who are SGA < 10th% have more challenges (ie: feeding, jaundice, multiples) and more likely to have maternal morbidity eg PET, than term babies 38 weeks and more and more likely to be LBW <2500g
- These preterm or low birth weight (LBW) babies are at higher risk of issues with temperature control, jaundice, establishing feeding, maintaining blood sugars and gaining weight.
- Parents should be informed of the unique characteristics of their preterm or LBW baby. For example, these babies may not wake spontaneously, may not feed effectively and may lack stamina to take adequate feeds
- Consequently closer scrutiny of breastfeeding and protection of lactation by hand expressing and / or electric breast pumping is required to ensure lactation keeps pace with baby's caloric intake.
- Babies ≥38 weeks with birthweight between 3-10% will have daily reviews by the midwifery team who will refer to the Neonatal Team if issues arise. We recommend they stay to Day 3 and are assessed for appropriateness for discharge after the Day 3 weight

These babies require:

- Daily review, whilst inpatient, by the Neonatal Team.
- Document findings on the **Small Baby Neonatal Care Plan** – Maternity on Cortex (see below)
- Neonatal team or LMC will perform the 24 hour baby check and document on Newborn Record (QMR0044)
- Standard NEWS observations at 1, 4, 12, 24 hours as well as oxygen saturations once within 12- 24hrs and blood sugar monitoring 3 hourly initially
- A blood sugar check prefeed 3-4 hours after birth (combine with lactate if required) and repeat sugar prefeed until there are 3 consecutive levels ≥2.6mmol/L
- Referral and review by the Lactation Consultant team to formulate a feeding plan which will include cue based feeding with no longer than 3 hours between feeds with top-ups of expressed breastmilk (EBM) as available or donor breast milk (pasteurised or unpasteurised if applicable) or infant formula.
- Monitoring input and output that are consistent with postpartum age with clear documentation on Infant Feeding Record (Ref.2400431)
- Weight around 72 hours of age (Day 3) is required
- Clearance by the Neonatal Team prior to discharge/transfer
- Ensure a feeding plan is in place
- From 24 hours if a baby is ≥37 weeks and is 3-10th% they may transfer out to a primary birthing unit if that is desired but only normal if the NEWS score and BSL are normal and the baby is feeding well AND after discussion and review by the Neonatal team.
- If the baby stays at CWH then from 72 hours (Day 3) consideration can be made to the mother and baby's readiness for discharge or transfer with the following options available:
    1. Stay at CWH for 4 days – mandatory if preterm <37 weeks at birth
    2. Require ongoing oversight but this could occur at a Birthing Unit from 72 hours onwards
    3. Be ready to be discharged home but would need a 72 hour weight prior to discharge to ensure that this is a safe decision
- It is recommended that Vitamin D is supplemented (from birth) if <37 weeks or <2500g until 12 months age
- Iron to start from 4 weeks of age if they are breastfed and <37 weeks or <2500g birth weight. This is recommended to continue until 12 months age
- Babies needing Vitamin D and Iron should get a prescription before discharge from the Neonatal Team.
- A discharge letter will be written after final review
-

Cortex Small Baby Care Plan

- This template should be used for babies needing daily NICU review due to being **preterm or small**
  - <37 weeks
  - 37^{+0}-37^{+6} weeks with birthweight <10th%
  - ≥ 38 weekers with birthweight <3rd%

- The care plan should be used for <u>all reviews</u> of the baby once it has been started rather than use other progress notes. There is a progress note section in the Care Plan to use.
- It is for the Neonatal Team's documentation of the medical review – the midwifery team have their own templates for documentation
- Under the baby's NHI click + and choose Care Plan – Neonatology – Small Baby Care Plan Neonatal
- Save and sign every entry
- **The template can be updated many times in a day but as it is a living document the data is overwritten unless the template has a SNAPSHOT taken which saves a version in the patient's timeline.**
- Recommend that once a day or after all the necessary entries are made the Care Plan needs to have a **SNAPSHOT** to save all the days entries – the option to Snapshot only becomes available after the first initial save
- The template has been created to have some fields visible on certain days when they are relevant so it will not look the same day to day
- If a field is not necessary for your patient then you do not need to enter anything
- If entered fields are no longer relevant then they can be deleted to keep the care plan less cluttered
- There are mandatory fields which must be entered before you can save it
- If a heading has an "i" in a circle – click it and you get some hints
- When the baby is discharged you need to **END CARE PLAN** to close off the admission

Discharge Letter Criteria

- Discharge letters are required for the following babies on the postnatal ward:
  - Admission to NICU for > 4 hours prior to transfer to the postnatal ward
  - Received antibiotics
  - If they are preterm or small and have had neonatal input on the maternity ward ie: <37 weeks or <2500g
  - Babies do not specifically need a letter if they are just going home on Vit D due to identified risk factors such as darker skin, maternal Vitamin D deficicency or being breastfed over winter
  - Babies with congenital abnormalities eg Downs syndrome, Cleft lip and palate
    Check with consultant re need for outreach / discharge facilitation, physio assessment, early intervention after discharge, social work input, Child disability allowance
  - Referrals to other specialties have been made ie: ENT, Paediatric Surgeons, Plastics, Orthopaedics
  - Outpatient investigations have been made (excluding routine hip and renal scans)
  - If any clinic follow-up appointments are necessary
- If the baby has been referred to the NICU Team they must be discussed with them prior to discharge. This ensures the necessary paperwork and follow up is arranged appropriately
- Copies should go to the GP, LMC, Parents and other specialties involved in the care of the infant – this should be arranged by the postnatal ward admin staff
- If a baby needs follow-up to be arranged then bring a copy of the discharge letter to the NICU Ward Clerks who can facilitate the follow-up appointment. They are used to this process as opposed to the postnatal ward staff

Vitamin D Supplementation

- All babies < 37 weeks or <2500g should be prescribed Vitamin D Puria one drop daily
- Other babies who are high risk for deficiency as per Ministry of Health Guidelines are:
  ≥37 weeks high risk term babies if:
  - Breastmilk fed
    - over winter (April – October)
  - Breastmilk or formula fed with:
    - naturally dark skin
    - a mother with vitamin D deficiency
    - a sibling who has had rickets or seizures from low blood calcium levels

- It is recommended to continue supplementation until 12 months of age.

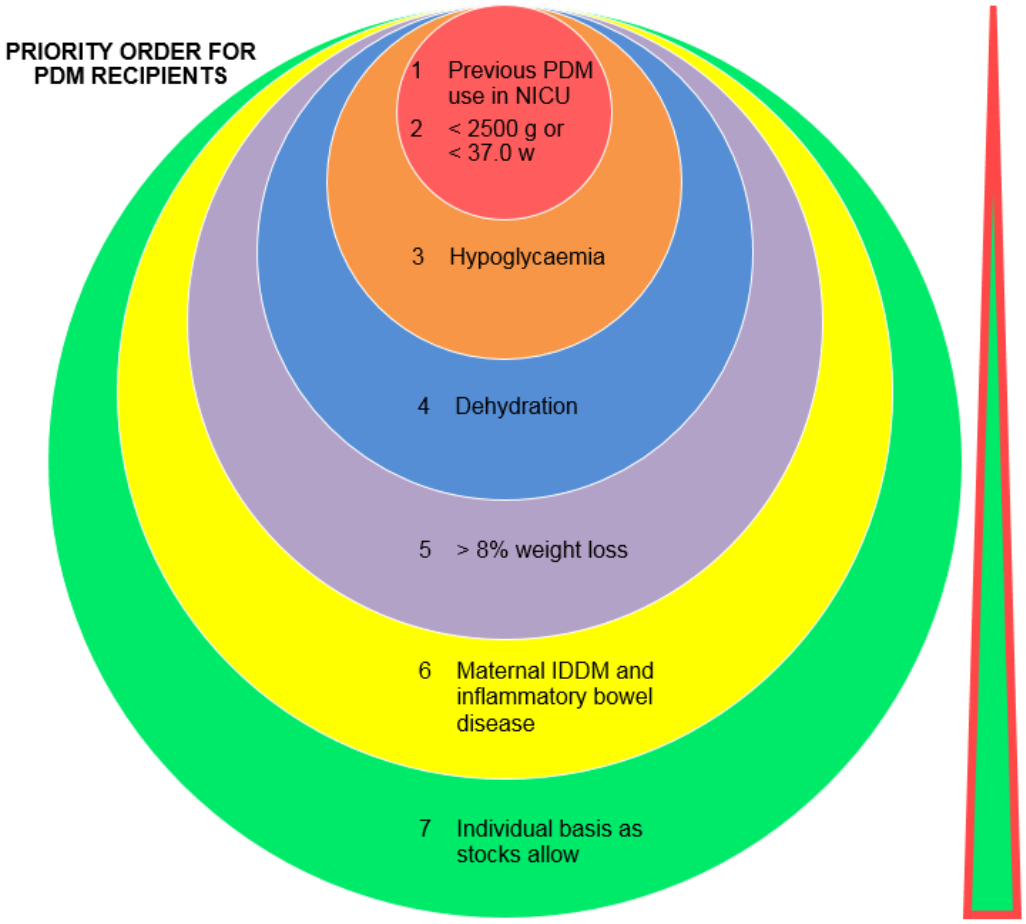
❖ HYPOGLYCAEMIA OF THE NEWBORN ON THE POSTNATAL WARD

Click here

❖ ALTERNATIVES TO BREASTMILK

Pasteurised Donor Breastmilk

- The Neonatal Unit has a Human Milk Bank of pasteurised donor milk. This is available for use for all babies admitted to NICU when supply is high and limited to risk criteria when supply fluctuates.
- The availability of pasteurised donor milk extended to the maternity ward in late 2017 when the NICU has surplus milk. This supply is not guaranteed
- There is a priority order for use of pasteurised donor milk on maternity depending on availability and this is communicated from the Milk Bank Manager to the Lactation Consultants/Nurse Manager on maternity
- If the baby meets criteria for PDM then this can be offered if the mother's plan is to exclusively breastfeed to 6 months of age and is committed to actively work on her lactation
- Consent can be obtained by Maternity staff who have had the necessary training.
- Pasteurised Donor Milk Prescribing/Dispensing Process (Ref.2405141)
- Recipient of Pasteurised Human Donor Milk Consent (Ref.2403664)



Unpasteurised Donor Breastmilk

- In some situations a parent requests the use of donor breastmilk from a breast feeding woman other than the biological mother of the infant.

- Donor breastmilk is an alternative to formula where mothers are unable to provide their own milk due to maternal infection or illness, medication or low milk supply.
- Currently a Human Milk Bank of pasteurised donor breastmilk exists within the CDHB but does not have the capacity to offer pasteurisation of milk for all babies outside the neonatal unit but when supply is available and the baby meets criteria then pasteurised donor milk may be available to use.
- Unpasteurised breastmilk is not given to infants in the Neonatal Unit
- Where a parent or guardian requests the use of donor breastmilk outside of the neonatal unit it must be explained to both the donor and recipient that the milk is not pasteurised. Informed consent for the donation and receipt of the donor milk must be obtained and recorded.
- For the use of unpasteurised donor breastmilk link on CDHB premises please refer to the policy link here: Unpasteurised Donor Breastmilk (Ref.6668).

Formula

- Come parents will choose to formula feed their baby from birth
- Supplementation of a breastfed baby with infant formula is only recommended:
  - when the BSL is below the accepted threshold of 2.6 mmol AND when hypoglycaemia is unresponsive to breastfeeding with EBM top-ups AFTER treatment with Dextrose Gel.
  - Or when the baby is dehydrated or had significant weight loss and there is insufficient breastmilk/donor milk
- Acceptable medical reasons for supplementation are outlined in the New Zealand BFHI documents, available from this link: Baby friendly part 2 pp. 23-24).

❖ ASSESSMENT OF HYDRATION

Sign of Adequate Hydration

Output of urine	Colour: pale straw or colourless Odour: non offensive Frequency: minimum of six per day (if no other fluids given) from day 4 Volume: soaked nappy Urates in the nappy beyond day 5 warrant a feeding and weight assessment
Feeding frequency	8-12 per 24 hours This depends on the age baby and individuality
Behaviour	The baby settles well after most feeds and is generally contented. Most babies have a normal 'unsettled' period, often in the early evening – but frequently between 10pm and 4am – this will settle with time
Appearance	Good skin colour and perfusion Bright eyes Alert and responsive
Bowel motions	Changing stool by day 4. If not present then the feding and weight need assessment Breastmilk bowel motion regularly by day 7
Weight	Regains birth weight by 10 -14 days Gains 140 - 170 g per week, this may slow after the first month
Reference	Lauwers J. and Swisher, A (2005) Counselling the Nursing Mother (A Lactation Consultants guide) Mohrbacher, N (2010) Breastfeeding Answers

Normal Pattern of Wetting/Soiling Nappies in Neonates

How Do I Know My Breastfed Baby is Getting Enough to Eat (Ref.2406229)

Supplementary Feeding Volumes

Age	Volume of Top-Up
0-24 hours	2-10 mL per feed
24-48 hours	5-15 mL per feed
48-72 hours	15-30 mL per feed
72-96 hours	30-60 mL per feed

Reference: Academy of Breastfeeding Medicine. Protocol 3.Supplementary feeding in the healthy term breastfed neonate. 2017

Feeding Red Flags

If any consecutive breastfeeds are A-D do a full set of newborn observations and consider recording feeding concerns in NOC/NEWS (Ref.2401230)

Red flags that would trigger a score for **feeding concerns** include a baby who:

- Is lethargic and too sleepy to feed
- Not had a first feed in the first hour, followed by no feed in the first 4 hours.
- Has an initial first feed, then not waking for a feed within the next 6 hours
- Regular feeding for 12-24 hours is then not interested for 6 hours. When a baby stops feeding after previously doing well, this can be a sign of early onset sepsis (within the first 48 hours), severe hypoglycaemia, and in rare circumstances intra-abdominal problems
- Has hypothermia, which may also increase the risk of hypoglycaemia
- Babies with risk factors identified, who are not feeding well, have more potential to show early signs of infection or develop hypoglycaemia

If there are feeding concerns, then a blood glucose check may be warranted.

Consider the impact of maternal factors – eg; the reason for induction was poor growth at 37/38 weeks. Plus factors that delay lactation.

It is useful additional information recommended to plot the babies birthweight on a customised antenatal GROW chart in the mother's notes, if available.

Some babies who run into difficulty have asymmetric growth and their birth weight plots at 9-25th centile, so are not initially in a NEWS risk group

Risk Factors for Excessive Weight Loss and Dehydration

- Preterm <37 weeks gestation
- Twins
- Small for gestational age
- Intrauterine growth restriction

- Prolonged labour
- Perinatal sepsis
- Jaundice
- Congenital abnormalities or syndromes
- Structural/anatomical abnormalities of the jaw and mouth
- Babies of primigravid mothers at risk of delayed/inadequate lactation (eg: history of infertility, polycystic ovary disease)
- Significant maternal antepartum haemorrhage or postpartum haemorrhage
- Severe maternal illness including maternal mental health
- History of breast surgery involving periareolar incision

Note that multiple risk factors increase the likelihood of excessive weight loss

Signs of Dehydration

- Dry skin and mucous membranes with poor skin turgor (this is a late sign and may be missed).
- Weak cry, lethargy
- Scant urinary output – urates present if ≥5 days old. Note urine output may continue due to the poor concentrating ability of the kidneys in the first few days after birth. **Just because urine is being produced does not mean the baby is hydrated**
- Urine may be concentrated, reduced frequency, and not at every feed.
- Depressed fontanelle – may be a late sign of dehydration.
- Apathetic feeding at the breast, including falling asleep at the breast, difficult to waken.

Weight loss of greater than 10% on day 3-5 may be accompanied by hypernatraemic dehydration, therefore paediatric assessment and a blood test to check electrolytes are considered a minimum medical requirement.

- Lethargic, underfed babies will require adequate calorie intake and hydration before they will feed well. Assessment of feeding dyad and early detection of problems with appropriate interventions are key in preventing significant problems.
- Observe and document at least one breastfeed in clinical notes in each 8 hour period during the hospital stay. Assessment of urinary output and stooling patterns appropriate to age of infant should also be documented.
- Dehydration is associated with apathetic feeding and weight loss.
- Dehydration can occur due to baby not receiving an adequate amount of his mother's milk. Jaundice may also be evident. If it is identified during observation of feeding that milk transfer is inadequate but mother has an adequate supply then mothers should be assisted to express and supplement baby with their own breastmilk.

Management of Babies with Excessive Weight Loss

7-10% Weight Loss

- Observe a full breastfeed
- Ensure effective positioning and attachment
- Observe for effective suckling pattern, observe for milk transfer and use breast compressions throughout the feed
- Ensure minimum of 8 feeds in 24 hours
- Skin contact to encourage breastfeeding
- Observe for change in frequency / amount of urine and stools
- If top-ups are felt to be needed consider half tops ups (15-30mls)
- Reweigh after 24 hours
    - If weight increasing, continue to monitor closely and provide support
    - If no weight gain or further loss refer to the next section below

10-12.5% Weight Loss

- Follow the plan above
- Refer to Lactation consultant and Neonatal Team
- Express breastmilk after each feed and offer to baby
- Feed according to feeding cues with no longer than 3 hours between feeds
- Offer full top-ups (30-60mls) after each feed
- Consider breastmilk substitute if inadequate EBM
- **Reweigh after 24 hours**
    - If weight increasing, continue to monitor closely and wean top ups as able
    - If no weight gain or further loss will need NICU admission

>12.5% Weight loss

- Refer to NICU for admission and management

❖ JAUNDICE

Screening for Hyperbilirubinemia

- The goal is to promote earlier identification and treatment to avoid severe or critical hyperbilirubinemia and kernicterus, while preventing overtreatment of newborns who have physiologic jaundice that do not require treatment
- Over 60 % of normal newborn babies become visibly jaundiced (over 80-120 micromol/litre)

Why: Hb ↓ rapidly after birth from haemolysis (HbFetal → HbAdult, bruising, etc)
RBC lifespan shorter than adults (70 vs 120 days)
Hepatic bilirubin metabolism less efficient first few days
Previously cleared by the placenta

Symptoms and Signs

- Mostly NONE, unlikely if level is < 450uml/L
- Lethargy, poor suck and feeding > 450uml/L
- Kernicterus with back arching, irritability, opisthotonus, convulsions usually >480uml/L
- Signs to look for:
    - Yellowing of the skin and eyes
    - Bruising and cephalohaematoma
    - Polycythemia

Management and Prevention in the Postnatal Ward Setting

- Identify babies with risk factors
- Maintain hydration and feeding support
- Measure the SBR – don't rely on symptoms EVER. See indications for TcB
- Trust your experience and instincts

Jaundice and Feeding Support

If hyperbilirubinaemia, requires treatment with phototherapy then a full assessment of breastfeeding is required including baby's level of alertness, ability to transfer milk, urinary output and stooling patterns.

- If there is evidence of insufficient milk transfer then mothers should be supported to express and supplement their infant with EBM following a breastfeed.
- If feeding is inadequate and mother unable to supplement baby with her EBM then it may be necessary for the baby to be supplemented with Infant formula.

- Supplementing baby with infant formula or intravenous fluids has been shown to decrease the rate of exchange transfusion and reduce the time under phototherapy.[9]
- Close observation and assessment of breastfeeding and appropriate supplementation must be undertaken to optimize breastfeeding outcomes.

