

Key points	This guideline is a collaborative outcome of the Australasian Neonatal Parenteral Nutrition (ANPN) and Australasian Neonatal Medicines Formulary (ANMF) Parenteral nutrition is a medication. The parenteral nutrition (PN) formulations detailed in this document reflect the consensus reached by the Australasian Neonatal Parenteral Nutrition (ANPN) group during their March–April 2026 meetings in Australia and New Zealand. For PN consensus purposes, NANO preterm infants are defined as (1) infants born between 22⁺⁰ and 23⁺⁶ weeks or (2) birthweight <600g irrespective of gestational age.^{1,2} The NANO PN formulations are designed to provide PN in the first few days of life - a critical window when excessive fluid loss, hyperglycaemia, and azotaemia are highly prevalent. Once the infant is deemed stable, we recommend changing over to standard preterm PN formulations - Refer to Parenteral Nutrition – Preterm infant Clinicians may consider individualised PN formulations in some clinical scenarios including acutely deteriorating infant.
Indication	NANO Preterm Infants in the first few days of life
Action	PN is a mixture of dextrose, amino acids, lipid emulsions, vitamins, electrolytes, minerals, and trace elements. ³ PN is given to prevent catabolism, promote growth, improve survival and support neurodevelopment in these neonates.
Contraindications	When enteral nutrition is possible and sufficient.
Precautions	Critical cardiovascular instability or metabolic instabilities - Such instabilities require correction before administering intravenous nutrition. ⁴
Clinical Practice	ANPN consensus April 2026 This is a guideline only. Clinicians are encouraged to tailor fluid and PN management to the specific clinical circumstances and trajectory of the individual infant. Refer to Appendices for full parenteral nutrient intake recommendations and intakes. Consensus PN mixture is in 2 components: Component A: Contains AA (as Primene), glucose, electrolytes, minerals and trace elements in bags. Component B: Contains lipid emulsion, water and fat-soluble vitamins in syringe or bag. Consensus AA/glucose bags (Component A) are designed to deliver recommended AA at 60 mL/kg/day (Day 1 of life) and 135 mL/kg/day (stable phase). <u>NANO preterm infants are defined as (1) infants born between 22⁺⁰ and 23⁺⁶ weeks or (2) birthweight <600g irrespective of gestational age.</u> <u>Suggested fluid and PN management of NANO preterm infants</u> Day 1 of life: Total IV fluids – 100-120 mL/kg/DAY, of which 60 mL/kg/DAY is NANO-STARTER - Remaining 40-60 mL/kg/day – given as 10% glucose, 5% glucose or 2.5% glucose based on blood glucose levels. - Lipid emulsion – 1-2 g/kg/DAY, either as extra fluids or included in total. Day 2 of life onwards (during early transition period with acute metabolic complications of excess fluid loss, hyperglycaemia and azotaemia): Total IV fluids may be up to 200 mL/kg/DAY, especially in the first week of life. - Maximum of 135 mL/kg/DAY as NANO-STANDARD - Remaining daily volume can be 10% glucose, 5% glucose or 2.5% glucose based on blood glucose levels. - Lipid emulsion: daily increase by 1 g/kg/DAY to a maximum of 3 g/kg/DAY, either as extra fluids or included in total. After early transition phase

	Consider changing over from NANO formulations to standard preterm formulations			
Maximum dose	* It's a guide only. Clinicians may prescribe PN above the maximum recommended range in some scenarios. Amino acids (After day 1 of life): 4 g/kg/day ⁵⁻⁷ Glucose (After day 1 of life): 17.3 g/kg/day (12 mg/kg/min) ⁸ Lipids (after day 1 of life): 4 g/kg/day. ⁹			
Route	IV			
Presentation	AA/Glucose bags (Compounded and supplied by Baxter Healthcare Pty Ltd)			
	Solution name	Ordering Code	Osmolality	Shelf life
	NANO- Starter	NIC-NANOSTART	569 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	NANO – Standard	NIC-NANOSTD	648 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	Starter	NIC-STARTER2	944 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	Starter-Concentrated	NIC-STARTCNC2	1226 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	Standard preterm	NIC-PRESTD2	957 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	Concentrated preterm	NIC-PRECONC2	1242 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	High sodium preterm	NIC-PRENA2	997 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	5% Glucose preterm	NIC-PRE5G2	680 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	7.5% Glucose preterm	NIC-PRE7.5G2	818 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	Peripheral preterm	NIC-NPVL2	919 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	34 weeks to term	NIC-TERM2	846 mOsm/L	61 days at 2-8°C that includes 4 days <25°C
	Lipid emulsion - SMOFlipid (Compounded and supplied by Fresenius-Kabi Pty Ltd)			
	Content	45mL syringe (for ≤1 Kg)	50mL syringe (for ≤1 Kg)	151mL bag (for >1 Kg)
	SMOFlipid	32.5 mL	36 mL	109 mL
	Soluvit N	2.5 mL	2.8 mL	8.4 mL
	Vitalipid N infant	10 mL	11.2 mL	33.5 mL
	FK Code	FKS045V	FKS045V	FKS045V
	Stability	13 days at 2 ⁰ -8°C	13 days at 2 ⁰ -8°C	13 days at 2 ⁰ -8°C
Glucose solutions (Compounded and supplied by Baxter Healthcare Pty Ltd)				
Solution name		Osmolality	Shelf life	
5% glucose		278 mOsm/L	90 days in room temperature	
2.5% glucose – 50 mL		139 mOsm/L	No stability data available.	
