

**Royal Hospital for Women (RHW)
NEONATAL BUSINESS RULE
COVER SHEET**



Health
South Eastern Sydney
Local Health District

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SUMMARY	To provide feeding guidelines for preterm neonates with birth weight 1501-1800g

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This Clinical Business Rule is developed to guide safe clinical practice in Newborn Care Centre (NCC) at The Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this Clinical Business Rule. Using this document outside the Royal Hospital for Women or its reproduction in whole or part, is subject to acknowledgement that it is the property of NCC and is valid and applicable for use at the time of publication. NCC is not responsible for consequences that may develop from the use of this document outside NCC.

1. BACKGROUND

This CBR provides feeding guidelines for preterm neonates with birth weight 1501-1800g.

2. RESPONSIBILITIES

Medical, Nursing and Allied Health Staff

3. PROCEDURE

3.1 Nutrition Goals

- Regain birthweight by 10-14 days of age¹
- Achieve physical growth targets in the NICU^{2,3}
 - Weight – 15-20 g/kg/day³
 - Weight gain may slow to 25-30 g/day as approaches 40 weeks CGA.
 - Length – 1.1 cm/week (± 0.2 cm)
 - HC target – 1.1 cm/week (± 0.2 cm)
- Minimise the risk of necrotising enterocolitis.
- Prevent osteopenia of prematurity
- Improve neurodevelopmental outcomes

3.2 Clinical Practice

Prior to birth

- Antenatal counselling: NICU medical team or CMC for lactation may provide counselling for the woman and her partner about the importance of expression of mother's own milk, breastfeeding, feeding goals, availability of pasteurised donor human milk (PDHM) and probiotic. But DO NOT encourage expression prior to delivery, which may facilitate preterm labour.
- Consent: Obtain written informed consent for PDHM (if eligible) and probiotic.

At birth

- Determine if the infant is appropriately grown for gestational age (AGA) or small for gestational age (SGA), that is growth restricted with birthweight <10th percentile.
- Commence on 3 hourly feeds using mother's own milk (MOM) or PDHM for babies < 32 weeks or term formula. First feed to be administered within 6 hours of life.
- Stable, AGA infants with normal Doppler can be commenced on feeds of ~30ml/kg/day and graded up to 60ml/kg/day if tolerating first 2 feeds.
- SGA or infants with abnormal dopplers:
 - Discuss with neonatologist/Fellow about enteral feeds
 - Option to trial feeding regime of AGA infants or commence at 5 ml 3rd hourly and reassess every 6 hours
 - Consider peripheral parenteral nutrition for remaining fluid requirement

After 24 hours of life – Grading up feeds

- Increase feeds by 20-30ml/kg/day until 170mL/kg/day is reached.

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- Grading up feeds may need to be slow or altered (eg. hourly bolus feeds, slow bolus feeds over 20-30 minutes, continuous feeds, transpyloric feeds) in special circumstances, such as:
 - Growth restriction
 - Abnormal umbilical Dopplers
 - Feed intolerance
 - Necrotising enterocolitis and other medical or surgical gastrointestinal conditions
 - Haemodynamically significant PDA (particularly infants on indomethacin or ibuprofen)
 - Infants on inotropic support and/or muscle relaxants
- If continuous enteral feed is chosen – draw up only 2-hour feed volume into syringe and administer it using an infusion pump. Feed should be agitated gently every 1 hour to avoid sedimentation.

Fortification

- Commence half fortification (22-23 kcal/30mL) when enteral feeds reach 100-120 ml/kg/day and full fortification (24-25 kcal/30ml) at 120-150 mL/kg/day of enteral feeds.
- If standard fortifier is not tolerated or extra protein or calorie required, NICU dietitian and team may opt to use Beneprotein and/or MCT oil.
- Continue fortification generally until the time of discharge or until transitioning to breast feeds.
- Note: If on formula feeds – consider changing to Low birthweight formula at 100-150 mL/kg/day.

Parenteral nutrition (PN)

- PN is recommended if it is anticipated that the infant may not achieve full enteral feeds by day 5-7 of life.
- If peripheral IVC is used for PN administration
 - 2 options are available: (1) Peripheral preterm solution +/- SMOFlipid, or (2) standard preterm solution or 34wk-term PN +/- SMOFlipid
- If PICC line is used for PN administration
 - Administer standard preterm solution/34wk-term PN + SMOFlipid
 - May consider **concentrated** preterm PN once the IV fluid volume < 100 mL/kg/day.
 - Maximum **concentrated** preterm PN solution should not exceed 100 mL/kg/day. Volume > 100 mL/kg/day requires approval from neonatologist/NICU dietitian.
 - Maximum **standard** preterm PN/34wk-term PN solution that can be given is 135 mL/kg/day.
- Cease intravenous lipid emulsion once the infant tolerates 120 mL/kg/day of enteral feed.
- Cease PN solution and remove central line once the infant tolerates 150 mL/kg/day feeds.