Red Flags for Jaundice

The following situations are where babies need bilirubin levels to be taken

- Known maternal blood group sensitisation with antibodies detected,
  eg. Rhesus isoimmunisation, ABO incompatibility, other antibodies
- Family history of significant jaundice
  eg. due to blood group incompatibilities, hereditary spherocytosis, G6PD deficiency in males
- Preterm infants
- Any baby with visible jaundice in the first 24 hours
- Birth trauma
  eg. bruising, cephalhaematoma
- Polycythaemia
- Poor feeding and dehydration
- Sepsis
- HIE or other causes of acidosis
- Low albumin levels
- Dark pigmented skin (unable to assess jaundice levels visually)
- Ethnicity – increase risk in Asians, Mediterranean, African, Middle Eastern due to skin colour and risk of G6PD

When **2 or more red flags** are present this increases the chances of developing jaundice needing phototherapy
NEW screening: Do a TcB on all babies with red flags at **24-48 hours (See TcB protocol)**

Investigation of Jaundice

Indication for Cord Bloods

- If mother Rh negative and antibody positive cord blood must be analysed for
  - Blood group and Coombs
  - Bilirubin
  - Full blood count and reticulocyte count

Jaundice in the first 24 hours

- Serum bilirubin
- ABO blood group and Rh status
- Direct antiglobulin (Coombs) test
- Full blood count, film and reticulocyte count
- Sepsis evaluation if clinically indicated
- The Maternal group should be on HCS

Jaundice requiring phototherapy on day 2-5 in a term or late preterm baby

- Serum bilirubin
- ABO blood group and Rh status
- Direct antiglobulin (Coombs) test
- Full blood count, film and reticulocyte count if risk factors for haemolytic disease
- Make sure Guthrie card has been sent and check results with the National Testing Centre. Please click here for the Newborn Metabolic Screening Programme procedure (Ref.2403574).
- Consider G6PD deficiency screen if male infant of African, Mediterranean, Middle Eastern or Asian ancestry
- Review current weight versus birthweight and feeding history

Physiologic Jaundice

“Physiologic” or non-pathogenic jaundice in term infants is mild and transient and does not usually need phototherapy, but frequent feeds (preferably breast feeds) should be encouraged

- Peaks later in preterm and Asian infants and resolves in 2 weeks
- No set up for haemolysis or neurotoxicity risk factors
- Normal Guthrie test

- Not visible in first 24 hours of life and rate of rise 8 μmol/hour or less
- Peak at 300 μmol/L or less

Feeding related jaundice

- Impacts breastfeeding infants in first week of life
- An increase in enterohepatic circulation of bilirubin occurs in some infants who have decreased milk intake and who also have suboptimal fluid or low caloric intake
- Resolves with establishment of maternal supply and appropriate feeding routine

Breast milk jaundice

- Is the persistence of jaundice beyond first two weeks of age in term infants and beyond three weeks of age in preterm infants
- May not resolve until over 12 weeks of life
- Levels can be up to 300μmol/L
- Thought to be caused by an increased concentration of beta-glucuronidase in breast milk → increase in the deconjugation and reabsorption of bilirubin
- Treatment with phototherapy is not necessary for breast milk jaundice unless above the phototherapy line or the total serum bilirubin level of the infant is greater than 340 μmol/L

Bilirubin Blood Samples

- When taking blood for an SBR the phototherapy lights should be turned off and recommenced once the blood sample has been obtained.
- The SBR should be sent to the CDHB laboratories for processing.
- The blood sample should be sent immediately and does not need to be protected from light.
- The SBR can also be checked on the NICU blood gas analyser

Bilirubinometer

GLM0058 Transcutaneous Bilirubin (TcB) Monitoring for Babies in Maternity Ward

Phototherapy Charts

- Ensure you have the correct chart for gestation – **35-37 weeks gestation** or **38 weeks gestation and above**
- It is important to ensure the correct phototherapy chart is used as the treatment levels vary according to the infant's gestation.
- Fill in the top box with date and time of birth, maternal blood group , evidence of antibodies or haemolysis.
- These are to be used as a guide for when to start phototherapy
- There are 3 lines per chart – a top line for considering an exchange transfusion, a line for commencing phototherapy for standard blood groups and a line for babies ≥ 35 weeks with haemolytic disease (ie. positive DAT Coombs)
- Completing all the parts of the phototherapy chart ensures that at a glance all the information is present to make decisions on starting or stopping treatment
- When deciding if there are risk factors refer to the back of the phototherapy page under red flags and then indicate if these are present yes or no in the top box and list the red flags.
- Careful thought about the aetiology of the jaundice and appropriate investigation is usually at least as important as phototherapy, and may lead to identification of another specific therapy.
- In the right hand column ensure the date, time and result of the TcB and/or SBR are recorded and plot on the graph (each square is 4 hours).
- If the TcB result is within 50umol/L of the Phototherapy Standard purple line (which equates to being on or above the grey Phototherapy Haemolytic line) an SBR needs to be taken.
- Record number of lights or bilibed in the box labelled "number of lights". This is important to help assess the response to treatment.

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NEONATAL SERVICES

Phototherapy Chart

INFANTS 38 OR MORE WEEKS GESTATION

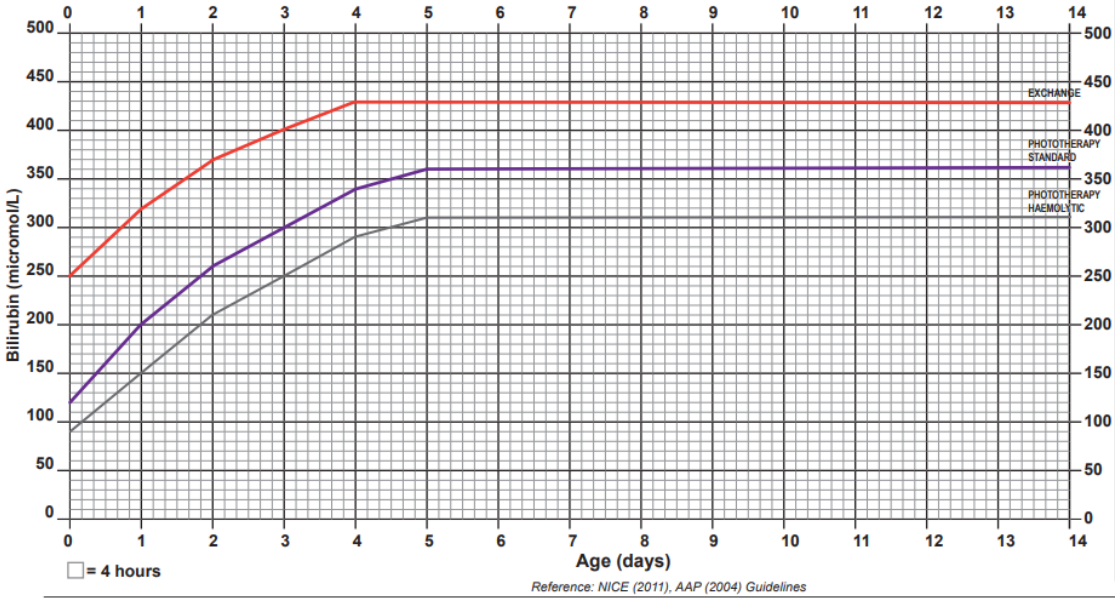
Birth gestation: ..... /40

SURNAME:..... NHI:.....
FIRST NAME:..... DOB:.....
ADDRESS:.....
..... POST CODE:.....
(or affix patient label)

Date of birth:..... Maternal blood group:..... Red cell antibodies:..... Red Flag for needing Phototherapy: ☐ Yes ☐ No *(see page 2)*
Time of birth:..... Infant blood group:..... Infant Coombs test:..... List:.....

- Indicate on the chart when phototherapy is started and stopped, and call the **Neonatal Team** for phototherapy management.
- If rate of rise > 10mmol/L/hr call **Neonatal Team (refer to the neonatal handbook)**

Number of Lights:



Date	Time	SBR	TcB

Reference: NICE (2011), AAP (2004) Guidelines

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INFANTS 38 OR MORE WEEKS

Canterbury District Health Board
Te Poari Hauora ō Waitaha
CHRISTCHURCH WOMEN'S HOSPITAL
NEONATAL SERVICES

Information and Investigation Guide

STAFF INFORMATION

Haemolytic Cause for Jaundice - use the grey "phototherapy haemolytic" line on the chart

Rhesus (AntiD), ABO incompatibility, other antibodies,G6PD, pyruvate kinase deficiency, other haemolytic causes.

Red Flags for Jaundice Requiring Phototherapy

Birth trauma (Bruising, cephalhaematoma)
Birth Asphyxia/ HIE
Polycythaemia
Preterm
Poor Feeding
Dehydration
Sepsis
Dark skin (loss of visual cues)
Family history severe jaundice
Ethnicity – Asian, African, Middle Eastern, Mediterranean

Testing:

1. Known antenatal haemolytic disease – cord blood sample

FBC, Bilirubin, Group and Coombs

2. Early jaundice < 24 hours

Bilirubin
Group and Coombs
FBC
CRP, Blood culture, if unwell

3. Jaundice > 24 hours and above phototherapy level

Bilirubin
Group and Coombs
FBC
Guthrie card sent

4. Jaundice approaching exchange level

Bilirubin and conjugated bilirubin
Group and Coombs, cross match
FBC
Liver function tests CRP, NEON
Blood culture
Guthrie card sent

5.Prolonged jaundice – Visible jaundice or unconjugated bilirubin >150 umol/L at 2 weeks (term) or 3 weeks (preterm) OR dark urine/pale stools at any time

Conjugated and unconjugated bilirubin
T4 and TSH
Guthrie card result from National Testing Centre

6. Conjugated Jaundice – conjugated bilirubin >20umol/L

Requires further tests. Discuss with SMO and refer to Neonatal Handbook for investigations

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Phototherapy on the Maternity Ward

- Care of Infants Requiring Phototherapy (PPN48) document from NICU can be read here
- Explain the need for phototherapy to the family and why minimal handling is required to ensure that the baby receives sufficient phototherapy to manage their jaundice.
- Follow the NOC/NEWS chart:

Colour								
	Jaundice (under 24 hours)						3		
	Jaundice above phototherapy line						2		
	Mild jaundice below phototherapy line						0		
	Pink/well perfused						0		

- Complete a full NEWS score at commencement of phototherapy.
- Repeat the NEWS score 6 hours after commencing phototherapy and whenever the bilirubin is repeated
- Ensure the Neonatal team are aware that a baby needs to or has started phototherapy. See escalation pathway.
- As much skin needs to be exposed as possible to treat the jaundice.
- Skin needs to be clean, dry and oil free.
- Eye shades are required for body phototherapy devices but not the bilisoft.

- Bilirubin levels should be monitored according to treatment threshold, gestation, age and NICU team direction. Record levels on age appropriate phototherapy chart for gestation.
- Babies under phototherapy will be reviewed by the neonatal team on a daily basis
- They will direct how often tests should be taken.

When to stop phototherapy

- The phototherapy lines are indications to start phototherapy and do not guide when to stop phototherapy. This decision is made taking into account the risk factors for jaundice, the rate of rise or fall of the bilirubin, the number of lights the baby is on and how far below the treatment line the bilirubin is.
- It is best to have the bilirubin significantly under the treatment line before stopping lights or the baby may rebound quickly back on to lights. There is no need to have 2 results below the line if the result is well below the line, ie. > 50 umol/L under.

Bilisoft

Prepare the cot/incubator

- Hospital cot on top of the mattress
- Can also be used inside an incubator
- The grey box to be on a flat surface on a trolley and not

In the cot or incubator

- Plug the fibreoptic cable into the box
- Insert fibreoptic pad into the bilisoft cover
- The side labelled “this side facing patient” should be against the padded side of the cover

Care of the infant

- Place the infant on the padded side of the cover and cover with blankets to keep warm
- Place eye protection if there is visible light from the Bilisoft but if they are swaddled with no light escaping then eye protection is not needed

- The baby can be held with the Bilisoft in place whilst breastfeeding

Neo Blue Phototherapy

Prepare the incubator

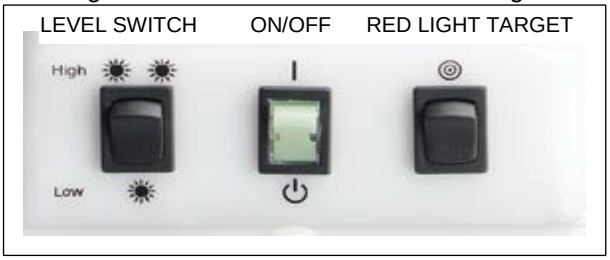
- Initially commence temperature at 30 degrees.
- This may be adjusted until adequate infant temperature is maintained (see incubator guideline)
- Towels and linen may be used to provide a nest, however must not cover the skin (see incubator guideline)

Care of the infant

- Undress the infant but keep the nappy on
- Place infant in supine position.
- Always use eye protection

Light positioning

- Place the light directly on top of the incubator. The effect is best the closer to the baby.
- The rubber feet on the lights enable secure positioning and allow air flow between the light and incubator
- Use the red light to give central positioning of the infant under the lights. This will maximise skin coverage
- Press the switch to High which provides the equivalent of 1 light
- Adjust according to medical advice
- Ensure drapes are down to protect the parent's eyes.



BILILUX Phototherapy

Process Steps	Rationale
• **INCUBATOR TEMPERATURE MUST BE IMMEDIATELY TURNED DOWN, OR TURNED OFF WHEN USING BiliLux**	The Draeger Bililux can increase the infant's body temperature by more than .5 degrees.
• Check infant's temperature within 30 minutes of placing infant under phototherapy and then monitor regularly until stable.	
• Consider placing servo control temperature probe on the infant.	The incubator temperature will decrease as infant's temperature increases.
• Minimum of 30 cm distance between the BiliLux and the infant. There are 5 increments of intensity or 5 lamps.. Each reduction of lamp intensity is	

Process Steps	Rationale
equivalent to 20% of total irradiation, (ie. at 30 cm) **Note: For Clinical use we use at either 5 Lamps or 3 lamps**	
IRRADIANCE DOSE: STARTING PHOTOTHERAPY • 5 lamps illuminated (full irradiance) – infants close to exchange level or jaundice before 24 hours or haemolytic jaundice. • 3 lamps of irradiance – for all other infants commencing PT • Chart this on the phototherapy chart along with any reductions as directed by medical staff. NOTE: 5 lamps (equivalent Double Phototherapy), 3 lamps Standard or Single PT	
• Expose as much of the infants body surface as is possible to maximise phototherapy treatment. This may include removing infant's nappy, reducing the size of the eye protection to expose more of the infant's head. Ensure skin is clean, dry and oil free.	Phototherapy only works on exposed skin surface. 
• Place the BiliLux onto incubator over the infant with a minimum distance of 30 cm between the light and the infant.	If less than 30 cm distance between BiliLux and infant then harm may be caused to the infant.
1. Ensure infants eyes are protected by eye shields. 2. Press the start key on the control panel to turn on phototherapy light. 3. Adjust the irradiance to the desired level using the intensity keys on the control panel. Left hand button to decrease and right hand button to increase intensity. The button with the head and light is the observation light, the effect of the phototherapy is not affected when observation light is on.	→ 

CONSIDERATIONS FOR SAFE USE

- The Bililux unit should always be left uncovered.
- Shade curtain can be used (as long as unit not covered).
- Bililux may be placed directly on top of incubator:
  - Caution as may fall off if incubator moved or if on incubator hood with upward travel (eg. Leo/giraffe).
  - Unplug and remove before moving incubator or moving hood up.
- The observation light can be turned on at the same time the phototherapy light is operating to soften the intensity of the blue light without altering effectiveness of phototherapy unit.

Process Steps	Rationale
Useful when phototherapy light on if finding intensity of light disturbing to eyes of staff or parents.	

Incubator Use

Incubator Use Maternity

Canterbury District Health Board
Te Poari Hauora ō Waitaha

1 Prepare the incubator

- For cold infants start temperature at 34 degrees.
- For infants receiving phototherapy commence temperature at 30 degrees.
- Ensure the incubator is on air mode only.
- Position incubator away from direct sunlight and draughts.
- Do not open the door to cool the incubator down or if incubator alarms, the incubator will self-adjust.

NOTE: Ensure the incubator is plugged in and pre warmed at all times.

2 Care of Infant

- Axilla temperature should be maintained between 36.5 – 37.5 degrees.
- Ensure infant is naked apart from a nappy.
- Position infant in the supine position. Nests maybe used by utilising linen to secure and form boundaries to settle, ensuring the infants face is clear at all times. Prone position maybe used to optimise oxygenation and lower energy expenditure in grunting infants, however infants in this position must be given extra supervision.
- Access the infant through portholes if possible as this will limit heat loss from the incubator.
- Ensure the parents are aware of the access points to provide comfort and cares.

NOTE: Ensure the fan in the incubator is not obstructed by linen.
No equipment is to be placed on top of the incubator.

3 Monitoring

- An axilla temperature should be checked initially prior to being placed in the incubator.
- Repeat temperature in 30 minutes, then hourly, thereafter 4 hourly or as condition dictates.
- Incubator temperature should be adjusted by no more than 0.5 degrees until adequate thermoregulation is restored and maintained.
- Infants that are unable to maintain their body temperature may need BSL's and further investigation. Please seek medical advice.

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❖ NEONATAL SEPSIS AND CONGENITAL INFECTIONS

Thorough handwashing, before and after every contact with every baby is by far the most important method of preventing nosocomial infections.

Early Onset Sepsis (EOS)

- This is most often perinatally acquired, but nosocomial possible.
- ANZNN definition is the first 48 hours
- *Group B streptococcus (GBS)*, *E coli K1*, *Streptococci* and Gram negative organisms are common causes
- *Listeria monocytogenes* can also occur in a sporadic or epidemic pattern.
- The EOS rate in VLBW infants in a study by Ting et al. 2019, was 1 in 56 with risk factors, whereas when no risk factors are present was 1 in 204.

Maternal Antibiotic Prophylaxis

- CWH adopts a risk based approach to GBS (as opposed to universal antenatal screening).
- Risk factors need to be identified in pregnancy/labour to dictate the course of management.
- 20-30% of women are colonised with GBS.
- Prevalence of Ecoli has been increasing and Gentamicin should be given for all preterm labour < 32 weeks and any chorioamnionitis.
- GBS neonatal infection occurs early in 80% (<7 days age) and can be a devastating infection if untreated.
- If GBS is present and treated in the pregnancy do not consider that the GBS has been eradicated.
- ≥ 4 hours of intravenous antepartum antibiotics are required to provide cover to the baby.

GLM0032 Group B Streptococcus – Management and Prophylactic Antibiotics in Labour

Risk Factors for GBS

- Previous baby with GBS (including late onset)
- GBS in the maternal urine in the current pregnancy
- GBS colonisation on vaginal swabs in the current pregnancy (with the exception of a negative swab at ≥37wk using the selective broth process)
- Prolonged ROM ≥ 24 hrs (increasing risk after 18 hours)
- Preterm labour <37 weeks (with or without ruptured membranes)

Risk factors for Early Onset Neonatal Sepsis

- prolonged rupture of membranes ≥24hrs (increasing risk after 18 hours)
- maternal illness, pyrexia >38.0 C (but any elevation >37.5 C increases risk), WBC > 15, raised CRP >10, suspected chorioamnionitis
- pathogens (e.g. GBS, E. coli) present in maternal urine or high vaginal swab
- preterm labour < 37 weeks
- fetal distress, tachycardia > 160 bpm or need for resuscitation
- twin gestation
- meconium

Although none of these risk factors alone has particularly good positive predictive value for sepsis, the more that are present, the lower the threshold should be to investigate and treat the baby for even minor clinical signs. In all sepsis, early diagnosis is vital.

Commencing antibiotics based on good clinical judgement will always be supported.

Risk factors may be an indication for investigation but are not in themselves an indication for antibiotics if the baby is born at term and is clinically well.

The decision process needs to balance the potential for unnecessary treatment of uninfected babies with delaying antibiotic treatment in infected babies.

Initial therapy is often commenced on the basis of clinical suspicion, since life-threatening infection can become established extremely quickly.

Signs and Symptoms of Early Onset Sepsis

- All newborn infants with early respiratory distress (tachypnoea, grunting, increased work of breathing, nasal flare) should be assessed for risk of EOS (GBS, E. Coli, other).
- Where grunting is intermittent / and maybe described as “singing” they are not for transfer out from CWH OR if in primary maternity unit may need transfer into CWH.
- Temperature instability – hypothermia and hyperthermia are often due to issues with environmental temperature, but a body temp. of < 36^0C or > 37.5^0C for greater than 1 hour (if appropriate manoeuvres have been undertaken to correct environmental temperature) is **possible sepsis and warrants clinical review and investigations**
- Previously healthy baby who becomes too sleepy/lethargic to feed
- Listlessness, lethargy, pallor, mottling and irritability
- New or increased respiratory distress – tachypnoea, increased WOB, grunting, increase in oxygen requirement
- Jaundice if it develops unusually rapidly
- Abdominal distension or bilious vomiting or nasogastric aspirate suggesting ileus
- Apnoea, especially new onset or increased frequency or severity
- Hypotension
- Seizures
- Persistently high lactate

The antenatal history should be reviewed for risk factors and the baby observed and investigations and management as per the following flowcharts

Management of Babies at Risk of Early Onset Sepsis

- We continue to try to balance the use of antibiotics in well appearing babies versus missing / delaying antibiotics when there are risk factors
- If antibiotics are not started from birth this means that ongoing observation is required and if the clinical picture changes then there is always the opportunity to start antibiotics then.
- No antibiotics does not equate to no care.