2.5% glucose in 0.225% sodium chloride – 50 mL		216 mOsm/L	90 days in room temperature	
2.5% glucose in 0.45% sodium chloride – 50 mL		294 mOsm/L	90 days in room temperature	
Compatibility ^{22,23}	NOTE:			
	1. This list is accurate at the time of publication. For the most up to date information – please consult the hospital pharmacist for appropriate resource. 2. If there is no information concerning the compatibility of the medication with PN, it is recommended to be administered separately from the PN, but some clinical decisions are at the discretion of the treating team.			
	Y-site compatibility with aminoacid-glucose solution: Amikacin, aminophylline, amoxicillin, ampicillin, ampicillin/sulbactam, atracurium, aztreonam, bumetanide, buprenorphine, calcium gluconate, cefazolin, cefepime, cefotaxime, cefoxitin, ceftazidime, ceftizoxime, ceftriaxone, cefuroxime, clindamycin, clonazepam, dexamethasone, digoxin, dobutamine, dopamine, doxycycline, enalaprilat, epinephrine, erythromycin, fentanyl, fluconazole, gentamicin, heparin, hydrocortisone sodium phosphate and			

	succinate, imipenem-cilastatin, insulin, isoproterenol, leucovorin calcium, levetiracetam, lidocaine, linezolid, lorazepam, magnesium sulfate, methylprednisolone, metronidazole, milrinone, morphine sulfate, multivitamins, nitroglycerin, norepinephrine, octreotide acetate, ondansetron, penicillin G, pentobarbital, phenobarbital 20 mg/mL*, piperacillin sodium, piperacillin-tazobactam, potassium chloride, propofol, ranitidine, sodium nitroprusside, tacrolimus, ticarcillin disodium, ticarcillin disodium-clavulanate potassium, tobramycin sulfate, trimethoprim-sulfamethoxazole, urokinase, vancomycin, vecuronium, zidovudine. *Phenobarbital at concentration of 64 mg/mL is incompatible. Y site compatibility with lipid emulsion containing PN: Amikacin, aminophylline, amoxicillin, ampicillin, ampicillin/sulbactam, aztreonam, bumetanide, buprenorphine, calcium gluconate, cefazolin, cefotaxime, cefoxitin, ceftazidime, ceftizoxime, ceftriaxone, cefuroxime, clindamycin phosphate, dexamethasone sodium phosphate, digoxin, dobutamine, enalaprilat, erythromycin lactobionate, fentanyl, fluconazole, gentamicin, hydrocortisone sodium phosphate and succinate, imipenem-cilastatin, insulin, isoproterenol, leucovorin calcium, levetiracetam, lidocaine, magnesium sulfate, meropenem, methylprednisolone sodium succinate, metronidazole, milrinone, morphine sulfate at 1mg/mL, nitroglycerin, norepinephrine, octreotide acetate, ofloxacin, oxacillin sodium, penicillin G potassium, piperacillin sodium, piperacillin-tazobactam, potassium chloride, ranitidine, sodium nitroprusside, tacrolimus, ticarcillin disodium, ticarcillin disodium-clavulanate potassium, trimethoprim-sulfamethoxazole, vancomycin, zidovudine.
Incompatibility	NOTE: 1. This list is accurate at the time of publication. For the most up to date information – please consult the hospital pharmacist for appropriate resource. 2. If there is no information concerning the compatibility of the medication with PN, it is recommended to be administered separately from the PN, but some clinical decisions are at the discretion of the treating team. Y-site with aminoacid-glucose solution: aciclovir, amphotericin B, cefazolin, fluorouracil, furosemide, ganciclovir, immunoglobulin, methotrexate, midazolam, phenytoin, potassium phosphate, sodium bicarbonate, sodium phosphate. Y-site with lipid emulsion containing PN: aciclovir, amphotericin B, cefazolin, fluorouracil, furosemide, ganciclovir, immunoglobulin, methotrexate, midazolam, phenytoin, potassium phosphate, sodium bicarbonate, sodium phosphate, tobramycin.
