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

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SUMMARY	To provide guidelines for clinicians on the use of and preparation of formula within Newborn Care Centre.
Key Words	Formula, Preparation, Specialised Formula, Neonate, Enteral Nutrition

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Health
South Eastern Sydney
Local Health District

Formula Preparations in Newborn Care Centre — RHW CLIN150

Contents

1 BACKGROUND

Expressed breastmilk (EBM) with multi-nutrient fortification is the preference to use in neonates. Occasionally, formula preparations are required as medically indicated. The guide is calculated with the assumption that breastmilk or standard formula preparation on average provides 20 kcal/30 mL or 67 kcal/100 mL. Average calorie content of the standard formula is considered equivalent to breastmilk.
This guideline assists staff in calculating the amount of powdered formula to be added to volumes of sterile water to achieve the desired calories.

Definitions[1]:

- Solute – A substance that is dissolved in a liquid (solvent) to form a solution.
- Osmolality – The concentration of a solution in terms of osmoles of solute per kilogram of solvent.
- Osmolarity – The concentration of a solution in terms of osmoles of solute per litre of solution.

2 RESPONSIBILITIES

2.1 Staff

2.1.1 NCC Medical – to liaise with the dietician and specialist medical teams at Sydney Children's Hospital (SCH) for nutritional management of neonates when required, to prescribe required formula, to review the ongoing need for the formula, to order any investigations required, to inform and educate parents/guardians of the need for specialised formula, prescribe the same on discharge scripts.

2.1.2 SCH Specialist medical teams- liaise with NCC medical teams and conduct a consultation or provide advice when required.

2.1.3 SCH Dietitian- to liaise with NCC medical team for nutritional management of neonates, to review nutritional status, educate parents/guardians of the need for specialised formula.

2.1.4 SCH Diet Aides- review the stock of formula within NCC, to supply sterile water for formula preparation, to prepare formula feeds, audit growth measurements weekly.

2.1.5 NCC Nursing – order specialised formula preparations (if not available in NCC), to prepare formula feeds, to perform growth measurements as per unit policy, to review and monitor neonates for formula tolerance, to inform medical officers of any feed intolerance, to educate and support parent/guardians on formula tolerance, preparation, and oral feeding practices.

3 PROCEDURE

3.1 Equipment

- Standard or specialised formula
- Sterile water (supplied by SCH diet aides)
- Measuring scoop or measuring scale
- Appropriate sized bottle
- Appropriate sized enteral feeding syringe
- Enteral syringe cap
- Formula milk label

3.2 Clinical Practice

- Medical staff to prescribe on eRIC:
  - Total fluid requirement (TFR)
  - Type of formula
  - Calorie content per 30mL
  - Volumes to be fed
  - Frequency to be fed
  - Recipe if using a powdered formula preparation (e.g. x scoops : x mL sterile water)

3.2.1 Types of Formulas and Indications for use

Formula category	Description	Indication	Examples
Standard Preterm	• meet the higher nutritional requirements of preterm neonates • can be used instead of fortified EBM/PDHM	• Birth weight (BW) <1800g • Preterm <34weeks Gestational Age (GA) • Fluid restricted • <37wks GA with sub-optimal weight gain	Alula Gold Low BW Pre NAN Low BW Aptamil Gold+ Preterm
Standard Term	• meet nutritional requirements of term neonates	• Term neonates	Alula Gold 1 NAN Optipro 1 Biostime Aptamil Gold+ 1
Semi-elemental/ Extensively hydrolysed Protein Modified	• whey protein broken down into small peptides (extensively hydrolysed)	• Intolerance to cow/soy/goat protein • Severe enteropathy, maldigestion and malabsorptive disorders	Pepti Junior Allerpro syneo 1
Elemental / Amino Acid Protein Modified	• whey protein broken down to contain individual amino acids	• Malabsorptive disorders, short gut, liver disease and Cystic fibrosis • Allergy to cow/soy/goat protein	Neocate Gold Neocate LCP Elecare Alfamino
Fat Modified	• whey protein with high medium chain triglycerides (MCT) and low long chain triglycerides (LCT).	• Chylothorax • Intestinal lymphangiectasia • Severe fat malabsorption • Long Chain Fatty Acid oxidation defects	Monogen, Lipistart