  We also have a focus on stopping an antibiotic course as soon as possible and this requires the whole team (medical, nursing, pharmacy) to trigger the first review of antibiotics before the 3rd amoxycillin dose at 24 hrs of age

- Determining the risk of infection includes stratification of the antenatal sepsis risk, taking into account the clinical picture, repeat clinical reviews and using investigations to help guide the timing and need for antibiotics
- It is usually obvious what to do for a well or clearly sick baby but there are situations when a baby may have some mild symptoms without strong risk factors and these babies could have a period of observation to see if they improve before inserting iv lines, taking bloods and starting antibiotics ie: elective section for IUGR/PET/abnormal Dopplers or maternal reasons and on CPAP in air
- This becomes easier with experience and so if in doubt talk to a senior colleague (NNP or Reg) or SMO
- The flowcharts have been created to help guide you what to do for babies who are well, sick or equivocal with and without antenatal sepsis risk factors

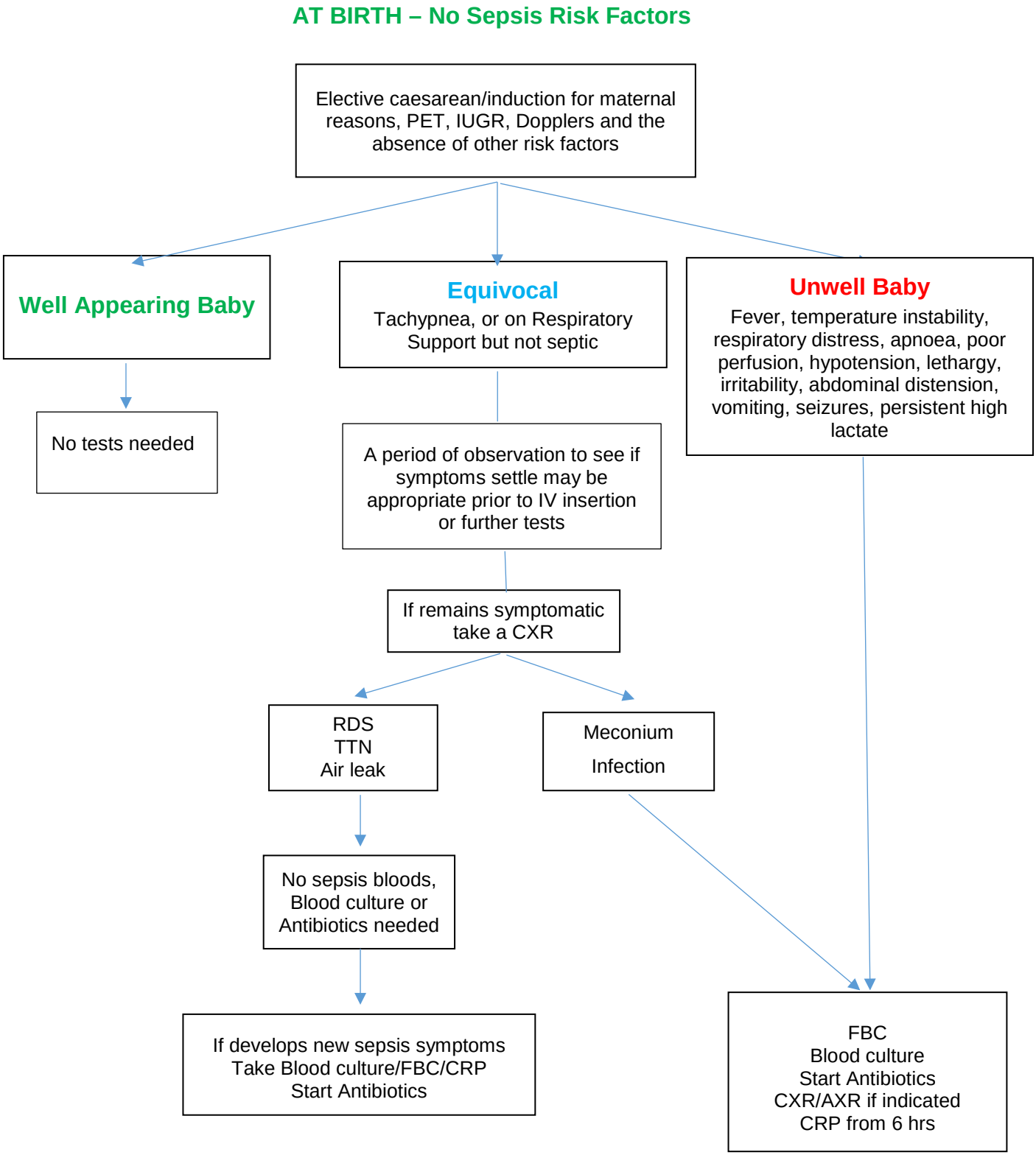
Sepsis Calculator

- It is recommended to also use the Sepsis Calculator in babies with sepsis risk factors from 34 weeks.
- Document the calculator findings and recommendations in the clinical notes
- https://neonatalsepsiscalculator.kaiserpermanente.org/ (validated for babies ≥34wks in the first 12-24hrs of life).
- An app is available – EOS Calculator
- There are 3 Clinical Categories for risk stratification – clinical illness, equivocal presentation and well appearing
- Divided into 3 pathways – treat empirically, observe and evaluate, and continue observation.
- Use 0.4/1000 for the incidence of EOS
- You need to know the highest maternal temp in labour (use 37.0 if unknown) GBS status and duration of antenatal antibiotics

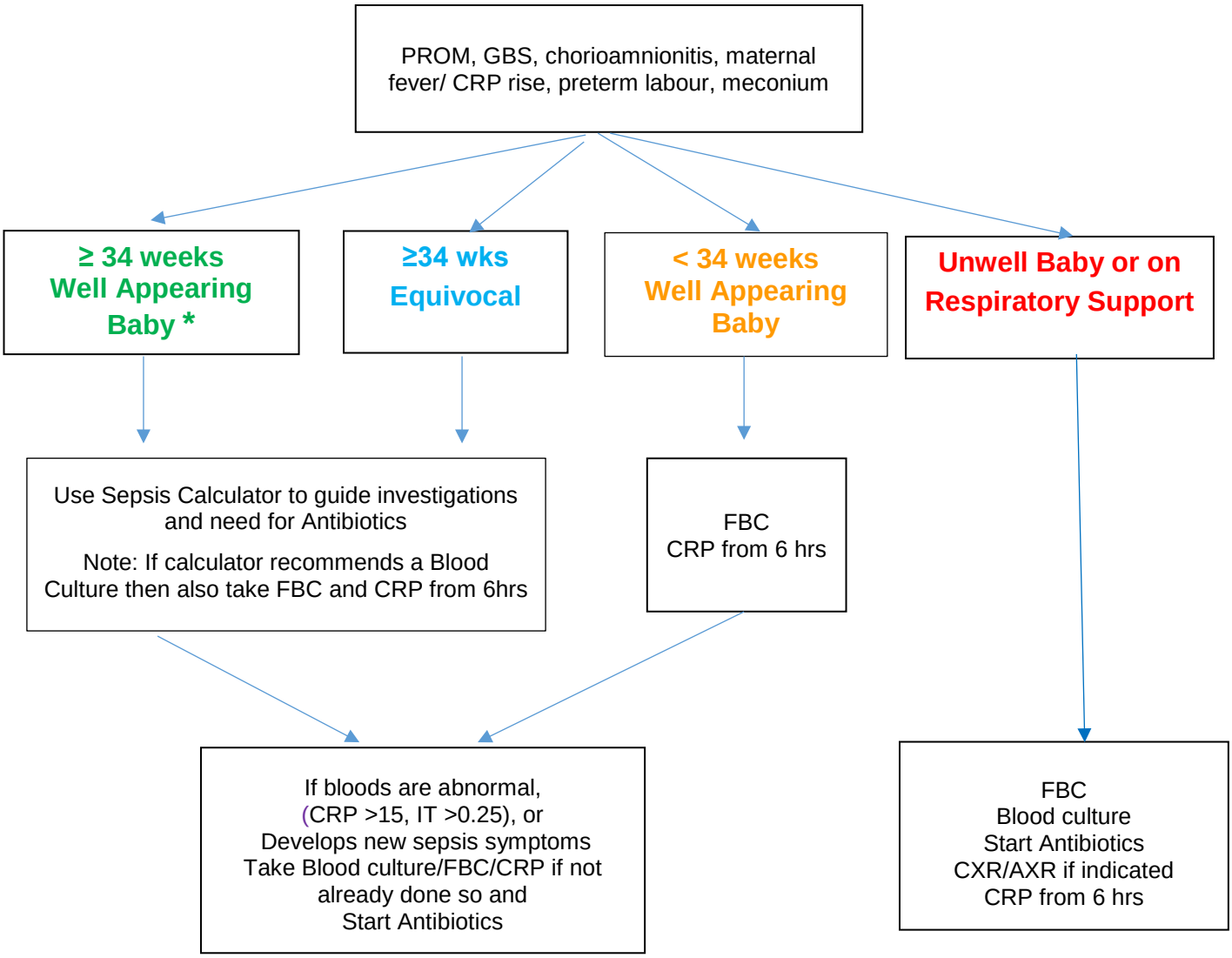
Variances

- The Sepsis calculator will recommend or strongly advise antibiotics in any baby from 34 weeks if they are on CPAP. As some of these babies will have no sepsis risk factors ie: elective section at 37 weeks and they have TTN or RDS on their CXR we have decided to ony use the calculator for babies with sepsis risk factors to avoid overtreating some babies with antibiotics.
- The calculator may advise to take a Blood culture and not other blood tests but we recommend also taking a FBC and a CRP from 6hrs after birth if the recommendation is for a culture ± antibiotics

Decision Making For Early Onset Sepsis



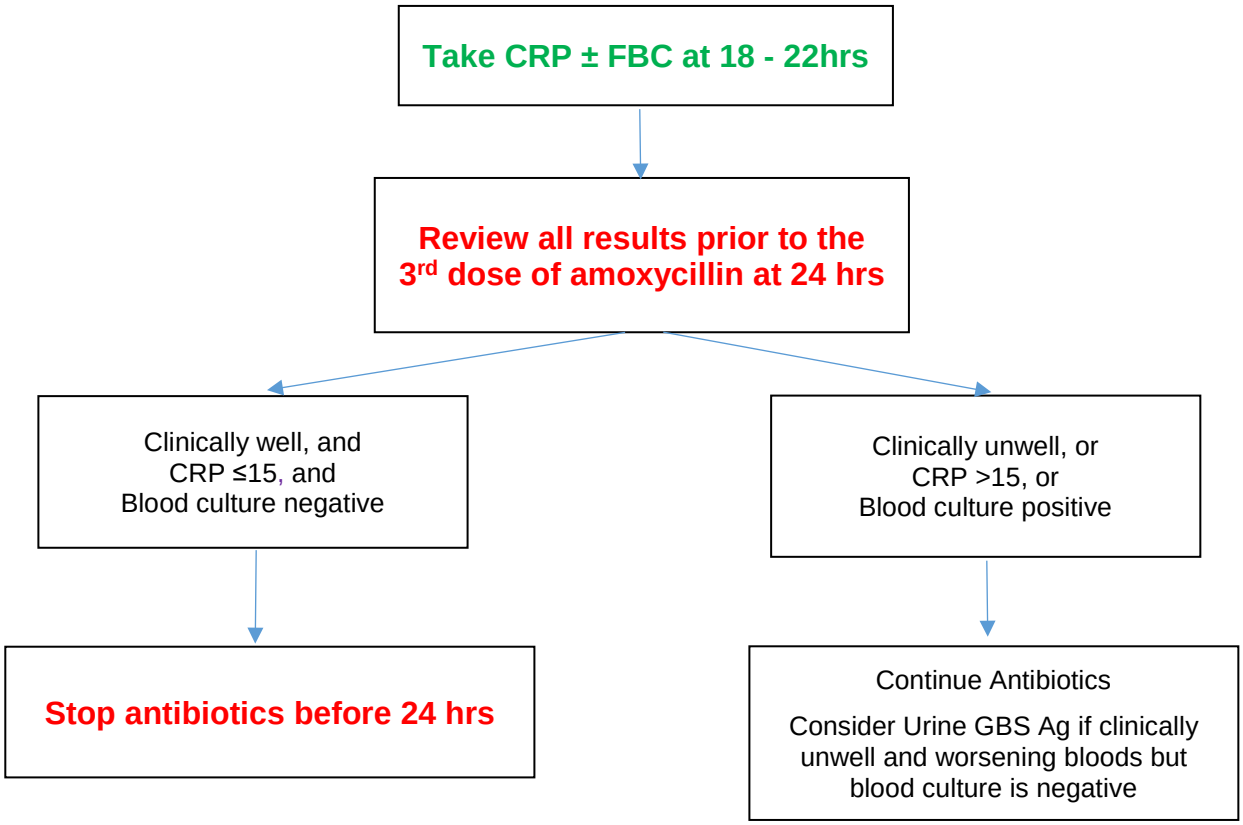
AT BIRTH - Risk Factors for Sepsis:



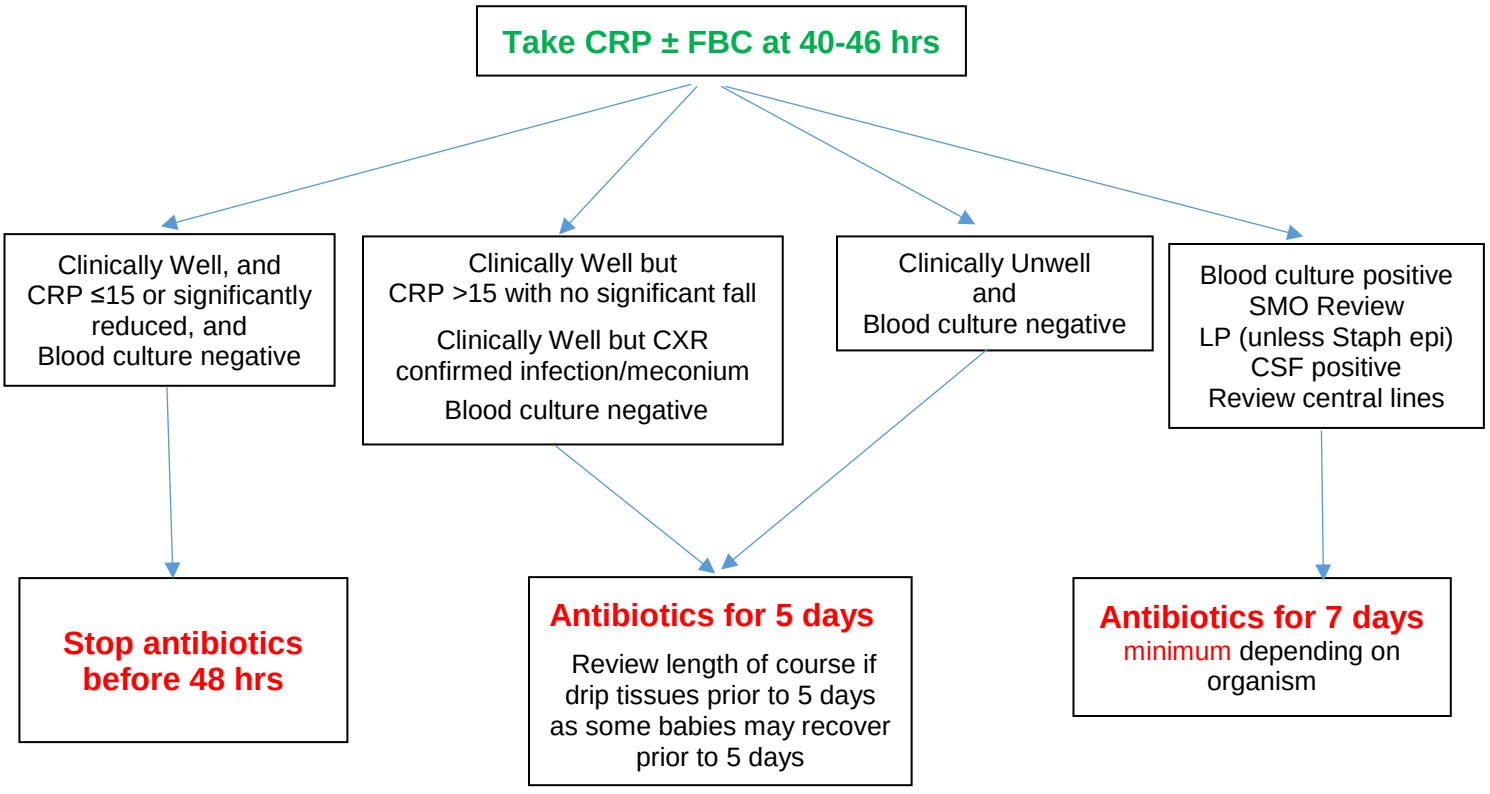
*If on Maternity, Well Baby, no Sepsis Calculator recommendation for antibiotics:

- Sepsis Risk Observations at 1hr, 4hrs and 4hrly for 24 hrs
- <37 weeks
  - daily neonatal review and admission may be up to 4 days due to prematurity
- ≥ 37 weeks
  - Clinical Chorioamnionitis – not to transfer or discharge until after 24hrs
  - Sepsis Risks and Intrapartum Ab <4hrs – may transfer to birthing unit after 6 hrs or discharge after 24hrs
  - Sepsis Risks and Intrapartum Ab ≥4hrs – may transfer to birthing unit or discharge anytime after birth
  - Midwifery review prior to transfer and NEWS score = 0

REVIEW AT 24 HOURS



REVIEW AT 48 HOURS



Investigations for Early Onset Sepsis

There is no test with perfect sensitivity or specificity so the clinical scenario needs to be taken into account along with the blood test findings to decide if sepsis is present

Usual first line investigations are

- FBC and Blood Culture
- CXR
- CRP from 6hrs

FBC

- Total WBC < 5 and neutropenia < 1
- Immature/Total neutrophil ratio* >0.25 on day 1, >0.20 from day 5

  *This is immature neutrophils, (ie. bands + myelocytes + metamyelocytes) divided by the total of immature neutrophils plus the mature neutrophils.
- Toxic granulation, vacuolisation or Dohle bodies present on the film.
- Thromobocytopenia < 100 – think about Candida

CRP

- An acute phase reactant synthesised within 6-8 hours in response to tissue injury
- Non-infectious processes can also elevate the CRP ie: PROM, perinatal asphyxia, IVH, pneumothoraces, meconium, infarction, trauma, immunisation
- Levels peak at 24-48 hours
- A normal CRP at the start of an illness or at birth lacks the sensitivity to rule out sepsis but if taken at >6hrs the sensitivity improves to >90%, this continues to improve with serial normal CRP levels
- A level of ≤15 mg/L has a high sensitivity for excluding sepsis

Blood Culture

- 1ml of blood is required for an adequate blood culture - smaller volumes may miss bacteraemia
- A negative blood culture result can be due to lack of infection, inadequate sample size or intrapartum maternal antibiotics

CXR

- AP & Lateral views for first X-ray.
- If concern re pneumothorax a AP shoot through will verify an anterior pneumothorax

Urine

- Urine for Group B Strep antigen should be sent for **targeted cases only** in the evaluation of early onset sepsis and not for all babies starting antibiotics
- **Targeted cases** are those where the baby is symptomatic with abnormal bloods (raised CRP and IT ratio) but negative blood cultures and the antibiotic course is continuing past 24 hours. The blood cultures may be negative if the mother received intrapartum antibiotics but the urine GBS Ag positive indicating systemic infection and this will guide length of antibiotic course and obstetric care for future pregnancies.
- The sample should be collected by a catheter or suprapubic aspiration and only use a bag urine if these fail (false positive results can occur due to skin contamination from the bag collection method)
- A positive urine Group B Strep Ag indicates systemic GBS infection and not a GBS urine infection
- Microscopy and culture is not required for the evaluation of early-onset sepsis as the likelihood of a UTI is extremely low

Gastric Aspirate and Surface Swabs

- These have limited value and are not required routinely as the result only indicates colonisation
- Gastric aspirates should be done for admissions of extremely preterm infants (<28wks) with a high index of suspicion of infection (eg chorioamnioniitis).