Multivitamins and Iron supplementation

- Add Multivitamin once the feeds reach 120 mL/kg/day or the day after SMOF lipid ceased:
 - Pentavite 0.45 mL daily OR
 - Brauer 0.5ml twice per day + vitamin D 400IU daily
- Iron is not required if PreNaN FM85 Fortifier is used at >160mL/kg/day.

Monitoring

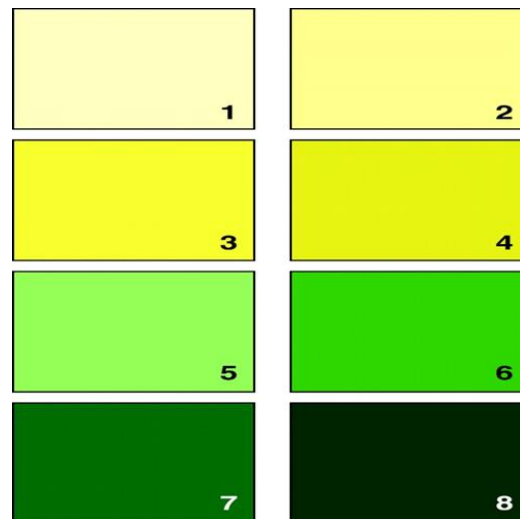
- Clinical monitoring for feed intolerance:
 - Medical team to assess the abdomen once a shift or more frequently if concerns of abnormal findings such as abdominal distension, discolouration, or blood in stool.
 - Prefeed gastric aspirate to confirm the IGT position: Aspirate only up to 0.5 mL to check the colour of aspirate and the pH for tube position.
DO NOT ROUTINELY ASPIRATE THE ENTIRE GASTRIC RESIDUALS.
 - If aspirate/vomit is heavily bile stained (colour number 7 or 8 (Figure 1) – return the aspirate, stop feeds, and notify medical team for assessment.
 - Occasionally, the volume of aspirate would be measured.

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- If aspirate volume is <50% of previous 6-hour volume, not heavily bile stained and clinically stable abdomen, return aspirate and continue to feed.
- If aspirate volume \geq 50% of previous 6-hour volume or heavily bile stained, return aspirate, stop feed, and assess the infant for any abdominal pathologies.



- Growth
 - Weight every Monday, Wednesday, and Friday
 - Weight target 15-20 g/kg/day
 - Weight gain may slow to 25-30 g/day as approaches 40 weeks CGA.
 - Length and head circumference every Wednesday
 - Length target 1.1 cm/week (\pm 0.2 cm)
 - Head circumference target 1.1 cm/week (\pm 0.2 cm)
- Biochemical markers
 - Fortnightly serum Ca/Mg/P/urea/Cr and liver function test
 - NICU team may cease biochemical monitoring if adequate weight gain and over 36 weeks corrected GA.

3.3 Educational Notes

- The recommended nutritional practice for very low birthweight infants is to provide their own mother's human milk along with a human milk fortifier (HMF) to avoid protein and nutrient deficiencies.¹
- These local guidelines are a compilation of an integrated system for providing optimal newborn care, family integrated care, kangaroo care (skin-to-skin contact), rooming-in, respecting the WHO/UNICEF Ten Steps to Successful Breast-feeding expanded in 2011 for use in NICUs, and other best practices for neonatal care.^{4,5}
- Early intervention with milk expression soon after delivery (ideally within 1 hour of birth) is critical for milk production of NICU mothers; therefore, mothers should be taught a method of milk expression within this time frame.
- This feeding strategy should be done in conjunction with Immuno-Supportive Oral Care (ISOC).⁵
- Routine prefeed gastric residual (GR) aspiration of entire contents in the clinically stable infant is not recommended. Assessment of GR volumes should be performed only when other clinical signs associated with feed intolerance or NEC are present.¹

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- Bolus feeds promote cyclical release of gastrointestinal tract hormones to stimulate gut maturation and motility but marked variations in practice exist and many use continuous feeds. Low-quality evidence suggests feeding 3-hourly is comparable to 2-hourly feeding although extremely low-birth-weight infants may reach full enteral feeds earlier when fed 2-hourly compared with 3-hourly. Bolus feeding increases splanchnic perfusion more than continuous feeding. Energy expenditure may increase upon bolus feeding as compared to continuous feeding. Systematic reviews show longer time to reach full enteral feeding using continuous rather than intermittent feeding infants⁶ and fat loss may also be greater although there were no significant effects on growth. Data on apnoea are inconsistent.¹ In our guideline, fat loss and sediment formation will be mitigated by limiting the continuous feed volume to not more than 2-hour volume, meaning milk is prepared every 2 hours.
- Growth targets of weight: 15-20 g/kg/day,³ length and HC target: 1.1 cm/week² (± 0.2 cm) during NICU stay were extrapolated from expert recommendations^{2,3} and extreme LBW infants.²