Low calcium & low vitamin D	• consultation with endocrine/renal team prior commencing	• Hypercalcaemia	Locosol
High calorie and Sodium Chloride Moderate protein Low potassium, calcium phosphate and vitamin A	• for neonates in renal failure.	• Chronic kidney abnormality, acute kidney injury • Hyperkalaemia • Polyuria • Sodium wasting	Renastart, Kindergen

- Caution needs to be taken when prescribing specialised term neonatal formulas (e.g. semi-elemental and elemental formulas) to preterm neonates as they do not meet the recommended macro- and micronutrient requirements (in particular calcium, phosphate, sodium, zinc, vitamin A, vitamin C).

3.2.2 Term Formula Powder Preparations

	20kcal	22kcal	22.5kcal	24kcal	25kcal	26kcal	27kcal	28kcal	29kcal	30kcal
NAN Optipro 1 1 scoop to	30 mL water	27 mL water		25 mL water		23 mL water		21 mL water		20 mL water
Karicare 1 1 scoop to	50 mL water	45 mL water			40 mL water				35 mL water	
Alula 1 1 scoop to	60 mL water	55 mL water		50 mL water		45 mL water		42mL water		40 mL water
Bellamy's Organic 1 scoop to	60 mL water	55 mL water		50 mL water			45 mL water			40 mL water
a2 Platinum 1 scoop to	50 mL water	45 mL water			40 mL water				35 mL water	
Aptamil Pepti-Junior Gold+ 1 scoop to	30 mL water	27mL water		25mL water		23mL water		21mL water		20mL water
Neocate Gold / Neocate LCP1 scoop to	30 mL water	27 mL water		25mL water		23mL water		21mL water		20mL water
Monogen 1 scoop to			30 mL water		27 mL water		25 mL water			22 mL water
Locasol 1 scoop to	30 mL water	27mL water		25 mL water		23mL water		21mL water		20mL water
Kindergen 1 scoop to	33mL water	30 mL water		27 mL water		25 mL water				21 mL water

Note
If prescribed formula is not listed in this table, discuss preparation instruction with SCH dietician.

3.3 Documentation

- eRIC

3.4 Education Notes

- Currently, the standard measurement of feed concentration is osmolality. Historical consensus view is that the osmolality of enteral feeds should not exceed 450 mOsm/kg (which approximates to an osmolarity of 400 mOsm/L). Average osmolality of human milk is 281-297 mOsm/kg H_20.
- Formula preparations and the addition of human milk fortifiers have higher osmolality than unfortified human milk.[3,4] However, all these preparations in common use have osmolality below 450 mOsm/kg.
- The normal physiological response to an increase in osmolality is to delay gastric emptying and allow dilution of the contents with hypo-osmolar gastric and intestinal secretions.[1]

3.4.1 Nutritional Composition of Formula Preparations commonly used at RHW

- Ready to Feed (RTF) term formulas

Formula Name	Kcal/30mL	Kcal/100mL	Protein g/100mL	Protein – whey:casein	Hyrolysed Protein	Osmolality, mOsm/kg	HMO's
Alula Gold 1	20	66	1.3	65:35	Intact		No
Nan Optipro 1	20	67	1.3	70:30	Intact	311	2'-FL
Nan Supreme *pro* 1	20	67	1.3	100% whey	Partially hydrolysed		2'-FL, DFL, 3'-SL, 6'-SL
Biostime	19	64	1.4	60:40	Intact	291	2'-FL
Aptamil Gold+ 1	20	67	1.3	60:40	Intact	315	No