Lumbar Puncture

- This should be considered in a baby with a positive blood culture and in those babies with a negative blood culture but have significant blood changes or clinical signs that make meningitis a possibility
- Should be discussed with the Consultant
- This is never an urgent investigation (generally done in daytime hours) and can be delayed if the baby would not tolerate the procedure ie: unstable, ventilated, coagulopathy
- Meningitis antibiotic doses are indicated until LP undertaken
- Consider Acyclovir if delay in LP and history of herpes simplex exposure

Neonatal Antibiotics

Considerations

- Antibiotics for infants with sepsis can be lifesaving
- Overuse of empirical antibiotics can facilitate antibiotic resistance and prolonged use is associated with adverse outcomes.
- Prolonged antibiotic courses without a positive microbiology should be exception rather than the rule
- Culture media with antimicrobial neutralization properties enhance the reliability of blood cultures when the mother has received intrapartum antibiotics
- Antibiotic use has been linked to disruptions in the microbiome and is postulated to have a critical role in development of significant neonatal morbidities eg CLD, NEC, ROP & PVL, along with asthma, inflammatory bowel disease and childhood obesity
- A baby on IV antibiotics must be **reviewed daily**. If results are normal, stopping antibiotics at 24-36 hours is good clinical practice.
- If antibiotic duration required has been determined to be > 48 hours, but the baby is now well, CRP has normalised ≤15 or the drip tissues, an SMO review may help to reduce the length of the antibiotic course
- For **severe sepsis** the following are sometimes indicated (discuss with consultant):
  - Immunoglobulin 500 mg/kg.
  - Exchange transfusion - e.g. if evidence of purpura fulminans (remember to 'top-up" antibiotics afterwards).
  - G-CSF if the baby is neutropenic and not responding to antibiotics or immunoglobulin.

Firstline Antibiotics for Early Onset Sepsis

- The first choice antibiotics for suspected or proven sepsis presenting within 48 hours and **admitted to NICU:**
  Amoxycillin - 50mg/kg/dose, Q12H, 100mg/kg/dose if suspected meningitis or severe sepsis
  Gentamicin (IV infusion based on locally devised extended interval dosing)
- The first choice antibiotics for suspected or proven sepsis presenting within 48 hours and remaining on the **postnatal ward** with no requirement for NICU admission are:
  Amoxycillin (50 mg/kg/dose, Q12H
  Cefotaxime (50mg/kg/dose Q12H
  (Gentamicin is currently not given on the postnatal ward as it is an infusion with levels required. However, discuss each case at an appropriate time with the SMO as there may occasionally be clinical factors that dictate gentamicin to be more appropriate)
- For babies who start their antibiotic course in NICU and are transferred to the ward:
  Amoxycillin
  Change Gentamicin to Cefotaxime only if a 5 day course is required - this needs to be charted to start at the time that the next gentamicin dose was due (60 hours)
  These babies are reviewed daily on ward. Discuss with SMO covering room 5/6/7 is preferred contact.
- The preference is for babies on the postnatal ward to have their IV line sited on the postnatal ward.
  - Consider using the Maternity Midwife/ACNM or Clinical Support Nurse (NICU) when available to help hold and tape.
  - If it is necessary to bring the baby down to NICU for an IV line then call the NICU ACNM to coordinate where this is best to be done given NICU workloads. The intention then would be for the IV line to be placed and the baby returned to the postnatal ward for antibiotic administration
- For Staphylococcal skin sepsis or pneumonia treat with flucloxacillin IV or oral depending on the situation and if severe use in conjunction with gentamicin

- Babies with proven or suspected UTI or renal tract anomalies should receive oral cotrimoxazole (use amoxicillin if the baby is jaundiced and change to cotrimoxazole after 5-7 days when the jaundice has settled or by 2 weeks at the latest)

Intramuscular Antibiotics

- Ideally antibiotics are given iv however there will be situations when an iv line cannot be sited and the clinical situation will need to be discussed with the consultant
- The usual antibiotics that can be given im are amoxicillin and cefotaxime and these can be drawn up with 1% lignocaine to help with the pain after injection
- Due to the potential four-fold error in drawing up the more concentrated gentamicin (80 mg/2 mL) for im injection versus our usual 10 mg/mL concentration a decision has been made not to give gentamicin im

First Dose of Antibiotic

- Baby with **signs of sepsis** and unable to site a peripheral iv line
  - Insert a UVC on NICU
- Baby with **risk factors** for sepsis but is **well** and unable to site a peripheral line
  - D/W SMO to see if a UVC is felt to be necessary to give antibiotics , or
  - D/W SMO to see if antibiotics are required or if taking FBC, CRP, blood culture and observation are appropriate, or,
  - Give IM cefotaxime 250mg/ml made up with 1% lignocaine as the sole antibiotic with Gram negative and GBS cover (do not give amoxicillin as well to avoid the baby receiving 2 im injections) and review the route of administration prior to the next dose

Subsequent Dose of Antibiotic

- Baby with **signs of sepsis**, peripheral iv has tissued after receiving at least 1dose of amoxicillin and gentamicin
  - Insert a UVC, or,
  - Give IM amoxicillin 250 mg/mL made up with 1% lignocaine as the sole antibiotic, as initial gentamicin dose will be providing coverage for 60 hours and review the amoxicillin route of administration prior to the next dose
- Baby with **risk factors** for sepsis but is **well** and peripheral iv has tissued after receiving at least 1 dose of amoxicillin and gentamicin
  - D/W SMO to see if antibiotics are still required or if taking FBC, CRP, blood culture and observation are appropriate, or,
  - Give IM amoxicillin 250 mg/mL made up with 1% lignocaine as the sole antibiotic, as initial gentamicin dose will be providing coverage for 60 hours and review the amoxicillin route of administration prior to the next dose

Sticky Eyes

- The commonest cause of a sticky eye is a blocked tear duct
- If the eyes are sticky and the conjunctiva are red and swollen, send an urgent gram stain and appropriate swab for culture to exclude gonococcal ophthalmitis (call microbiology).
- A chlamydia swab should also be taken and sent for immunofluorescence
- Chlamydia swabs (special pink swabs) are kept in the fridge in Level 3, or may need to be requested from the laboratory. A vigorous scraping of the conjunctiva should be undertaken, prior to the baby being commenced on treatment. If the immunofluorescence is positive, commence systemic erythromycin.
- A routine bacterial culture should also be sent. Routine treatment for purulent eye discharge is chloramphenicol eye drops, one drop each eye four times a day for one week. Fusidic acid is an alternative

Staphylococcal Infections

***Staphylococcus aureus* skin colonization**

- Some babies may be colonized by *Staph. aureus* in the first 24 hours, but, only 30% of infants in one study were found to be colonized by bacteria at 6 days of age.

- Staph. colonization does not always correlate directly with incidence of infection presumably because of variable virulence of the organisms and host resistance.
- Male infants appear to have higher infection rates of bacterial infection compared to females.
- The sites most commonly colonised by *Staph. aureus* are the umbilicus, skin flexures and the nares.

***Staphylococcus aureus* superficial infections**

- **Omphalitis:** erythema and/or induration with purulent discharge from the umbilical stump, due to gram+ve / gram-ve/ anaerobic organisms
- **Paronychia:** inflammation of the nail bed
- **Pustulosis:** localised collections of vesicopustules on an erythematous base in an otherwise asymptomatic baby. Gram stain will show Gram-positive cocci and abundant neutrophils, and culture will confirm *Staph. aureus*.

Treatment for *Staphylococcus. aureus* skin infections

- Any systemic sign of infection take blood cultures and give systemic iv antibiotics (flucloxacillin and add in gentamicin if severe)
- Any Staphylococcal infection in a preterm infant < 35 weeks
  - blood cultures and systemic iv antibiotics: iv for minimum 24-48 hours, after which oral antibiotics to complete a 5 day course if the baby remains well
- Isolated Staphylococcal skin pustules in a well baby > 35/40
  - consider chlorhexidine body wash and repeat at 24 hours if improved
  - start oral flucloxacillin if not improved within 24 hours and treat for 5 days
- Isolated Staphylococcal superficial omphalitis
  - oral flucloxacillin for 5 days
  - consider adding topical treatment with alcohol wipes as well
- Those with open, purulent sites may need contact precautions in addition to universal precautions.

Chlorhexidine wash protocol

- Wet the baby's body, face, eyes and ears with warm water.
- Spread 1% chlorhexidine white obstetric cream over the whole body **except the eyes**. All creases, the perianal area, periumbilical area, axillae and the neck folds should be treated.
- Massage the chlorhexidine cream gently into the scalp.
- Leave the cream in contact with the skin for 60 seconds or more.
- Wash all of the cream off gently or sponge off with warm water.
- If chlorhexidine cream accidentally gets into the eyes, gently rinse with a liberal amount of warm water only.
- An in vitro study showed that an increasing duration of exposure of *Staphylococcus aureus* to chlorhexidine 0.5% solution from 15 to 30 and 60 seconds reduced the colony count by 37%, 77% and 93% respectively.
- Single application

Staphylococcal Scalded Skin Syndrome

This condition is characterised by red blistering skin which is caused by the release of two exotoxins (epidermic toxins A and B) from toxigenic strains of *Staphylococcus aureus.* Neonates are particularly at risk due to the lack of specific immunity to the toxins and an immature renal clearance system. Outbreaks in Neonatal units may be due to a staphylococcal carrier in the staff. When a baby is thought to have staphylococcal scalded skin syndrome the management will include:

- Admit baby to NICU
- Specimen (skin swab) to be sent to the Institute of Environmental Science and Research (ESR) along with a detailed history to determine whether the *Staphylococcus aureus* is a toxigenic strain.
- Place the infant into contact isolation until the results are available (1-2 weeks)
- IV antibiotics – flucloxacillin +/- gentamicin
- When the infant is being bathed they should be washed with 1% chlorhexidine obstetric cream (as above) until discharge. This is aimed at suppressing the organism on the affected infant and reduces the likelihood of transmission to other infants in the unit.
- Consider contact tracing of staff
- Strict hand hygiene is the key to prevention and further transmission.

Congenital Infections

The presentation of these diseases is rarely specific and maternal infections antenatally are often asymptomatic or only mildly symptomatic. Therefore consider congenital infections in infants who have:

- IUGR, Purpura, jaundice, chronic rash, anaemia, seizures, cerebral calcification, hepatosplenomegaly, chorioretinitis, microopthalmia, pneumonitis, cataract

The investigation and treatment of these diseases is complicated and should be done in consultation with the N**eonatal consultant and the Paediatric infectious disease consultant Tony Walls.** At discharge discuss the follow up needs of infants with congenital infection with the consultant. Most will need developmental follow up and many will need hearing and ophthalmological assessments.

HERPES SIMPLEX	(updated from 2013 National Guidelines) (CDHB Labs no longer processes surface swab cultures and only uses PCR)
Symptoms and risk	• Only 30% of mothers of infected infants have a history of symptomatic genital herpes so need to have an index of suspicion • 85% of disease is contracted during labour with only 10% being contracted postpartum • The risk of HSV infection in an infant born vaginally to a mother with a first episode of primary genital infection is 57% and so caesarean section is indicated • The risk from recurrent genital HSV is 3% as there is some protection from maternal Ab's • There are no absolute guidelines on how to deliver a mother with an active recurrent lesion, however, caesarean section should be offered but will not eradicate the risk of HSV transmission and is not an absolute indication (see flow charts). • Scalp electrodes and instrumentation must be avoided if there is suspicion of active HSV There may be a history of contact with herpes simplex but most symptoms are non-specific, vesicular lesions (in 40% only), pustules, fever, seizures, encephalopathy, may present with liver disease • Intrauterine disease – IUGR, chorioretinitis, skin scarring, hydranencephaly • Skin/Eye/Mouth – in 45%, good prognosis but readily disseminates if not treated • Disseminated disease – in 25%, with mortality of 30% even if treated • CNS disease – in 30%, presents with encephalitis from day 5-21
Investigation for mother	• Type specific serology testing but not often at the time as results are not immediate • Vesicle fluid sent for HSV/VZV PCR • Acyclovir from 36 weeks may decrease the risk of recurrent lesions at term (if prior outbreak earlier in pregnancy) and decrease the need for a LSCS if there are no lesions present at the time of birth. Aciclovir in this setting does not eliminate viral shedding though
Investigation for infant if: **Suspected or confirmed primary HSV infection at birth or within 6 wks of birth**	• Delivered by LSCS and membranes ruptured for less than 4 hours – Surface swabs of oropharynx, conjunctiva, rectum for **PCR 24-48hrs after birth** – **If swabs are negative** – no further treatment required – If baby becomes symptomatic with CNS signs, disseminated disease or skin lesions at any time whilst the initial surface swab results are awaited the admit and investigate as below **Symptomatic or positive surface swabs:** • Take Blood (**PCR and culture**), CSF (**PCR and culture**) prior to starting iv aciclovir • If there are any skins lesion scrape the base of the lesion and send for **PCR** • Treat for a minimum of **5 days** with aciclovir until **Blood and CSF (PCR and culture)** results remain negative • Treat CNS/ disseminated disease for 21 days, treat for 14 days if skin/eye/mouth disease
	• Delivered Vaginally or LSCS but membranes ruptured for more than 4 hours – Surface swabs of oropharynx, conjunctiva, rectum for **PCR immediately after birth** – If there are any skins lesion scrape the base of the lesion and send for **PCR** – Take Blood **(PCR and Culture),** CSF **(PCR and Culture)** prior to starting iv aciclovir – Treat for a minimum of **5 days** with aciclovir until **Blood and CSF (PCR and Culture)** results remain negative – Treat CNS / disseminated disease for 21 days, treat for 14 days if skin/eye/mouth disease

HERPES SIMPLEX	(updated from 2013 National Guidelines) (CDHB Labs no longer processes surface swab cultures and only uses PCR)
Investigation for infant if : **Recurrent HSV infection**	• Vaginal delivery is appropriate even in the presence of recurrent lesions. • Often a LSCS is offered, but, it does not eradicate the low risk of transmitting HSV • Avoid scalp electrodes and instrumentation even if no lesions are present • If there are lesions present at delivery or a history of recurrent lesions in this pregnancy then take surface swabs of oropharynx, conjunctiva, rectum for **PCR 48hrs after birth and not before 24 hours** • As the risk of transmission is very low the baby can be discharged from CWH and the LMC can take the swabs and follow-up the PCR results **Asymptomatic but positive surface swabs:** • If any of the PCR surface swabs taken after 48 hrs age come back positive, in a well-baby, there are no current recommendations of what to do in this low risk population. The clinical history and risk factors need to be reviewed and the baby needs a clinical examination and repeat surface swabs taken. This is often best done with a referral to CAA if they are at home. **Symptomatic:** • If baby becomes symptomatic with CNS signs, disseminated disease or skin lesions at any time whilst the initial surface swab results are awaited then admit and investigate with Blood (**PCR and culture)**, CSF (**PCR and culture)**,if there are any skins lesion scrape the base of the lesion and send for **PCR.** Start on iv aciclovir and treat for a minimum of **5 days** with aciclovir until **Blood and CSF (PCR and Culture)** results remain negative • If the baby has confirmed infection then treat CNS / disseminated disease for 21 days and 14 days if skin/eye/mouth disease
Isolation	• Contact isolation required, especially if skin lesions present. • Advise mother about the importance of handwashing if she has active lesions

CYTOMEGALOVIRUS (CMV)	
Symptoms	**Maternal symptoms**: asymptomatic and/or viral illness with atypical lymphocytes. **Fetal/Neonatal signs:** intracerebral calcifications, microcephaly, hydrocephaly, thrombocytopenia, haemolytic anaemia, ascites, hydrops and IUGR. • Commonest congenital infection • 15% of those born after primary infection of their mother will have sequelae. • Infection and disability can occur regardless of timing in pregnancy but most severe will be primary infection in the first trimester • 90% infants are asymptomatic at birth but are at risk of hearing impairment and learning disability
Investigation for mother	• Serology CMV IgG and IgM (if these are positive in the first 20 weeks gestation, the lab will do avidity testing - low avidity means infection < 3 months ago, high avidity means infection > 3 months ago) Repeat serology required in 2 weeks' time from first testing, if booking bloods are unavailable. • Consider PCR on amniotic fluid in antenatal period (won't confirm that the fetus is infected though). • Obstetric specialist input required.
Investigation for infant	• All infants need <u>one</u> urine sample for PCR taken after birth. Best transported fresh and chilled. • The virus can be shed for up to 3 weeks so if diagnosis is delayed urine can still be collected up to 3 weeks of age • Head ultrasound and ophthalmology review if CMV positive • Universal hearing screening with aABR and review at 9 months and annually until 6 years if CMV positive
Management	• Treatment of CMV positive babies is intensive (6weeks of iv ganciclovir) and not routine care • No clear evidence that it will improve outcomes • Isolation not required but strict handwashing is important

TOXOPLASMOSIS	
Symptoms	**Maternal symptoms**: sore throat, malaise, fever and lymphadenopathy **Fetal/Neonatal signs**: hydrocephalus, microcephaly, intracerebral calcifications, hepatosplenomegaly, lymphadenopathy, maculopapular rash, jaundice, thrombocytopenia, seizures, chorioretinitis. 85% of infected infants will appear normal at birth.
Investigation for mother	• Infection in first trimester is less likely to infect fetus (10%) but more likely to cause harm. • Infection in second/third trimester more likely to infect fetus (30-50%) but with milder effects • Toxoplasma IgG and IgM serology and lab will do IgG avidity testing if IgM serology is positive in the first 20 weeks gestation. • High IgG avidity indicates infection >3mths ago, low IgG avidity indicates infection <3mth ago • IgM can be detected 2weeks after infection, peaks at 1 month and declines by 6 months • IgG peaks 1-2 months after infection and remains lifelong • PCR on amniotic fluid in antenatal period can confirm fetal infection • Placental tissue sample sent for toxoplasma PCR (although most positive placenta samples are also detected by other tests) • If toxoplasma infection is considered then treatment of the mother with pyrimethamine, sulphonamide and folinic acid may decrease the severity of the disease in the fetus. • Serial ultrasounds are needed to monitor the pregnancy
Investigation for infant	• Serology toxoplasma IgM and a baseline IgG (only 75% of congenitally infected infants will produce detectable IgM) • PCR on blood, urine, CSF • Head ultrasound, ophthalmology review, universal hearing screening with aABR
Management	• Isolation is not needed • Confirmed congenital infection • Treat with pyrimethamine, sulfamethoxazole, folinic acid for 1 year • IgG will still be present after 1 year and titres will rise • Not confirmed congenital infection (likely maternal infection and no transfer) • IgM should be negative • IgG titres will fall over time (as they are the maternal antibodies) • Transplacental IgG from mother's infection should disappear by 6-12 months

PARVOVIRUS	
Symptoms	**Maternal symptoms:** Illness with rash, fever, myalgia, arthritis, +/- anaemia. **Fetal/Neonatal signs:** Anaemic or hydropic infant noted on ultrasound scan or known maternal seroconversion in antenatal period particularly between 10 – 20 weeks gestation**.** Risk of fetal demise is 2-6%.
Investigation for mother	• Serology for Parvovirus IgG, IgM (positive IgM indicates infection within past 2-4mths) • Obstetric specialist input required. • Consider USS, MCA Doppler velocity monitoring and fetal blood sampling if anaemia is suspected • Tissue sample from placenta sent in sterile pottle with no saline.
Investigation for infant	• If hydropic infant or stillborn, send tissue sample from placenta as above, and this will be tested for Parvovirus PCR
Management	• No specific treatment available • Contact isolation

RUBELLA	
Symptoms	**Maternal symptoms**: Routine antenatal screen at booking. Testing done after contact with rubella or symptoms of fever, erythema, lymphadenopathy or arthralgia. **Fetal/Neonatal signs**: Retinal pigmentation, cataracts, glaucoma, microcephaly, sensorineural deafness, pneumonitis, hepatosplenomegaly, thrombocytopenia, blueberry muffin lesions
Investigation for mother	• Rubella IgM and IgG if there is a rubella contact and/or symptoms of rubella • 85% chance of transmission to fetus if contract rubella in first 12 weeks of pregnancy • Obstetric specialist input required
Investigation for infant	• Serology rubella IgM (note there can be false positives and negatives) • Consider sending EDTA tube from cord or infant blood for rubella PCR • Consider urine/CSF for rubella PCR • Head ultrasound and ophthalmology review • Universal hearing screening with aABR
Management	• No specific treatment • Can be infectious for the first year of life after congenital rubella • Contact isolation