3.4 Abbreviations

NCC	Newborn Care Centre	IVC	Intravenous Cannula
NICU	Neonatal Intensive Care Unit	SMOFlipid	Soybean oil, medium-chain triglyceride, olive oil, fish oil
CGA	Corrected Gestational Age	IGT	Intra Gastric Tube
HC	Head Circumference	Ca	Calcium
CMC	Clinical Midwifery Consultant	Mg	Magnesium
PDHM	Pasteurised Donor Human Milk	P	Phosphorus
AGA	Appropriate for Gestational Age	Cr	Creatinine
SGA	Small for Gestational Age	HMF	Human Milk Fortifier
MOM	Mother's Own Milk	ISOC	Immuno-Supportive Oral Care
PDA	Patent Ductus Arteriosus	GR	Gastric Residual
MCT	Medium Chain Triglycerides	NEC	Necrotising Enterocolitis
PN	Parenteral Nutrition	LBW	Low Birth Weight

3.5 References

1. Embleton ND, Moltu SJ, Lapillonne A, et al. Enteral nutrition in preterm infants (2022): a position paper from the ESPGHAN committee on nutrition and invited experts. *J Pediatr Gastroenterol Nutr.* 2023;76:248-68.
2. Ehrenkranz RA, Dusick AM, Vohr BR, et al. Growth in the neonatal intensive care unit influences neurodevelopmental and growth outcomes of extremely low birth weight infants. *Pediatrics.* 2006;117:1253-61.
3. Cormack B. Section 3. Growth goals and centile charts. In *Neonatal & Paediatric nutrition handbook.* 5th ed. 2022.
4. Nyqvist KH, Häggkvist AP, Hansen MN, et al. Expansion of the ten steps to successful breastfeeding into neonatal intensive care: expert group recommendations for three guiding principles. *J Hum Lact.* 2012;28:289-96.

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5. Immuno-supportive oral care. Royal Hospital for Women Newborn Care Clinical resources and guidelines.
6. Wang Y, Zhu W, Luo BR. Continuous feeding versus intermittent bolus feeding for premature infants with low birth weight: a meta-analysis of randomized controlled trials. Eur J Clin Nutr 2020; 74:775–83.

4. RELATED BUSINESS RULES AND POLICY DOCUMENTS

- NSW Health Policy Directive – Pasteurised Donor Human Milk For Vulnerable Infants – PD2018_043
- RHW NCC Medical CBR – Enteral Nutrition - formula preparations in Newborn Care Centre
- RHW NCC Medical CBR – Enteral Nutrition - human milk fortification - preparation
- RHW NCC Nursing CBR – Breastfeeding - First Breast Expression
- RHW NCC Nursing CBR – Enteral Feed Warming – Calesca
- RHW NCC Nursing CBR – Immuno-Supportive Oral Care (ISOC)

5. CULTURAL SUPPORT

- When clinical risks are identified for an Aboriginal family, they may require additional supports. This may include Aboriginal health professionals such as Aboriginal liaison officers, health workers or other culturally specific services.
- For a Culturally and Linguistically Diverse CALD family, notify the nominated cross-cultural health worker during Monday to Friday business hours.
- If the family is from a non-English speaking background, call the interpreter service: NSW Ministry of Health Policy Directive PD2017_044-Interpreters Standard Procedures for Working with Health Care Interpreters.

6. IMPLEMENTATION PLAN

This revised CBR will be distributed to all medical, nursing and midwifery staff via @health email. The CBR will be discussed at ward meetings, education and patient quality and safety meetings. Education will occur through in-services, open forum and local ward implementation strategies to address changes to practice. The staff are asked to respond to an email or sign an audit sheet in their clinical area to acknowledge they have read and understood the revised CBR. The CBR will be uploaded to the CBR tab on the intranet and staff are informed how to access.

7. RISK RATING

- Low

8. NATIONAL STANDARDS

- Standard 1 Clinical Governance
- Standard 2 Partnering with Consumers
- Standard 3 Preventing and Controlling Infections
- Standard 4 Medication Safety
- Standard 5 Comprehensive Care
- Standard 6 Communicating for Safety

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9. REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
2010	1	S Bolisetty (lead clinician); Newborn Care Management Committee and RHW Quality & Patient safety
2018	2	S Bolisetty (lead clinician); NCC LOPs Committee
2019	3	S Bolisetty (lead clinician); NCC LOPs Committee
2023	4	S Bolisetty (Medical Co-Director), S Allworth (Dietitian), SJ Tapawan (NICU CMO), E Jozsa (CNS), M O'Connor (Acting CMC), A Scott-Murphy (NUM), R Jackson (NE), P Everitt (CMC), K Lindrea (CNC), T Parmar (NICU fellow), E Deibe (CNE); NCC CBR Committee
10.1.24	4	Endorsed out of session by RHW SQC