- Powdered term formula preparations

Formula Name	Kcal/30ml	Kcal/100ml	Protein g/100ml	Protein – whey:casein	Hyrolysed Protein	Osmolality, mOsm/kg
Nan Optipro 1	20	67	1.3	70:30	Intact	311
Pepti-Junior	20	67	1.8	100% extensively hydrolysed whey protein		210
Neocate LCP	20	67	1.8	100% amino acid		340
Monogen	22.5	75	2.2	100% whey	Intact	240

- RTF preterm formulas

Formula Name	Kcal/30ml	Kcal/100ml	Protein g/100ml	Protein – Casein/Whey Ratio	Hyrolysed Protein	Osmolality, mOsm/kg
Alula Gold Low BW	24	80	2.7	60:40	Intact	290
Pre Nan Low BW	24	80	2.9	100% whey	Partially hydrolysed	308
Aptamil Gold+ 1 Preterm	24	80	2.7	60:40	Intact	310

3.5 Abbreviations

EBM	Expressed Breast Milk	SCH	Sydney Children's Hospital
TFR	Total Fluid Requirement	PDHM	Pasteurised Donor Human Milk
BW	Birthweight	GA	Gestational Age
MCT	Medium Chain Trigylcerides	LCHADs	Long Chain Fatty Acid Oxidation defects
RTF	Ready to Feed		

3.6 Related Policies/procedures

- NSW Health Guideline- GL2023-021 Breastmilk: Safe Management
- RHW NCC CBR- Enteral Feed Warming - Calesca
- RHW NCC CBR- Enteral Nutrition - human milk fortification - preparation
- RHW NCC CBR- Enteral Nutrition - preterm infants 1000g and under
- RHW NCC CBR- Enteral Nutrition - preterm infants 1001-1500g
- RHW NCC CBR- Enteral Nutrition - preterm infants 1501-1800g
- RHW NCC CBR- Enteral Nutrition - infants greater than 1800g
- RHW NCC CBR- Intragastric Tube Insertion and Maintenance
- RHW CBR- Breastfeeding – Protection, Promotion and Support
- RHW CBR- Supplementary Feeding of a Breastfed Neonate in the postpartum period
- SESLHD Guideline- SESLHDGL/081 Expression and Safe Management of Expressed Breast Milk

3.7 References

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2. Janjindamai W, Chotsampancharoen T. Effect of fortification on the osmolality of human milk. J Med Assoc Thai 2006;89:1400-3.
3. Koletzko B, Poindexter B, Uauy R. Nutritional care of preterm infants. Scientific basis and practical guidelines. Vol 110; Karger Publications 2014. P304.

4. Tsang RC, Uauy R, Koletzko B, Zlotkin SH. Nutrition of the preterm infant. Scientific basis and practical guidelines. Second edition. Cincinnati, Ohio: Digital Educational Publishing inc; 2005. P 336.

4 ABORIGINAL HEALTH IMPACT STATEMENT DOCUMENTATION

- Considerations for culturally safe and appropriate care provision have been made in the development of this Business Rule and will be accounted for in its implementation.
- When clinical risks are identified for an Aboriginal and/or Torres Strait Islander woman or family, they may require additional supports. This may include Aboriginal health professionals such as Aboriginal liaison officers, health workers or other culturally specific services

5 CULTURAL SUPPORT

- For a Culturally and Linguistically Diverse CALD woman, notify the nominated cross-cultural health worker during Monday to Friday business hours
- If the woman 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 NATIONAL STANDARDS

- Standard 1 Clinical Governance
- Standard 5 Comprehensive Care
- Standard 6 Communicating for Safety

7 REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
26.6.2017	1	S Bolisetty (lead clinician), E Jozsa (CNE)
6.3.2018	2	S Bolisetty (lead clinician), E Jozsa (CNE), J Menzies (RN)
June 2019	3	Minor revision approved by NCC LOPs committee
March 2018	4	Revised and approved by NCC LOPs committee
24.02.2025 5.6.2025	5	S Bolisetty (Medical Co- Director), S Allworth (SCH Dietitian) Endorsed NCC CBR Committee
23.6.25	5	RHW BRGC