VARICELLA ZOSTER	
Symptoms	**Maternal symptoms:** chicken pox vesicles, pneumonia. Contact with chicken pox later in pregnancy carries a risk for the infant – living with a person in the same household or face to face contact for > 5 minutes are considered risk factors. **Fetal/Neonatal signs:** infection in the first trimester can cause congenital varicella syndrome in 1-2% – limb hypoplasia, skin scarring, eye and CNS anomalies
Investigation and management for mother	• If vesicles evident, swab the base of the vesicle and send for VZV/HSV PCR • If previous history of Chicken pox is unknown – request urgent VZV IgG serology (IgM is unreliable) **Treatment for exposure in seronegative women:** • If mother is seronegative and she presents within 4 days from chicken pox contact, mother should get ZIG to attempt to prevent infection developing. • If consultation is greater than 4 days from chicken pox contact, no ZIG is required. • Oral aciclovir is given in the 2nd half of pregnancy, in the immuno-compromised, in a smoker or a woman with underlying lung disease. **Treatment of women with active chicken pox:** • If seen within 24 hrs, mother to get oral aciclovir. • If seen after 24 hrs, no aciclovir. • If seen after 24 hrs and is considered high risk and at risk of complications, mother to get IV aciclovir. • If mother develops chicken pox 5 days prior to 2 days after birth, infant should receive ZIG.
Management of infant	• If maternal chickenpox onset is 5 days prior to delivery or develops within 2 days of birth, infant to have ZIG • If maternal chickenpox onset is greater than 7 days prior to delivery, no ZIG necessary • Healthy term infants exposed to chicken pox outside these timeframes in a mother who has not had chicken pox do not need ZIG but should seek medical review if any lesions occur as there is a risk of severe disease that may need treatment. **Treatment for infant:** • In an infant who develops chickenpox and is very preterm, has respiratory disease and or severe chicken pox disease, this infant to have IV aciclovir administered. • ZIG to be given if the neonate is preterm and there is no maternal history of chicken pox • ZIG to be given if <28wks or <1000gm regardless of maternal chicken pox status • Isolate (contact and airborne precautions) if the baby has active lesions until they crust over • Infants with embryopathy at birth do no need isolation

ENTEROVIRUS	
Symptoms	**Maternal symptoms**: Fever, encephalitis, myositis, Hand Foot and Mouth disease. **Fetal/Neonatal Signs**: Nonspecific but can include apnea, sepsis, meningitis, hepatitis
Investigations for infant	• Call Microbiologist to discuss appropriate testing required. • Samples can be sent for PCR or culture • Nasopharynx/throat/rectal swabs may be done after discussion with microbiology • If doing an LP send the CSF for PCR
Management	No specific treatment

SYPHILIS

There has been a rapid rise in syphilis cases among women in recent years with a corresponding increase in cases of congenital syphilis. Incorrect or delayed management or inadequate follow up can result in increased morbidity

There should be information in the antenatal folder regarding women that are known to have syphilis

Definitions

Acquired syphilis can be divided into **primary** (ulcer or chancre stage), **secondary** (systemic dissemination), **early latent** (within 2 years of acquisition with no symptoms), **late latent** (> 2 years since acquisition with no symptoms) and **tertiary** syphilis (symptomatic late syphilis e.g. gummas, cardiovascular and neurological involvement).

The riisk of congenital syphilis is very high during the first 4 years after acquisition of syphilis and is negligible after 8 years of infection.

Maternal and Antenatal Risk factors

The risk of congenital infection for untreated pregnant women is 100% for primary syphilis and secondary syphilis, 80% for early latent and 10% for late latent syphilis [8].

The risk of congenital syphilis in women treated during pregnancy is between 1-2% [9]

Antenatal Scans

Ultrasound signs of congenital syphilis in the fetus include hepatomegaly, placentomegaly, polyhydramnios, ascites and elevated middle cerebral artery peak systolic velocity [12,13]. Less frequent findings include bowel dilatation and long bone abnormalities [13]. Abnormal ultrasound finding prior to treatment is associated with treatment failure and delivery of a neonate with congenital syphilis [12].

Understanding Investigations

EIA	TPPA	RPR	Interpretation
Reactive	Reactive	Reactive	Confirmed syphilis infection
Reactive	Reactive	Non-reactive	Evidence of past treated syphilis or latent infection OR very early infection,
Reactive	Non- reactive	Reactive	Biological false positive OR very early infection Repeat in 2 weeks
Reactive	Non-reactive	Non-reactive	Possible early primary, latent or false-positive, retest in one month
Non - reactive	Not tested	Not tested	No evidence of syphilis, or too early, retest in one month if strong suspicion based on clinical evidence.

A decrease of RPR titres after treatment from 1:16 to 1:4 is indicative of adequate treatment. Conversely for example, a rise in RPR titres after treatment from 1:2 to 1:8 is indicative of re-infection or treatment failure.

Symptoms

Babies born to all women treated for syphilis in current pregnancy require evaluation at birth.

The newborn infant should be examined for the following clinical features:

- IUGR / Unexplained enlarged placenta.
- Hepatomegaly/splenomegaly
- Necrotising funisitis – inflammation of the umbilical cord
- Fever / Jaundice.
- Non immune hydrops fetalis (NB: check for parvovirus).
- Generalised lymphadenopathy.
- Snuffles, haemorrhagic rhinitis.
- Bullous lesions, palmar/plantar rash,mucous patches.
- Condylomata lata.

	Investigations that may suggest diagnosis • Osteochondritis/periostitis. • CNS signs, elevated cell count or protein in CSF and no other cause found • Haemolytic anaemia, DIC, thrombocytopenia. • Pneumonitis, Nephrotic syndrome.
Investigation for infant	The interpretation of syphilis serology in neonates requires specialist input as no single test can be used to diagnose congenital syphilis. Passive transfer of maternal antibodies makes interpretation of neonate serology more complex • Paired venous blood samples: RPR serology paired with mother o Send a neonatal venous blood sample for syphilis serology: request serum treponemal EIA, RPR, treponemal IgM (available through select laboratories in NZ). Take blood from the neonate, not the umbilical cord. Send a maternal venous blood sample for serum RPR at the time of delivery if no result available within the past 4 weeks from the same lab • Send further tests as clinically indicated below
Management	See below

Category	Findings	Evaluation	Treatment	Follow Up
Proven, or highly probable congenital syphilis	Abnormal physical examination consistent with congenital syphilis **OR** A serum RPR titre fourfold high than the mother's titre on 2 occasions (e.g. mother's RPR 1:4, infants 1:16) or infant IgM positive **OR** T. pallidum PCR assay of lesions or body fluids reactive	• CSF analysis (VDRL, cell count, protein) • FBC, EUC, LFT • Long-bone X-Rays • Other tests if needed: - Chest X Ray - Neuroimaging • Ophthalmologic examination • Formal audiologic • Examination • Placental histology and syphilis PCR	Benzylpenicillin 50,000U (30mg)/kg/dose IV every 12 hours during the first 7 days of life **AND** every 8 hours thereafter for a total of 10 days *****	1) Paediatric review at 6wks, 3mths, 5-6 mths and 12-18 mths of life. 2) RPR expected to be negative at 6 months 3) If congenital neurosyphilis diagnosed at birth- repeat CSF analysis every 6 months until normal parameters 4) If infant RPR increasing or not decreasing may need repeat LP / retreatment
Asymptomatic possible congenital syphilis	Normal clinical examination **AND** serum RPR equal to or less than fourfold the maternal titre **AND ONE OF THE FOLLOWING** Mother not treated, inadequately treated or no documentation of treatment **OR** Mother treated with a non-penicillin regimen **OR** Mother received recommended treatment <4 weeks before delivery	• CSF analysis (VDRL, cell count, protein) • FBC, EUC, LFT • Long-bone X-Rays • Placental histology and syphilis PCR	Benzylpenicillin 50,000U (30mg)/kg/dose IV every 12 hours during the first 7 days of life **AND** every 8 hours thereafter for a total of 10 days***** Note: For some infants where CSF examination and other investigations normal and where follow up can be assured, then benzathine benzylpenicillin tetrahydrate 50,000U/kg IM as a single dose may be used after discussion with Paediatric ID specialist #	1) Paediatric review at 6wks, 3mths, 5-6 and 12-18 mths of life with repeat RPR 2) RPR expected to be negative at 6 months 3) If congenital neurosyphilis diagnosed at birth- repeat CSF analysis every 6months until normal

Category	Findings	Evaluation	Treatment	Follow Up
Congenital syphilis less likely	Normal infant examination **AND** Serum RPR titre equal to or less than fourfold the maternal titre **AND** Mother treated appropriately during pregnancy for stage of infection and treatment was administered > 4 weeks before delivery **AND** Mother has no evidence of reinfection or relapse	None needed	Repeat serology at 6weeks, 3 and 6 months **OR** If any concern regarding follow up or lack of required maternal testing then **GIVE** benzathine benzylpenicillin tetrahydrate 50,000U/kg IM as a single dose #	1) Repeat syphilis serology at 3 months – if all negative – discharge 2) If syphilis serology reactive then repeat at 3 monthly intervals until negative 3) RPR is expected to be non-reactive at 6 months - any passive cross over of treponemal antibodies will be negative by 15 months of life.

Management of Babies Born to Hepatitis B, C and HIV Positive Mothers

- Wear gloves when handling the baby until they have been bathed
- Bath the baby in warm water only to remove any maternal secretions
- Clean the skin with an aqueous chlorhexidine (alcohol-free) swab prior to giving im Vitamin K
- Hep B positive mothers – baby to receive Hep B immunoglobulin and vaccination as soon as possible (see immunisation section)

❖ ORTHOPAEDICS

Developmental Dysplasia of the Hips

Risk factors for developmental dysplasia of the hips (DDH)

Breech or transverse lie in the 3rd trimester

First degree relative with history of DDH

Severe oligohydramnios of long duration

- These infants should have a hip ultrasound at 6 weeks after their due date regardless of a normal hip examination (scans done before 6 weeks are hard to interpret due to immaturity and need to be repeated so details such as the EDD are crucial to get the correct timing of the scan)
- There is a standard referral form for DDH at-risk follow-up: Health Connect South: **Add New Document – New Referral Document – Neonatal Specialty – Document type** to get the hip dysplasia template
- The form includes information for the parents to understand why the scan is being requested and the follow-up required if the scan is abnormal
- Give the other copies of the form for the GP and LMC to the Neonatal ward clerk to distribute
- Details such as EDD, phone number and GP name are essential on the US request form
- All results are reviewed by the Orthopaedic DDH coordinator so ensure all referrals have **Team DDH CDHB as the Responsible Clinician**
- Borderline results involve arranging a repeat hip US in 6 weeks
- Abnormal results are referred on to Orthopaedics for a clinic review within 4 weeks

Abnormal Hip Examination

Hips that are dislocated or dislocatable or there is a major risk factor such as neural tube defect or arthrogryposis

- Discuss the clinical findings with the neonatologist on service who may also examine the baby
- After discussion with the neonatologist refer to orthopaedics by completing the referral form (saved in the the common folder in G:drive as “DDH Referral Form” and emailing a scanned copy of the form to the DDH Coordinator at ddh@cdhb.health.nz. And the NICU secretary nicuadmin@cdhb.health.nz to upload on to HCS.
    - The Coordinator can also be contacted on 021951261 if you have any questions
    - There is no need to phone the on-call Orthopaedic Registrar and no need to order an ultrasound as orthopaedics will arrange that after assessing the baby.
- The referral will be reviewed and booked within 3 days and an appointment made within 2 weeks

LMC Orthopaedic Referrals

- For babies that are inpatients at CWH please ask the Neonatal team to arrange referrals for screening hip ultrasounds or referrals to Orthopaedics for abnormal hip examinations
- For babies not at CWH the LMC should contact the DDH team directly by email: ddh@cdhb.health.nz or ph: 021 951 261 if a baby needs hip dysplasia screening or has an abnormal hip examination

Talipes

Positional talipes

- The foot can be brought into normal anatomical alignment when manipulated
- No need for Orthopaedic review but notify the Neonatal Physio (pager 5119 or referral in pigeon hole) who will review the baby on the ward or contact the family by phone to discuss exercises to perform.

Talipes calcaneovalgus

- The foot is pressed against the front of the shin is of no significance and needs no treatment.

Talipes equinovarus

- The foot is inverted, supinated and adducted distal to the talus
- Many babies are born with a minor degree of positional talipes equinovarus in which full ankle movements are possible and in these cases no treatment is necessary.
- Fixed talipes can be detected on antenatal scans and an antenatal referral may have gone to the Orthopaedic Paediatric Physio who should have met with the family to discuss the treatment after birth
- Babies on the postnatal ward with fixed talipes should be referred to the Orthopaedic team by completing a yellow consult sheet (Fax 80806). Please include on this the Mothers NHI as the team may have met the family antenatally. A senior Orthopaedic Nurse will either visit the family in hospital or arrange to see them as an outpatient within 2 weeks to discuss the treatment required. There is no need to call the on-call Registrar.
- Babies in NICU with fixed talipes should have a yellow consult sheet faxed to the Orthopaedic team when the baby approaches term (if born prematurely) as casting will not be done prior to this as it is not developmentally supportive.
- Treatment involves casting from about 2 weeks of age in term babies or around term corrected age in preterm babies. The casts are changed every week for about 6 weeks and then they proceed to a tenotomy and a further 4 weeks of casting before starting to wear John Mitchell boots and bars.

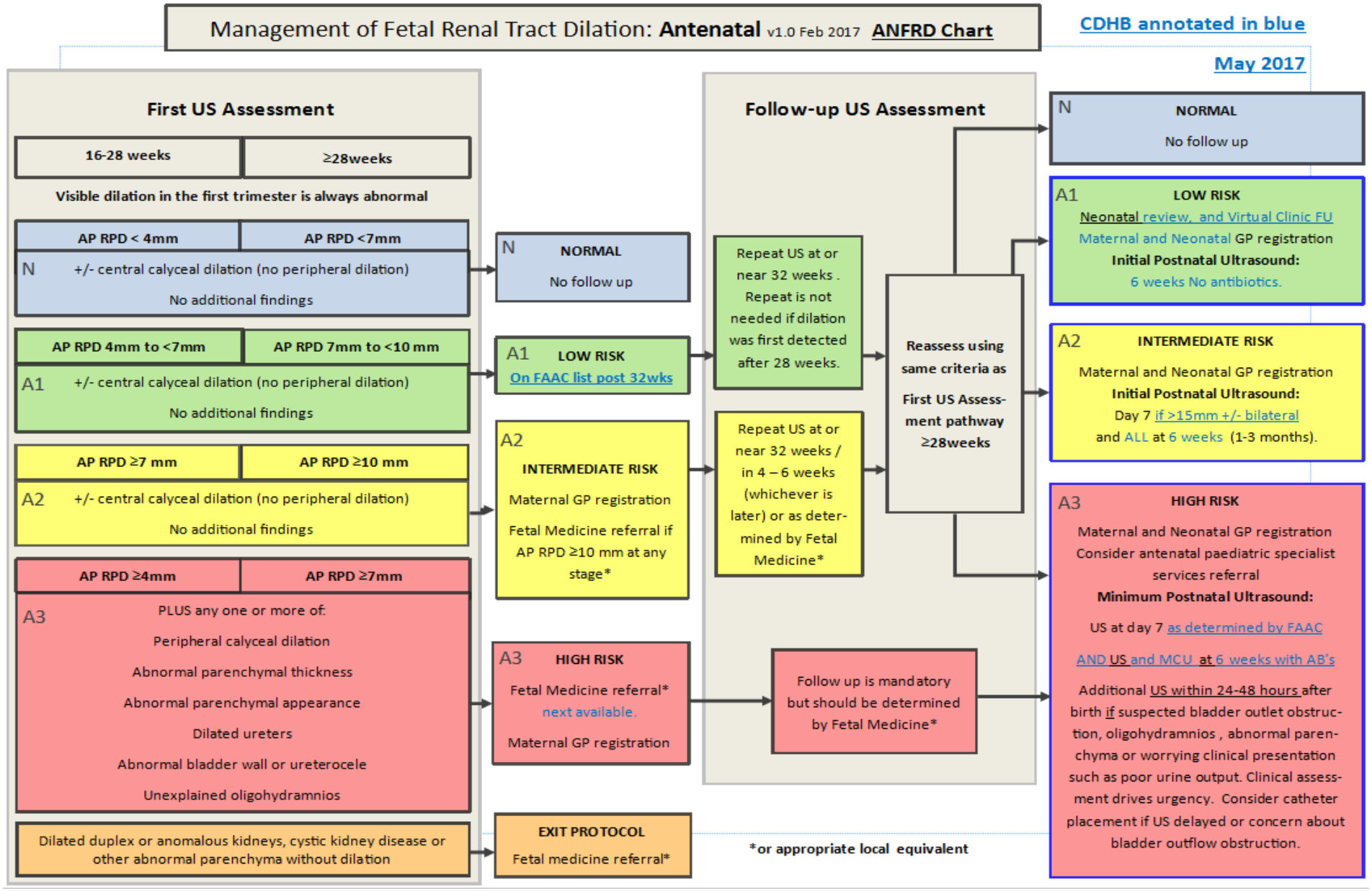
Erbs Palsy

- This is caused by injury to the brachial plexus often after a difficult delivery
- Typically the arm is held limply by the side, medially rotated and the hand in a “waiters tip” position
- Flexion at the elbow is diminished
- Look for associated clavicular and humeral fractures and Horner’s syndrome (ptosis, small pupil)
- Refer to Neonatal Physio (page 5119 or place a referral in her pigeon hole in NICU) who will review on the ward if available and at 2 weeks of age. If the palsy has not recovered then they will refer to the Child Development Service for ongoing follow-up and management

Other Orthopaedic Issues

- Occasionally other orthopaedic issues occur that need to be discussed with the Orthopaedic team, eg. fractured humerus or femur, dislocated joints, congenital skeletal abnormalities.
- If they are non-acute then a consult sheet to Orthopaedic Outpatients is all that is required. This will be reviewed by the Orthopaedic Paediatric Physio in the first instance who will liaise with the available Paediatric Orthopaedic Surgeon and a time will be arranged to review the baby
- If it is acute and within work hours then complete a yellow consult sheet and contact Jan Armstrong (Charge Nurse) on phone 80812 or mobile 0276890189 and she will liaise with the Paediatric Orthopaedic Surgeon available and arrange for the baby to be seen. Faxes can be sent to 8086 (int) or 03 3640806 (ext) or emailed to orthopaedics@cdhb.health.nz
- If it is an acute issue that is out of hours then call the Acute Orthopaedic Registrar on 027 222 2723 as the first point of contact

❖ ANTENATAL RENAL



Management of Fetal Renal Tract Dilation: **Postnatal** v1.0 Feb 2017

CDHB annotated in blue

May 2017

First US Assessment

Timing as per the Antenatal Pathway. ALL scans will be reviewed under the virtual clinic process. Letter to GP will be sent.

Scans performed before 7 days of age may falsely underestimate dilatation and should be repeated after 7 days

N — **AP RPD < 10mm**
+/- central calyceal dilation (no peripheral dilation)
No additional findings

P1 — **AP RPD 10 to < 15mm**
+/- central calyceal dilation (no peripheral dilation)
No additional findings

P2 — **AP RPD ≥15mm**
+/- central calyceal dilation (no peripheral dilation)
No additional findings

P2 — **AP RPD < 15mm**
With peripheral calyceal dilation and/or dilated ureters
No additional findings

P3 — **AP RPD ≥15mm**
With peripheral calyceal dilation and/or dilated ureters

P3 — **Any AP RPD**
PLUS Any one or more of:
Abnormal parenchymal thickness
Abnormal parenchymal appearance
Abnormal bladder wall or ureterocele

Anomalous kidneys, cystic kidney disease, symptomatic child or urinary tract infections

All children with abnormal renal scans require registration with a GP

N — **NORMAL**
Normal scan after 1 month age:
EXIT PROTOCOL: No further follow-up

P 1
LOW RISK: Virtual Clinic review, and letter to GP.
Low risk US after 1 month age:
Needs repeat US and assessment at 6-12 months of age. Review at GU clinic

P2 — **INTERMEDIATE RISK**
Virtual clinic review
D7 scans reviewed (see P3)

P3 — **HIGH RISK**
Needs urgent specialist input
Abnormal D7 scans reviewed at NICU xray meeting with Paediatric Surgeons. Confirm 6 week tests ordered.

EXIT PROTOCOL
Referral or other management as appropriate

US assessment at 12 months

Use same criteria as first US assessment

If normal at 12 months then EXIT PROTOCOL
No further follow up

If remains P1 at 12 months old then EXIT PROTOCOL
No further follow up

If P2 or P3 at 12 months then follow appropriate pathway.
Review at GU clinic will be arranged.

1. Follow up at GU clinic will be arranged .
2. 2. Repeat US 1 – 3 months

At discretion of responsible clinician, consider:
- Prophylactic antibiotics –Radiology prescribe if VUR identified
- MCU if bilaterally dilated ureters or calyces
- (Mag3 or DTPA after 3 months age if suspicion of obstruction)

1. Urgent referral to local Specialist Paediatric Service . Tests at 6 weeks reviewed by Virtual clinic and FU arranged at monthly GU clinic.
2. Repeat US /other tests as determined by specialist

At discretion of responsible clinician, consider:
- Catheter placement if concern about bladder outlet obstruction
- Prophylactic antibiotics (Continue if grade 3 or more VUR)
- MCU for assessment of reflux or bladder outlet obstruction
- Mag3 or DTPA after 3 months age if suspicion of obstruction

Other Renal Issues
The flowcharts above only relate to antenatal renal dilatation, however, there are other antenatal renal anomalies that need follow up: Check the letters on HCS which contains the FAAC group advice.

• **Single kidney and Unilateral Multicystic dysplastic kidney**:
- **US at 6 weeks** unless FAAC suggest otherwise which would be due to additional findings.
- Virtual clinic follow-up
- An MCU will be done if required after the US.

• **Horseshoe kidney or Pelvic kidney**
- without dilatation or dilatation less than 7mm: **– US at 6 weeks**
- If dilatation ≥7mm or ureters seen, then **MCU and US at 6 weeks with antibiotic prophylaxis**
- Virtual clinic follow-up

- **Duplex kidney**
  - No Antenatal dilatation and RPD < 4mm at 32 weeks - **No postnatal US required**
  - Duplex with RPD ≥4mm and central dilatation only **– US at 6 weeks**
  - Duplex with peripheral calyceal dilatation / moiety dilatation – **US and MCU at 6 weeks with antibiotic prophylaxis**

• **Family History of High grade VUR** in parent or siblings, ie. first degree relatives:
- Parents should be made aware that despite normal antenatal ultrasound findings the infant is at increased risk of VUR and investigation are recommended.
- Incidence of VUR is 20-40% if a sibling is affected and 40-60% in offspring of mothers with VUR.
- Over the years the level of VUR at 6 weeks age when the postnatal renal US was normal is usually grade 3 or less and the need for other than US monitoring has not been required in the majority of cases.
- **US only if no antenatal dilatation and no antibiotics** are needed, however after discussion, acknowledge that the family may request an MCU due to their previous experience
- **US and MCU if antenatal RPD dilatation > 7mm** or ureters seen, regardless of peripheral calyceal involvement and **antibiotic prophylaxis**
- Family history of VUR with early UTI history in other family members and normal antenatal scans - some parents will prefer antibiotics from day 5 depending on their experience. Signs and symptoms of UTI are variable and subtle.

Antibiotic prophylaxis
- If an MCU is done < 7 days age give a dose of iv gentamicin prior to the MCU
- Prophylactic oral antibiotics can start from day 5
- Firstline choice is trimethoprim (2mg/kg/dose at night) and to continue until the MCU result is known
- Any baby having an MCU are recommended to have prophylactic antibiotics by 5 days of age
- Parents are sometimes reluctant for their baby to be on antibiotics – they should be advised depending on the severity of the antenatal findings. If at the mild end of the spectrum commencing 2 nights before the MCU is adequate

Documentation
- Generic letter to be completed: **Health Connect South – Add New Document – New Referral Document – Neonatal Specialty – Document type** to get the correct template (Renal or Renal Family History) which explains the process to parents, LMC, GP
- The US and MCU are ordered electronically.The SMO for the investigations should say **R SINCLAIR** so that the results go to the appropriate person to act upon
- The requests must have the Maternal NHI written in free text for the Radiologists to be able to view the antenatal scans at the time of the postnatal investigations
- To ensure the baby is booked in to the Antenatal Renal Virtual Clinic (Paediatric Outpatients) to follow up their scan results the following is needed:
  - Open the Referrals tab on HCS and Create Outpatient Referral in the same way other clinic appointments are requested
  - Choose Paediatric Medicine, clinic assessment at Christchurch Hospital
  - Reason for Referral - request the Virtual Renal Clinic with Dr Ruth Sinclair in 6-8 weeks and add the date that the US ± MCU has been requested for so that the clinic appointment can be booked at an appropriate time after the investigations have been done.

Renal Referrals if not an inpatient at CWH

- LMC's should contact the ward registrar or CNS-ANP/NNP on pager 5039 during working hours to arrange the necessary investigations and arrange prophylactic antibiotics if required
- Copies of the antenatal ultrasound will need to be faxed to 3644883 or 85883 internal or scanned and emailed if they are not available on Health Connect South
- Virtual clinic follow up is as above after the investigations at 6-8 weeks.

❖ CARDIOLOGY

Murmurs

- The following recommendations are based on the fact that the majority babies will have an audible murmur (often quite transiently) sometime in the first 24 hours, caused by closure of the ductus arteriosus or other circulatory changes related to the perinatal transition.
- The murmur of normal ductal closure in a well term infant is typically a systolic murmur with blowing or "whooshing" quality. It can be reasonably loud but should never be accompanied by a precordial lift or thrill, abnormal peripheral pulses, cyanosis. It is usually short, as opposed to the holosystolic or machinery murmur of a persistent patent ductus arteriosus in an older baby, presumably because the pulmonary vascular pressures are still relatively high. With experience, you will get used to these innocent murmurs and will distinguish them from murmurs that sound more pathological in origin.
- However, it is also important to recognise that several of the most serious congenital heart defects that present in the first week of life can be associated with soft or insignificant sounding murmurs. Thus, in excluding serious congenital heart disease, the rest of the cardiovascular examination is just as important as auscultating the heart.
- If the baby is well and has a normal examination, and is less than 24 hours old, re-examine in 24 hours.
- Examine the baby daily up to day 4 or until the baby is discharged. **If the murmur is still present on day 4 or at discharge:**
  - Perform pre (right wrist) and post ductal oxygen saturations (feet) prior to discharge. The oxygen saturation should be read once a satisfactory trace has been obtained (for at least 6 minutes)
  - Infants in whom the **oxygen saturation is < 95%** on either of the recordings or where there is a significant difference (≥ 3%) between the two readings should have an echo performed prior to discharge
  - Infants in whom the **oxygen saturation is < 90%** or in whom there is clinical concern should be seen by the neonatal registrar/CNS-ANP and admitted to the NICU
  - Infants in whom the **oxygen saturation is ≥ 95%** on both of the recordings should be booked in to the Echocardiogram clinic on a Wed afternoon in CWH Radiology.
    - Order a **heart US** by completing an electronic radiology request on Health Connect South and choose **US Chch Womens Hospital and in the order ask for a heart US**.Consultants will triage and arrange a Wed appointment within 1-2 weeks
    - If an **echo** is requested by the Consultant to be performed by the **echo technicians from cardiology**, complete an electronic radiology request on Health Connect South and choose **Transthoracic echo**
    - Perform CXR, ECG, 4 limb BP if baby unwell or echo indicates a significant shunt.

❖ ENT/PLASTICS

Ear Deformities

- Deformational ear anomalies are not uncommon and occur in up 1:400 live births.
- There is a spectrum of deformation from anotia (the absence of external/internal ear components) to mild external ear deformations (Lop/Stahl Ear etc)
- Tanzer[1] has described a classification system according to the anatomical regions of the canal/external ear affected

BOX 7.1 Clinical classification of auricular defects (Tanzer)

I. Anotia
II. Complete hypoplasia (microtia)
  A. With atresia of external auditory canal
  B. Without atresia of external auditory canal
III. Hypoplasia of middle third of auricle
IV. Hypoplasia of superior third of auricle
  A. Constricted (cup and lop) ear
  B. Cryptotia
  C. Hypoplasia of entire superior third
V. Prominent ear

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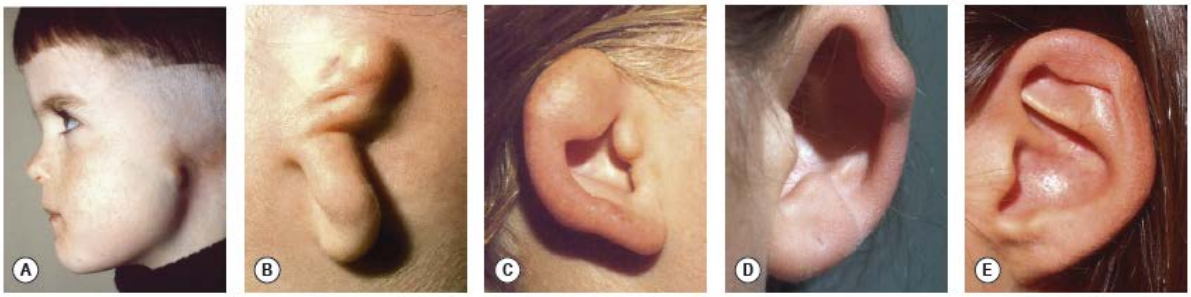
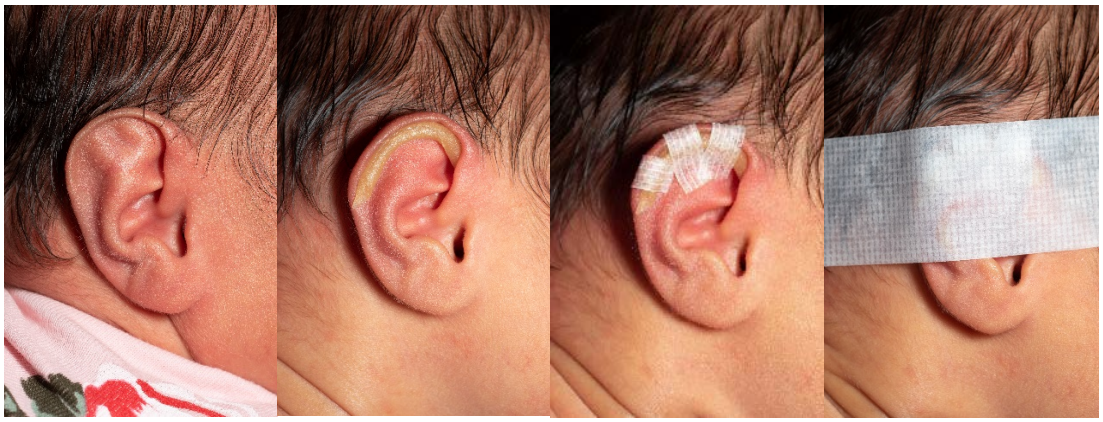


Fig. 7.4 Ear malformations, shown by severity. **(A)** Anotia. **(B)** Grade III microtia. **(C)** Moderate constriction. **(D)** Grade I constriction. **(E)** Lop ear.

- Microtia – or 'small ear' (up to 1/1500 live births in certain populations) is also associated with auditory canal atresia. Hearing assessment at audiology should always be assessed in these children without hearing screening. These babies will be directly referred to audiology as per National Hearing Screening protocol.
- Management of congenital ear deformational anomalies ranges from complex staged surgical correction in Grade I – II to simple splinting measures in Grades IV and above.
- Tan et al [2] have shown that early external splintage reduces long term auricular deformity and the need for later surgical correction.
- Babies who are an inpatient with simple deformational ear anomalies should be referred by NICU Team (if involved) or LMCs to the Plastic Surgery on-call registrar contacted through the Christchurch Public Hospital operator for consideration and treatment discussion with the parent/s or caregivers of simple splintage while still in hospital. A time will be made in the Plastic Surgery Outpatients clinic as a follow up as well. More complex anomalies should also be referred and appropriate multidisciplinary team consultations (neonatal service) can be arranged.

Ear Splinting

- The technique of ear splinting used at Christchurch is as described by Manji et al [3]; a small roll of thin DuoDerm is used to splint the anti-helical fold, secured with steri-strips and 3M Silicone tape to set-back the pinna.



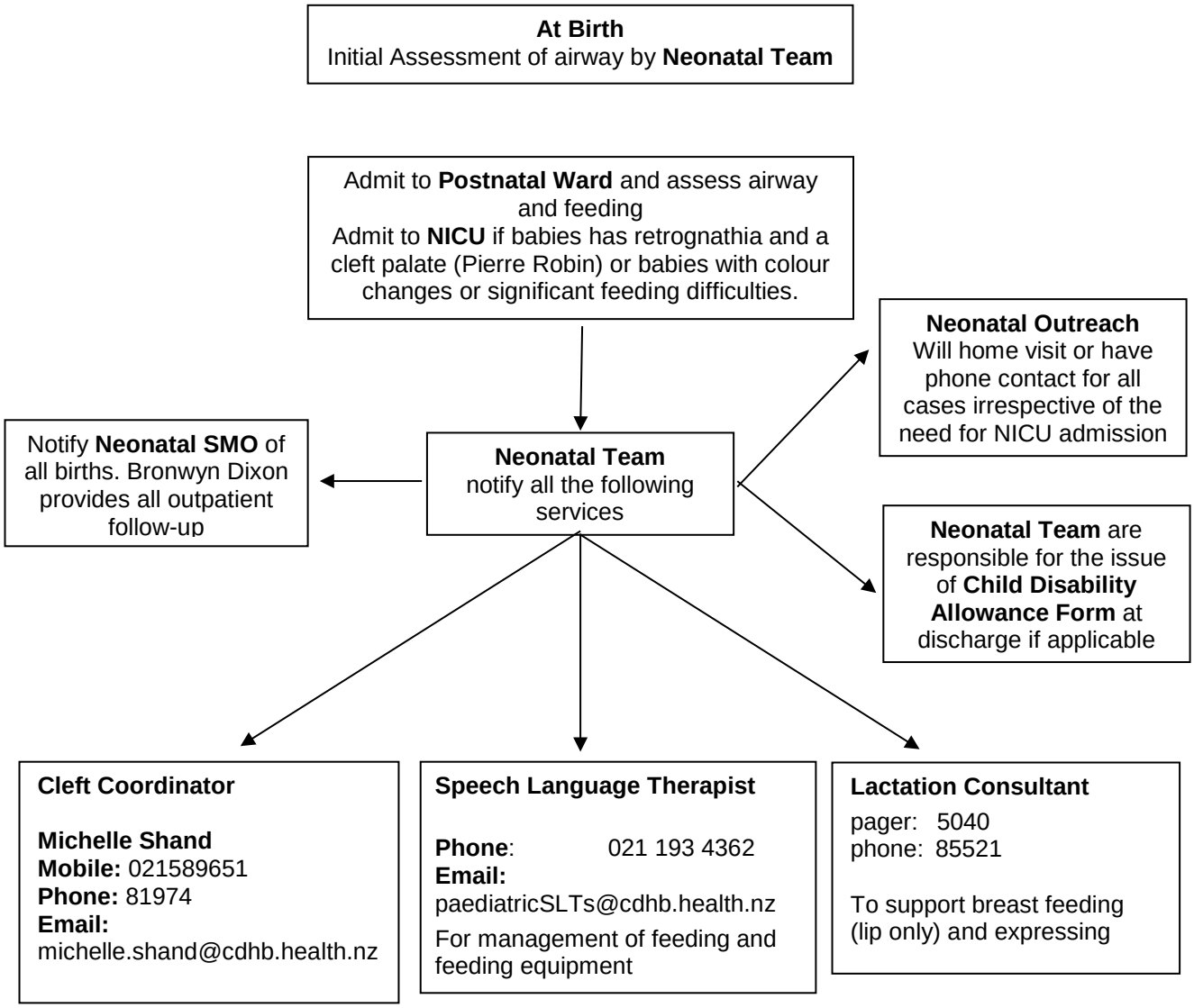
- Ideally this would be performed as soon as the deformation is noted and within the first week of life to achieve the highest success of long-term correction in the shortest timeframe.
- Follow up will be performed 1 week after first splint application in Plastic Surgery Clinic then as required for the following weeks.
- At week 5, the splint is taken down for 24 hours and if the ear deformation remains corrected after this time, one further week of splinting is applied then ceased.
- The simple splinting technique is taught to the parents/caregivers of the new-born and is performed by them weekly.
- All equipment will be kept in the Plastic Surgery Outpatients department.

[1] Tanzer RC. The constricted (cup and top) ear. *Plast Reconstr Surg.* 1975, 55:406
2. Tan ST, Shibu M, Gault DT. A splint for correction of congenital ear deformities. *Br J Plast Surg* 1994;47:575e8
3. Manji, I. Durlacher, K. Verchere, C. Correction of neonatal ear deformities using DuoDERM: A simple technique, *Paediatrics and Child Health*. 2020 1, 1-4

Referral process for babies in the community

If an ear anomaly at the 24-hour new born health check is noted and the baby is at a primary unit or at home take a photo of the each ear and send this to plasticsoutpatients@cdhb.health.nz, attention Dr Sarah Gardiner/Oliver Jensen, including a brief summary of the child's newborn and antenatal health (including other anomalies). If the newborn hearing screening team are the first to notice an anomaly of the baby's ear they will call the LMC and discuss options of referral for the baby. The parent/caregiver when seen by the Plastic Surgery team will have the opportunity to discuss options and whether they choose to correct the ear anomaly.

Cleft Lip and Palate Pathway



❖ MATERNAL THYROID DISEASE

- Maternal stimulating or inhibiting thyroid antibodies may cross the placenta and transiently affect the baby
- Occasionally some of these infants will need treatment in the neonatal period.
- When there are more than two generations affected by thyrotoxicosis or more than one first degree relative consider the even rarer autosomally dominantly inherited activating mutations of the TSH receptor. This is important as the neonatal thyrotoxicosis is more persistent
- Any symptomatic baby needs a medical review
- Note that the Guthrie will only detect hypothyroidism

Maternal Hypothyroidism secondary to ectopic thyroid or thyroid aplasia

- There is only a slightly increased risk in the neonate and a Guthrie card test should suffice. Please click here for the Newborn Metabolic Screening Programme procedure (Ref.2403574).

Maternal Graves Disease

- In mothers with a history of Graves disease will have circulating thyroid stimulating antibodies which can cause a transient hyperthyroid state in the neonate that may require treatment.
- This can occur even if the mother has been rendered hypothyroid by surgery or radioiodine treatment.
- Both carbimazole and propylthiouracil cross into breastmilk but do not appear to affect the neonate if maternal doses are less than 15 mg per day of carbimazole and less than 150 mg per day for PTU
- Although rare neonatal thyrotoxicosis is associated with a high mortality.
- The incidence of Grave's is estimated to be about 0.2% and only 1-10% of infants will subsequently be affected. The highest risk is in those whose mothers are receiving antithyroid treatment at the time of delivery.

Maternal Hashimoto's

- In mothers with Hashimoto's thyroiditis there may be circulating stimulating or inhibiting antibodies that may transiently affect the neonate.

Investigations

- The optimum timing of **thyroid function tests** in the newborn is debatable.
- We know that there is a natural physiological surge in TSH and subsequently T4 at about 30 minutes post-delivery. The TSH falls over the next 5 days with the T4 gradually declining over the next 2 weeks
- Babies at **high risk** of (mothers with active Grave's in pregnancy) or with symptoms of hyperthyroidism (tachycardic, weight loss, loose stools, increased temperature/hot, jittery/hyperactive) should have thyroid function tests done **at 2 days, in conjunction with the Guthrie** (or earlier if symptomatic) and repeated at 1 week with close observation for symptoms.
- Babies at **low but some risk** of hyperthyroidism (past history of Grave's disease or Hashimoto's thyroiditis) or hypothyroidism (Hashimoto's thyroiditis) should have thyroid function tests checked at **5-7 days** and parents advised of symptoms of thyroid disease.
- Babies at **low risk** (mothers with an ectopic or aplastic thyroid, or on thyroxine replacement with no antibodies) should simply have a **Guthrie** done
- Babies whose mothers are on thyroxine but have no thyroid antibodies only need a Guthrie
- TFT's (TSH, free T4, free T3) are done in the biochemistry lab at Canterbury Health Lab for screening in low risk/asymptomatic babies or as part of a prolonged jaundice screen. **Fill one green tube to the top line, this can be done by the midwife by heelprick along with the Guthrie.** Results available that day.
- TFT's (TSH, total T4, total T3, free T4, free T4 index) should be sent to the Endo lab **(fill 2 Red tubes so recommend this is done by venepuncture and not heel prick)** if the baby is high risk/symptomatic or if an Endocrine referral has been made. Note that the Endo lab does not process bloods daily or at weekends and so if a result is needed that day then the blood should be sent to the Canterbury Health Lab as above.

Process

- LMC identifies in pregnancy that the baby will need screening blood tests after birth
- LMC is responsible for ensuring the blood form is completed and their name on the form to check the result
- LMC to ensure the bloods are taken (if on day 2 then combine with the Guthrie and if in CWH then to be discussed with core staff about who will take the blood)
- LMC is the primary person responsible for checking the result. If the results are normal then no more action is needed. If the results are abnormal then that is the time to contact the Neonatal team on 5039 (weekdays) or 5019 (weekends) for help in interpreting the result

❖ BABIES OF MOTHERS WITH MENTAL ILLNESS

General considerations

- Mental illness combined with the stress of post-partum period may impair a mother's ability to comprehend or retain information and make decisions.
- Communicate with compassion and document clearly. Consider written information and ideally have a support person present when conveying complex or distressing information about their baby.
- Involve the father in discussions about the care of his infant however be mindful that there may be complex relationship issues, as well as legal and confidentiality issues.
- Babies of mothers with mental illness are more likely to have exposure to smoking, alcohol and substance misuse, poverty, social adversity and family violence so there may be care and protection considerations.
- Mothers with mental illness may struggle to bond with their infant and care should support the mother-infant relationship and minimise periods of separation.
- Encourage breastfeeding if no contraindications but support formula feeding or mixed feeding if it is the mother's informed decision or best way to protect maternal/infant wellbeing. Lack of sleep is a common precipitating factor for a relapse of severe psychiatric illness.

Birth care plans for women with complex needs

- Women living with complex mental illness will have a complex needs birth plan (usually completed by 34 weeks gestation). A copy is placed in a confidential folder in the locked Neonatal ACNM office and should be consulted if her infant needs neonatal assessment.
- A FloView notification and a psychosocial support plan sticker on the front sheet of a woman's notes alerts practitioners that the woman has a complex needs birth plan.

Resources

Maternity guideline on Substance abuse in Pregnancy
http://edu.cdhb.health.nz/Hospitals-Services/Health-Professionals/maternity-care-guidelines/Documents/GLM0067%20Substance%20Abuse%20in%20Pregnancy.pdf#search=psychotropic

Advice for Health Professionals Caring for Pregnant Women Taking Psychotropic Medicines and Infants Exposed to Psychotropic Medicines In Utero and while Breastfeeding
https://canterbury.communityhealthpathways.org/Resources/GuidelinesonPsychotrophicMedicationsinPregnancyandBreastfeedingFINAL.docx

❖ INFANTS AT RISK OF NEONATAL SUBSTANCE WITHDRAWAL

There is a range of maternal medications and substances taken in pregnancy that can impact the behaviour of babies. This is usually in the first 2 weeks of life.

Poor Neonatal Adaptation (PNA)

This describes a collection of symptoms seen in up to one third of infants exposed to a range of maternal medications, such as:

- antidepressants, SSRI's and other psychiatric medications (eg prozac™, citalopram, escitalopram, quetiapine, venlafaxine,)
- benzodiazepines (diazepam and temazepam)
- gabapentin
- other substances including tobacco, methamphetamines, ethanol, stimulants and marijuana*

Timing of withdrawal and symptoms vary but may include:

- chance of delayed transition/pulmonary hypertension and need for resuscitation at birth with SSRI's
- irritability, jitteriness, low tone and poor feeding,
- withdrawal from these substances without opioid exposure as well is generally more mild and usually resolves without intervention by 72 hours but can last up to 2 weeks

Management

- these infants can be monitored on the postnatal ward
- supportive care should include an explanation of the infant's symptoms to the mother, support for feeding, swaddling/skin to skin cuddles and pacifier use for settling.

Maternal Opioid Use

- Mothers in the Nga Taonga Pepi programme (Previously Methadone in Pregnancy Programme (MIPS) who will also have attended the OG3 High Risk Antenatal clinic will have babies identified antenatally as being at risk of opioid withdrawal
- The clinic uses two forms of treatment for Opiate Substitute Treatment (OST). Both are long acting opioids.
    - Methadone
    - Buprenorphine with naloxone (Subutex)
- Women on OST are often on additional prescribed medications and effects described under poor neonatal adaptation may also be seen.
- Infants can also have opioid withdrawal if the mother is on other opiates such as tramadol, oxycodone, morphine and codeine. These may be prescribed or used illicitly.

Neonatal Substance Withdrawal (NSW)

This is the postnatal drug withdrawal syndrome that can be exhibited by neonates with antenatal exposure to certain drugs.

Opioids are the only antenatal substance exposure associated with acute potentially life-threatening withdrawal effects. Infants with in utero exposure to opioids are closely monitored and treated as needed.

Timing of withdrawal and symptoms vary but may include :

- For short-acting opiates (codeine and oxycodone) these may start in the first 6 hours of life and generally appear by 48 hours
- For long-acting opiates (methadone and buprenorphine) these generally occur at 36 - 72 hours of life but may be delayed until 5 to 7 days of age. Onset as late as 4 weeks has been reported.
- Factors that influence the timing and severity of neonatal withdrawal include length of exposure to the substance, dosage and genetics.
- Infants who are full term are more likely to have significant withdrawal than preterm infants
- Polysubstance use is common among opioid users and may worsen or alter the timing of opioid-withdrawal symptoms
- Substances and medications noted to cause poor neonatal adaptation* may change the timing of withdrawal and/or lead to more severe withdrawal symptoms when in conjunction with fetal opioid exposure.

Symptoms include tremors, irritability, excessive crying, lethargy, hyper/hypotonia, poor feeding, tachypnoea, temperature instability, nasal congestion, hypoglycaemia, sneezing, vomiting and diarrhoea and poor sleep.

Monitoring Infants at Risk for Neonatal Substance Withdrawal

- Because withdrawal from long-acting opioids generally occurs after 24 hours of life, infants at risk for withdrawal may stay with their mother on maternity for the first 24 hours of life if they have no other issues requiring an increased level of care.
- These babies will be **monitored using the NEWS score**.
- On the Risk Assessment section of the NEWS – Tick, Other risks/concerns and name the medications/substances used antenatally.
- Initial NEWS is within two hours of birth and then 6 hourly
- NSW symptoms are covered by the assessment of Behaviour/Feeding which includes assessment of tone (low tone/floppy, jittery/ irritability) and feeding
    - eg: If they became jittery / irritable (score=1) + feeding concerns eg If consecutive feeds are A-D (score=1a) = NEWS 2
    - A NEWS score of 2 or higher would trigger escalation via a phone call to the Neonatal team and a review within 30 minutes
- Non-pharmacological interventions including low lights, quiet environment, swaddling and skin-to-skin contact should be used with all neonates antenatally exposed to drugs, nicotine and alcohol

Infants Exposed to Opiate Substitute Therapy (methadone or buprenorphine)

- Should be admitted to the NICU after 24±6 hrs of age (ie: between 18-30hrs of age when it is appropriate) for further monitoring and treatment as needed. The ACNM will advise when a bed is available for the mother if she is cleared from maternity.

Infants at Risk of Withdrawal from other Drugs

- Remain on maternity ward with their mother if they are well
- Review by the Neonatal Team if the birth plan has identified a high level of concern usually with input from mothers and babies service eg: polypharmacy, use of lithium
- Review on request for babies showing signs of poor postnatal adaptation or elevated NEWS scores
- Guidance to determine if the baby is ready for discharge:
  - ability to eat ≥30ml by day 3 PDM/MM or breastfeed well ("E" or "F"),
  - sleep undisturbed ≥1 hour,
  - and be consoled within 10 minutes of crying.
  - Weight should be done at 72 hours (either in hospital or at home). Follow the maternity pathway if ≥ 7% weight loss.
- The birth plan may have identified a 72 hour stay due to maternal mental health complexity. Check with the LMC, Social worker or mental health team if they are involved.

Breastfeeding

- Breastfeeding should be encouraged for mothers on methadone/buprenorphine and may reduce the risk of withdrawal. Opioid levels are low in the maternal breast milk and are not associated with respiratory depression or adverse effects in these infants.
- Women who are methamphetamine users should not breast feed for 48 hours after consuming "P". They need social work input, if not already under Oranga Tamariki.
- Lactation consultants can assist with breastfeeding advice in the setting of other medication and drug use.

Babies Exposed to Lithium

- In utero lithium is transferred freely to fetus across the placenta
- Lithium has a narrow therapeutic index (therapeutic levels in adults 0.4-1.2mEq/L) and requires close monitoring to avoid toxicity (seen in adults at levels > 1.2mEq/L, no data on infants).
- **Lithium can potentiate the effects of muscle relaxants**
- Lithium levels can fluctuate during pregnancy and at the time of birth.
- Babies exposed to lithium in-utero may be at **increased risk** of Ebstein's anomaly or other **cardiac defects** (first trimester exposure) and should have had a detailed fetal anomaly scan.
- Some infants exposed to lithium may be **hypotonic and require initial breathing support** after birth and the **neonatal team should be present at the birth.**
- Some infants exposed to lithium may experience a prolonged 'floppy baby syndrome' associated with lethargy, poor sucking, tachypnoea, tachycardia, respiratory distress, cyanosis and hypotonia. **The neonatal team should do the 24hr check including a pulse oximetry check.**
- Babies whose mothers are on lithium at the time of delivery are **at risk of lithium toxicity** in the immediate postpartum if mother's levels are high or if they become dehydrated. Extra monitoring and **support with feeding may be needed to prevent dehydration** and reduce risk of lithium toxicity.
- A **cord blood lithium level** should be taken on all recently exposed infants and reviewed by neonatal team. There are no current recommendations to guide interpretation. Below is a table of suggested actions. However regardless of blood lithium level, **any baby who is showing signs suggestive of lithium toxicity** (lethargy, hypotonia, poor feeding) should be **reviewed by neonatal team and will likely need admission.**

Lithium level <0.6	Lithium level 0.6-1.2	Lithium level >1.2
- support demand feeding - do not allow baby to go > 4 hours without a feed	- ensure adequate hydration - support feeding - do not allow baby to go > 3 hours without a feed - monitor lithium levels - check renal function	- consider admission to neonatal unit for cardiorespiratory monitoring - support hydration - monitor lithium levels - check renal and thyroid function

- As lithium can affect thyroid function it is important to ensure all exposed infants have their newborn screening test.

- **Breastfeeding is not recommended** for women on lithium as lithium is excreted into breast milk in variable amounts (up to 42%) and there is a risk of neonatal toxicity, particularly if the baby is unwell or premature. There is also a paucity of data on long term outcomes however there is currently no data to suggest lithium affects neurodevelopment long term. It may be acceptable for babies to have a first feed of colostrum to aid establishment of the intestinal microbiome. Beyond that donor human milk or formula milk is advised.
- If a mother decides to **breastfeed on lithium** the risks and uncertainties need to be carefully explained to the mother, and there needs to be **careful clinical oversight** by Mothers & Babies Team with **infant blood monitoring** (blood tests on day 2, 7, 14 and then 3 monthly for lithium level, renal and thyroid function). Additional testing should be done if baby becomes unwell or if maternal levels are high or if maternal dose is increased (allow 5 days before testing for steady state drug level to be reached). If baby stops breastfeeding or is predominantly formula milk fed then this monitoring is not needed. It is important to emphasise that this monitoring does not guarantee the infant will not suffer adverse effects.

KEY POINTS

1. Neonatal team to attend delivery of all babies of mothers on lithium
2. Cord blood to be taken for lithium level in all exposed infants (neonatal team to review result)
3. Close observation of baby after birth with feeding support to avoid dehydration
4. Neonatal team to do 24 hour check (including pulse oximetry check due to increased risk of cardiac defects).
4. Breastfeeding not recommended. If mother chooses to do so blood test monitoring of baby required.

Additional Resources:
New Zealand Formulary (www.nzf.org.nz)
Medsafe (www.medsafe.govt.nz)

Bumps (www.medicinesinpregnancy.org)
MotherToBaby (www.mothertobaby.org)
Lactmed (https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm)

You can also contact the Mothers and Babies Service Liaison Paediatrician for advice and the Hospital Drug Information Service. There is also a Health Pathways Guideline.

Neonatal Meconium Drug Screens

- Meconium starts to develop in the second trimester and any drugs that the fetus is exposed to will accumulate in the meconium. When the baby passes meconium after birth it can be analysed. This provides a long window of detection for drug exposure for at least the 3rd trimester and even possibly earlier.
- There are certain clinical situations where a meconium drug screen may be beneficial to the baby's care
- Discuss with the parents that the reason for the meconium sample is to ensure the baby is receiving the appropriate care that they need
- Placing on the Eat Sleep Console programme is beneficial to nonpharmacologic care and a baby may transition to the ESC programme from results form the meconium screen
- Opioids may be associated with the need for treatment for withdrawal, benzodiazepines are associated with need for higher treatment dose requirement or second line medication and a longer duration of treatment

Examples of Situations to consider Meconium Collection:

- Maternal history of drug use or suspected drug use and an unwell baby where drugs may be a contributing factor – such as neonatal abstinence syndrome or neonatal substance withdrawal symptoms, unexplained neurological symptoms
- Maternal behaviours suspicious for intoxication
- Maternal history of drug use but denying drug use in pregnancy
- No antenatal care
- Request from Oranga Tamariki for a drug screen for care and protection decision making

If a mother is open about drug use in pregnancy, especially if monitoring results are available electronically then a meconium screen does not need to be taken to confirm this. Discuss with the NICU SMO involved.

Meconium Sample and Testing

- Screens are done on meconium and not transitional stool or faeces so a sample does need to be taken early in the first day or two.
- Contamination with blood means the test cannot be run
- A “pea size portion” of meconium is required for the analysis in the laboratory. If multiple samples are needed to make up enough sample, then the sample should be held in the fridge in the Blood gas room.
- Turnaround time is typically within 48 hours Monday to Friday. The sample is likely to be run on the day that it is delivered to Toxicology

Consent

- Parental/Caregiver consent is required before sending the sample.
- The sample can be collected and kept in the fridge until parental consent is obtained.
- In some cases where Oranga Tamariki have been involved and consent has been obtained before the baby is born, this will be documented in the Social Work care plan under the mother on HCS. Always confirm with the mother.
- Where a baby is symptomatic for withdrawal, care and protection issues are present and the parent has not consented or has self-discharged the SMO should discuss further with the social work team ± legal team about how to proceed.
- If the sample is required to optimise the baby’s care then the sample should be taken and sent to the lab for analysis as the above issues are worked through.

Drug Testing Panel

- A standard drug screening profile, which includes approximately 300 narcotics, drugs of abuse and therapeutic drugs. The testing can be tailored to detecting specific compounds outside the standard panel where this may be indicated.
- A negative result does not necessarily mean that a drug was not ingested in pregnancy – it may be in lower levels than detectable on the assay or be due to the meconium sample size.
- Urine samples are less helpful as urine is not in ample supply in the early days and collection is fiddly or invasive. Urine only gives an overview of the past 2-3 days. If this is still helpful then a small sample of approximately 2 mL is all that is needed to perform a drug screen.
- Typically, the laboratory will give preference to NICU samples and run these as acute samples with results available as soon as possible.

❖ SURGICAL

Urogenital

Undescended Testes

- Most undescended testes are evident at birth.
- Descent is unlikely to occur beyond 3 months post-term
- Newborn testes are not retractile

Action:

- If undescended testis suspected, refer to paediatric surgery/paediatric urology at 3 months post-term
- Inform the GP and tell the parents that an operation is likely to be necessary if the testis is confirmed to be undescended

Hypospadias

- Presents as a bent penis (chordee), with an incomplete foreskin (dorsal hood) and a urethral meatus in an abnormal position (proximal to where it should be)
- Check that the testes are descended and that the scrotum is not bifid (this may indicate a DSD (intersex) problem

Action:

- Refer to the paediatric surgeon/urologist to be seen at 3 months
- Neonatal circumcision contraindicated
- If the abnormality is severe, obtain a renal USS.

Hydroceles

- Hydroceles need no treatment unless they persist

Action:

- Examine to be certain there is no inguinal hernia
- If hydrocele alone, reassure parents that these almost always resolve spontaneously,
- Refer to paediatric surgeon if there is diagnostic uncertainty or advise the parents that their GP can refer if they persist beyond 2 years of life

Inguinal Hernias

- Usually appear as an intermittent lump at the external ring in the groin
- Always needs surgical correction

Action:

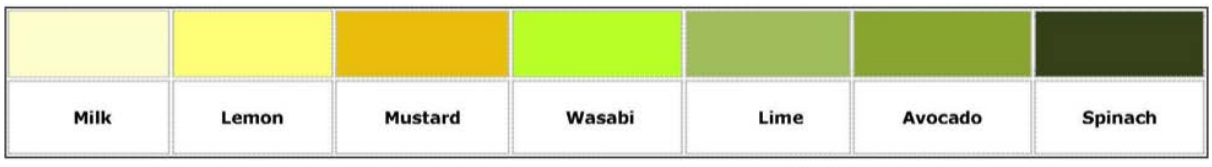
- Paediatric surgical referral before discharge.

Bilious Vomiting or New Large Bile Stained Aspirates

Bilious vomiting or new onset of bile aspirate in an NG fed baby is a sign **of intra-abdominal pathology and must be taken seriously.**

Term babies present usually in the first month of life and many in the first few days on the postnatal ward or primary birthing unit. They can also present to CAA.

The bile colour indicator ranges from yellow to very dark green (spinach in the chart below)



- Some infants will have bilious aspirates that are bright yellow in colour in the initial phases
- Note that colostrum may appear yellow in colour.
- Remember milk can reduce the intensity of the “bile”

Differential Diagnosis

Bile and never tolerated feeds

- It could be the first sign of malrotation* with volvulus even if the abdomen is not distended and this is a surgical emergency. Check for anorectal malformations
- Assess for Hirschsprung disease
- Review the antenatal scans as bowel dilatation may suggest an atresia.

Bile after having tolerated feeds

- The following causes should also be considered:
- NEC
- Malrotation with intestinal volvulus – these can present early and late.
- Intestinal obstruction – eg. bowel atresias, Hirschsprung disease, anorectal malformations, strictures, adhesions if previous NEC/surgery
- Strangulated inguinal hernia

Bile that may not be pathological

- Bilious aspirates occur frequently in the preterm infant on nasogastric feeds with feed intolerance in the first week as the gut motility develops.
- Similarly, post-surgical babies and those with ileus may have bilious aspirates in the recovery phase.

*In malrotation, the primary pathology is failure of the small bowel mesentery to attach to the posterior abdominal wall normally, such that there is a narrow "universal mesentery" with the superior mesenteric artery and vein supplying the whole of the mid-gut, (i.e., all the small bowel and much of the large bowel) enclosed within it. Twisting or torsion of this (called "volvulus") will lead to mid-gut ischaemia and necrosis, and sometimes a poor outcome (short gut syndrome or death).

Management

- Admit the baby to NICU (or HDU if presents to CAA)
- In some situations the baby < 1 month corrected may be more appropriate to be transferred to NICU. This is a SMO discussion/decision and reliant on bed state
- Take an accurate history of feeds and vomiting, as well as meconium and stool pattern.
- View the colour of the vomit if possible
- Examine the baby for abdominal distension, abdominal tenderness, bowel sounds and groin lumps
- Check the blood sugar (if they are obstructed they may not be absorbing enough milk to maintain blood sugars) and a capillary gas – checking pH, lactate, base excess
- AXR (AP and lateral).
- The Neonatal SMO must be informed and review the AXR with the on-site team at all times day and night. The Paediatric radiologist on-site or on call can also assist with the assessment.
- Consultation with the Paediatric surgeon on call at any time. It is best to notify them at the time of presentation / AXR.
- Initial management for the bile stained vomiting is to make the baby **NBM and start iv fluids and antibiotics** (amoxicillin/ gentamicin or cefotaxime/vancomycin if later presentation or concern for NEC / peritonitis consider metronidazole as triple antibiotic cover)
- The gold standard for the radiological diagnosis of malrotation is an **upper GI contrast study** #. The Paediatric surgeon and neonatologist should discuss the ordering of the study taking into account the clinical status of the baby. It needs to be clear who who will be calling the Radiology team after the contrast study is requested
    - In the day call the Paediatric Radiologist directly
    - After hours contact the On Call Radiology Registrar first and they will help liaise with the on-call Paediatric Radiologist
    - If volvulus is suspected, timing is urgent and will occur at any time of the day or night.
    - If the baby is stable and the contrast study is being deferred by the surgeons until the daytime then still order the test but inform the on call Radiology Registrar so that the Radiology team are aware of the need for the test and the reasons that it is not being done urgently
- Occasionally, depending on the clinical state of the infant surgery may be undertaken without prior imaging.
- Abdominal ultrasound should not be used as a first line investigation in suspected malrotation and volvulus unless the baby is too unstable to be moved to radiology for an upper GI study, and this should only be undertaken after discussion between the paediatric surgeon, neonatologist and paediatric radiologist. It can be performed at the bedside in the NICU.

- Ultrasound for malrotation/volvulus can be challenging depending on factors such as gaseous bowel distension and operator experience, and therefore may not always provide a definitive diagnosis.
- In addition to assessing for malrotation/volvulus (which is not always possible), abdominal ultrasound can also be used to assess for intramural gas, free fluid, perforation, collections and portal venous gas.

- If there is a clinical picture of malrotation, surgery will be required after the contrast study or US.
- Other indications for urgent surgery where malrotation has been excluded:
    - NEC with peritonitis typically with perforation,
    - Intestinal obstruction with compromised bowel
    - Irreducible inguinal hernia.

An upper GI study or barium meal, in malrotation will show the DJ flexure has failed to ascend to the same level as the pylorus, and is not to the left of the midline. Most of the small bowel will continue to spiral down in the right para-vertebral gutter.

Bowel Obstruction

A variety of conditions may present with similar signs and symptoms. Antenatal scans, history and careful examination should help in establishing a diagnosis. The higher the obstruction the earlier the vomiting with less marked abdominal distension. The lower the obstruction the later the vomiting and more marked the distension

Presentation

- Abdominal distension
- Tenderness or pain on examination of the abdomen
- Vomiting – often bilious
- Delayed passage of meconium or failure to pass meconium within 48-72 hours
- Maternal history of polyhydramnios may indicate a high obstruction

Ovarian Cysts

Ovarian cysts diagnosed antenatally

- The vast majority of these are benign follicular cysts and if they contain solid elements consider the possibility of a cystic teratoma
- Cystic masses containing solid elements or symptomatic ovarian cysts should be surgically removed and histology performed
- Septated or debris filled cysts usually mean that the ovary is already dead from torsion and ischaemia and these frequently disappear on follow up ultrasound scans
- All suspected ovarian cysts should be referred to the Paediatric Surgeons
- An early postnatal scan should be arranged – discuss timing with the surgeons and arrange follow-up in the surgical clinic after the scan

❖ ANTENATAL ULTRASOUND ABNORMALITIES

- Borderline cerebral ventriculomegaly (ventricles 10-15 mm)
  - Head circumference and careful physical exam
  - Ventricle/s > 10mm – postnatal head US if this is the advice from the Fetal Anomaly Committee
  - Head US as an inpatient has the benefits of rapid resolution of any parental concerns as the majority of these scans will be normal.
  - If the head US is done as an outpatient then arrange for the parents to receive the results – either by phone contact or review in CWH Wed clinic after the scan
- Choroid plexus separation
  - Physical exam including head circumference
  - Head US only if ventriculomegaly or structural abnormality (especially of corpus callosum) on later antenatal scan
- Choroid Plexus cyst(s) - Physical exam, if no abnormality, no investigation required
- Agenesis of the corpus callosum (CC) / absent cavum septum Pellucidum (CSP)

  Isolated partial or complete agenesis of CC +/- absent CSP:
  - Antenatal: Fetal MRI AND microarray
  - Postnatal:
    – Monitor blood glucose until 48 hours old, if < 2.6 mmol/L send hypoglycaemia panel immediately
    – Pituitary workup at 48 hours of age: T4, TSH, FSH, LH (inpatient)
    – Ophthalmology review (outpatient)
    – MRI if not obtained antenatally, microarray if not obtained antenatally

  Isolated absent CSP after 20 wks GA:
  - Antenatal: Fetal MRI, consider genetics only if additional anomalies found
  - Postnatal:
    - Monitor blood glucose for 48 hours, if < 2.6 mmol/L send hypoglycaemia panel immediately
    - Pituitary workup: At 48 hours of age, send T4, TSH, FSH, LH (inpatient)
    - Ophthalmology review (outpatient)
    - MRI if not obtained antenatally
- Fetal cardiac echogenic focus - Physical exam, if no abnormality, no investigation

  Abdominal calcifications
  - Physical exam, if no abnormality, may need no investigation.
  - Consider TORCH screen if not done antenatally.
  - Make sure Guthrie card is done after 48 hours protein feeds
- Borderline cerebral ventriculomegaly (ventricles 10-15 mm)
  - Head circumference and careful physical exam
  - Ventricle/s ≥ 13.1 mm – postnatal head US in all babies
  - Ventricle/s 10-13.0 mm – postnatal head US only if this is the advice from the Fetal Anomaly Committee, otherwise treat as normal
  - Head US as an inpatient has the benefits of rapid resolution of any parental concerns as the majority of these scans will be normal.
  - If the head US is done as an outpatient then arrange for the parents to receive the results – either by phone contact or review in CWH Wed clinic after the scan
- Choroid plexus separation
  - Physical exam including head circumference
  - Head US only if ventriculomegaly or structural abnormality (especially of corpus callosum) on later antenatal scan
- Choroid Plexus cyst(s)
  - Physical exam, if no abnormality, no investigation required
- Fetal cardiac echogenic focus
  - Physical exam, if no abnormality, no investigation

- Antenatal diagnosis aortic arch hypoplasia
  - These cases have had a potential arch abnormality detected on antenatal scans
  - A referral will have gone to Cardiology Akld with the scans being reviewed and a plan made that it is appropriate to deliver in Chch
  - Any fetus with a significant and likely duct dependent arch narrowing will have a plan made to deliver in Akld. However, the arch and PDA are dynamic structures so it is not always possible in borderlines/more mild cases to determine antenatally which cases will end up having a clinically significant arch narrowing that needs cardiology input soon after birth or prostaglandin to maintain systemic blood supply and which will have normal anatomy after birth.

Management

- Paediatric attendance at delivery is not required for this indication alone
- Keep baby with their mother on the postnatal ward if well and expect admission for a minimum of 3 days as monitoring and scans are required
- Daily Neonatal Team review and Neonatal Team to do the 24 hour baby check and to include pre and post ductal saturations at this time
- Monitor with newborn observations at 1,4,12 hours and then 12 hourly (including saturations) until the heart ultrasound is performed
- Lactate measurement 12 hourly until the heart ultrasound is done
- Heart ultrasound to be performed by NICU consultant day 2-3 or earlier if unwell
- The baby needs to remain an inpatient until the PDA closes and the aortic arch has been confirmed on scan as patent
- These babies often need a repeat scan at 6-8 weeks so discuss with Dr Alex Binfield (Paediatrician) regarding the requirement of this prior to the baby being discharged

- Abdominal calcifications
  - Physical exam, if no abnormality, may need no investigation.
  - Consider TORCH screen if not done antenatally.
  - Make sure Guthrie card is done after 48 hours protein feeds

❖ IMMUNISATION

Maternal Hepatitis B Carrier (HBsAg positive)

- The risk of mother passing the virus to her baby during delivery is high, and if not infected at birth, the baby remains at risk of hepatitis B infection from mother during the first five years.
- Although the baby's infection may be mild or even asymptomatic, chronic hepatitis occurs in up to 90% of infants who acquire the virus at birth.
- Thus, infection early in life results in a much higher risk of chronic hepatitis than in adulthood.
- Chronic hepatitis puts the baby, later in life, at high risk of transmitting the virus to others such as sexual partners and offspring, and of death from chronic liver disease or hepatocellular carcinoma.
- Recognition and counselling of mothers who are hepatitis B carriers should begin early in antenatal care.
- All pregnant women should be screened.
- Pacific Islanders, Africans, Asians and New Zealand Maori are high risk groups for chronic Hepatitis B carriage (this is presumed to be mostly due to perinatal acquisition).
- Carriage is also more common in people who have occupational or social exposure to human blood.

Management

- Wearing disposable gloves (to protect yourself) when handling the baby at birth and until they are bathed
- **Early bathing** of the baby to remove maternal blood and body fluids in warm water only
- Before any im injections the skin is to be cleaned with an aqueous chlorhexidine (alcohol-free) swab
- As soon as possible after birth, the infant should receive **Hepatitis B Immunoglobulin** (HBIG) and **Hepatitis B vaccine** IM at separate sites (see drug profiles)
- Vaccine and HBIG are likely to be fully effective when given up to 12 hours after birth, and will protect some infants even when given after that, but there is no advantage in delay.

- If the father or a household contact has Hepatitis B it is appropriate for the baby to receive the Hep B vaccination at birth but immunoglobulin is only indicated to prevent transmission from the mother during birth
- The baby will need subsequent hepatitis B immunisations as per the National Immunisation Schedule
- If a HBsAg positive mother has cracked, bleeding nipples and is breastfeeding the advice is that breastfeeding can still continue. Hep B does not transfer through breastmilk and there is additional protection after receiving the immunoglobulin and vaccine at birth.
- Infants of HBsAg positive mothers should be tested for HBsAg and antibodies to HBsAg one and three months after completion of the vaccine series. This will identify those few infants who have become chronically infected despite immunisation and will aid in their long term medical management. It will also identify infants who lack antibody and who should receive further doses of vaccine.
- If mother's HBsAg status is unknown at the time of delivery, maternal blood should be sent for testing.
- However, prophylaxis needs to begin immediately to be effective, so if she belongs to a **high risk group**, you should follow the protocol above for infants whose mothers are known to be positive without waiting for the results.
- If the mother proves to be negative the usual hepatitis B vaccine can be given at 6 weeks, 3 months and 5 months, and the serology testing after completion of the vaccine schedule can be omitted.
- We advise immunisation against Hepatitis B for all health care workers who are at risk of exposure to blood or bodily fluids. We also advise obtaining serologic proof that immunity has developed.

BCG Vaccine

- High rates of TB exist in New Zealand among population groups from Asia, Africa and the Pacific, particularly in recent immigrants.
- The role of vaccination is to protect individuals at high risk of exposure.
- BCG was introduced for neonates in 1976 and is effective in preventing extra pulmonary disease
- The LMC needs to assess the risk of TB in pregnancy and plan for vaccination after birth.
- In babies admitted to the Neonatal Nursery the Neonatal Staff also have the responsibility of considering eligibility for BCG vaccine.
- Preterm delivery or being of low birth weight are not contraindications to vaccination but babies should wait until they are >34 weeks before being vaccinated in order to ensure an adequate response.
- If eligible can be referred to the Public Health Nursing service by completing the **referral form**.
- Families should be referred to the Vaccination Clinic at CWH by phoning the Public Health nurses at Burwood Hospital on 99777 (internal) or 383 6863 (external) and faxing a request over 383 6878
- See Immunisation Handbook 2011 (www.moh.govt.nz/immunisation) for further information

Neonatal BCG Eligibility Criteria

- Living with a person with current TB or a past history of TB
- Living with one or more people who within the last 5 years lived for a period of ≥ 6 months in countries with a rate of TB ≥ 40 per 100,000
- During their first 5 years they will live for ≥ 3 months in a country with a rate ≥ 40 per 100,000 and are likely to be exposed to those with TB

Areas with rates of TB ≥ 40 per 100,000:
Africa, South America, Russia, India, China (not Hong Kong), South East Asia (not Singapore), Pacific (not Cook Islands, Fiji, Niue, Samoa, Tokelau, Tonga)

❖ DRUG PROTOCOLS

Amoxycillin (Parenteral)	**CLICK HERE**
Benzylpenicillin	**CLICK HERE**
Cefotaxime	**CLICK HERE**
Dextrose gel 40% (Glucose)	**CLICK HERE**
Flucloxacillin	**CLICK HERE**
Folic Acid	**CLICK HERE**
Ferrous Sulphate (Iron)	**CLICK HERE**
Hepatitis B Immunoglobulin	**CLICK HERE**
Hepatitis B Vaccine	**CLICK HERE**
Paracetamol - Oral	**CLICK HERE**
Sucrose	**CLICK HERE**
Vitamin A – Retinol	**CLICK HERE**
Vitamin D – Colecalciferol	**CLICK HERE**
Vitamin K – Phytomenadione	**CLICK HERE**

Haemorrhagic disease affects one in 2-400 babies who are not given vitamin K prophylaxis. Recommendations are:

- All infants should have vitamin K prophylaxis (2 mg/0.2 mL)
- Vitamin K given either as a **single IM injection or as repeated oral** doses is safe and effective in preventing haemorrhagic disease of the newborn in **well** newborns.
- Parents should be free to choose, either an injection or oral doses for their child.
- Oral vitamin K is given as 2 mg at birth with the first feed.
- For breastfed infants repeat doses (2 mg) should be given at 5 days (at the time of the Guthrie test) and at 6 weeks (with the first immunisation).
- IM vitamin K is given as a single injection of 1 mg (0.1 mL) at birth (< 1500 g 0.5 mg = 0.05 mL).
- **IM vitamin K is the strongly recommended route for high risk infants** (prematurity, birth asphyxia, traumatic deliveries, known hepatic disease, or any illness that will delay feeding, eg. most NICU admissions
- Maternal phenytoin, primidone, methsuximide or phenobarbitone therapy is an indication for the mother to be given vitamin K (10 mg IM vitamin K) 24 hours before delivery then the baby should have 1 mg IM vitamin K at birth then again 24 hours later.
- Usually maternal warfarin therapy is stopped well before delivery because it crosses the placenta and can cause severe neonatal haemorrhagic disease. Occasionally, it cannot be stopped for maternal reasons. In these circumstances, the baby will need immediate and usually repeated doses of vitamin K, as well as measurement of PT and PTT and fresh frozen plasma on standby.

❖ INVESTIGATIONS

Tubes for Lab Tests

- Intranet/Divisions/Canterbury Health Lab/Testing information will provide you with the blood volume and tube required for all tests done at Canterbury Health Labs
- Green tube = Lithium heparinised
- Pink tube = EDTA
- Red tube = Plain tube

BLOOD TEST	VOLUME	TUBE	COMMENTS	LAB	TESTED
Chromosomes	0.6 Ml	Green		80881	Mon-Fri
Chrom. microarray	1-2 mL	Pink - 2 full tubes		80881	Mon-Fri
CRP	0.6 mL	Green		80397	Daily
Full Blood Count	0.25 mL	Pink		80373	Daily
Gentamicin Level	0.25 mL	Green		80397	Daily
Group and Coombs	0.25 mL	Pink		80375	Daily
Group and Hold	0.25 mL	Pink	Handwrite label	80310	Daily
JAUN screen	0.6 mL	Green	Does not need foil around it	80397	Daily
NEON	0.6 mL	Green		80397	Daily
TSH/T4 Endo Lab	1.2 mL	2 Red tubes		80848	Mon-Fri
TSH/T4 at Biochem	0.6 mL	Green		80397	Daily

It is not necessary to cover the blood tube with tin foil when sending for bilirubin test

Swabs – Identification guide

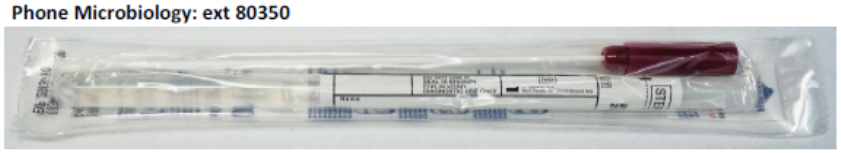
Canterbury Health Laboratories
www.chl.co.nz | 0800THELAB

Swab Identification Guide

Canterbury District Health Board
Te Poari Hauora ō Waitaha

Bacterial Swabs

Phone Microbiology: ext 80350



Bacterial Swabs with Transport Medium for Routine Culture
(including Cervical swabs for ***N. gonorrhoeae***)

CERVICAL SWABS / BACTERIAL SWABS (as above) for Mycoplasma/Ureaplasma →

Chlamydia Multi- Collect Kits

Phone Serology: ext 80418 (A/H 80350)

Multi-Collect Transport Tubes

ALL CHLAMYDIA PCR SWABS

Use for Chlamydia Testing:
- Genital
- Eyes

Herpes Group PCR Swabs including VZ

Phone Virology: ext 80356 (A/H 80350)

Black top (Plain, plastic shaft, Dacron tip)

No Transport Media

Respiratory Viruses

Nasophyarygeal swab in Viral Transport Media. Phone Microbiology: ext 80350

→

Enterovirus PCR: throat swab
Mycoplasma PCR: throat swab

Bordetella pertussis PCR

Nasophyarygeal swab >> place back in collection tube

No Transport Media

Measles PCR

Nasophyarygeal swab in Viral Transport Media

→

Oral Swabs for Measles PCR and Serology

For patients under 5 years only

No Transport Media

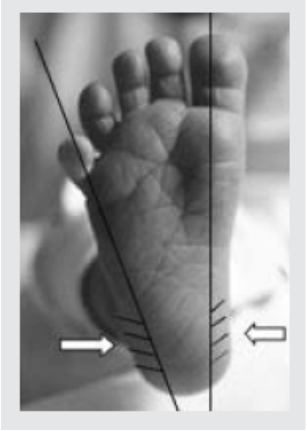
Authorised by: Microbiology, Canterbury Health Laboratories, CDHB
Date: April 2013

labnet
YOUR MEDICAL LABORATORY NETWORK

Capillary Blood Sampling

Ensure the parents understand the reason for the blood test.

- Assemble equipment required
- Wash hands
- Warm the site if required using heel warmer
- Give infant sucrose as per the drug protocol
- Disinfect the site using an alcohol free chlorhexidine 2% solution and allow to air dry
- Select site of the puncture – medial or lateral portion of the heel, plantar surface. Punctures should never be made on posterior curvature of the heel below Achilles tendon where bone is closest to skin or on arch of the foot. Do not puncture over previous site.



- Wear gloves and use universal precautions when taking blood
- Use an automated lancet with a depth of incision ≤ 2.0 mm to puncture the heel. Wipe off first drop of blood with sterile gauze. Collect drops of blood into appropriate tube. Do not scrape blood from the heel area.
- Apply gauze to puncture site and apply pressure until bleeding stops.
- Discard lancet into sharps container

Newborn Metabolic Screen

- Capillary blood sample as above
- Refer to Maternity Guidelines Newborn Screening Guidelines for collection on to test card

Care of IV Luer on the Maternity Ward

Once the IV luer has been inserted and secured it will have a splint in situ to minimise the possibility of it becoming dislodged. This should be left unbandaged in order for it to be seen and checked.

- The IV luer will be taped in such a way that the site of insertion is visible under the tegaderm dressing. Where the cannula ends will be visible to allow easy detection of any swelling/redness of the site.
- A PALL filter will be attached to the end of the luer with a smart site on either side of the filter line.
- The smart site is to be swabbed with a 70% alcohol swab prior to administration of the medication. Medications will be given via the smart site at the end of the connection, thus going through the filter
- A sodium chloride 0.9% flush of 1 mil will be charted on the Drug Treatment chart (QMR0004) to be given 6 hourly as a slow push to ensure the luer is patent. The luer is to be checked for patency before the administration of any medication through the cannula
- The site of the luer should be observed at a minimum of 3 hourly by a midwife or registered nurse and the parents instructed to notify the midwife/nurse if they notice anything they are concerned about
- Notify the NICU team if any concerns regarding the IV luer.

IV Luer Insertion on the Maternity Ward

IV insertion should be undertaken on the maternity ward whenever possible. Assistance with this procedure will be required from the maternity ward staff. Their responsibility with this procedure is to:

- Ensure sucrose is available and administer it to the baby as per the protocol
- Contain and hold the infant for the procedure
- Assist with securing the IV luer under the guidance of the NICU Team
- Provide ongoing care of the IV luer (as per care of the IV luer on the maternity ward)