Administration	• All PN solutions are to be administered as continuous intravenous infusion over 24 hours. • All PN solutions may be administered with accurate flow control. • Infusion system should be under regular visual inspection. • Peripheral infusions should be checked frequently for signs of extravasation or sepsis. • The pump should have free flow prevention if opened during use, and have lockable settings • PN solutions must be administered through a terminal filter: Lipid emulsions through a 1.2-1.5 µm filter; AA/glucose bags through a 0.22 µm filter. • PN solutions should be protected against light in order to prevent generation of oxidants. • Cycling PN: Administration may be reduced at the discretion of clinician after careful consideration of balance between potential benefit and risk of hypoglycaemia. In such cases, careful fluid management and blood glucose monitoring is needed.
Monitoring	• Azotaemia (High blood urea nitrogen), hyperglycaemia, metabolic acidosis, hypertriglyceridemia and conjugated hyperbilirubinemia are frequently encountered on PN. Periodic measurements of the following biochemical parameters are suggested during PN therapy. • Blood urea nitrogen (BUN): Most data originate from infants ≥24+0 weeks. Six studies reported BUN levels. The criteria for abnormal BUN in studies varied from >10 mmol/L to 21.4 mmol/L. Given the data supporting the importance of early AA administration in preterm infants, limiting AA intake based on serum BUN alone is not warranted. BUN levels up to 14.3 mmol/L may be considered acceptable in VLBW infants on PN provided there are no other parameters to suggest protein intolerance (eg hyperammonaemia >122 µmol/L).⁷

	- Hyperglycaemia: Mild hyperglycaemia (>8.3 mmol/L) is not uncommon. If blood glucose >10 mmol/L (moderate hyperglycaemia),^{10,11} further management to control hyperglycaemia needs to be considered including reducing glucose infusion rate, glucose concentration, or insulin infusion. - Cholestasis: Defined as serum level of direct bilirubin > 20% of total serum bilirubin or serum level of direct bilirubin > 34 mmol/L (mg/dL x 17.10).¹² - Hypoalbuminemia: Defined as serum albumin <18 g/L in preterm and <25 g/L in term neonates.¹³ - Hypertriglyceridemia (HT) (Plasma triglyceride >3.0 mmol/L): ESPGHAN 2018 Guidelines recommend monitoring of triglycerides in preterm and term infants.⁹ 2015 Consensus survey revealed 62% of respondents monitor plasma triglyceride levels either routinely or in specific circumstances.¹⁴ A retrospective study in an Australian NICU showed HT incidence of 32.5% in 23-25 weeks and 16.1% in 26-28 weeks. Severe HT (>4.5 mmol/L) was noted in 10% in 23-25 weeks and 4.5% in 26-28 weeks. There was no significant association of HT with either mortality or severe retinopathy of prematurity in multivariate analysis.¹⁵ <u>Suggested routine PN biochemistry orders</u> <table><tr><th>Test</th><th>First 3-7 days</th><th>Thereafter</th></tr><tr><td>Electrolytes, BUN, Bicarbonate (HCO₃), Creatinine</td><td>Daily or as needed</td><td>Once or twice a week</td></tr><tr><td>Calcium, Phosphorus, Magnesium, albumin</td><td>D2,5 and 7</td><td>Once a week</td></tr><tr><td>Triglyceride</td><td>24 hours after each increase</td><td>Once a week or when sick</td></tr><tr><td>Blood glucose</td><td>4-6 hourly</td><td>Once or twice a day</td></tr><tr><td>Liver function test including alkaline phosphatase</td><td>As needed</td><td>Once weekly or fortnightly</td></tr></table>	Test	First 3-7 days	Thereafter	Electrolytes, BUN, Bicarbonate (HCO ₃), Creatinine	Daily or as needed	Once or twice a week	Calcium, Phosphorus, Magnesium, albumin	D2,5 and 7	Once a week	Triglyceride	24 hours after each increase	Once a week or when sick	Blood glucose	4-6 hourly	Once or twice a day	Liver function test including alkaline phosphatase	As needed	Once weekly or fortnightly
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Adverse Reactions	Commonly encountered PN related complications: - Azotaemia (High blood urea nitrogen (BUN)) - Hyperglycaemia - Metabolic acidosis - Hypertriglyceridemia - Conjugated hyperbilirubinemia - Line related extravasation injuries - Blood stream infections																		
Stability	Refer to presentation section.																		
Storage	As per the manufacturer's instructions (Refer to presentation section).																		
Evidence	Overview The Australasian Neonatal Parenteral Nutrition (ANPN) consensus group was established in 2010, developing its first standardized AA/glucose and lipid emulsions in 2012. These formulations have been continually reviewed and refined through two subsequent consensus updates in 2017 and 2022. Within the extremely preterm population, infants born between 22 and 23 weeks form a unique niche that has historically lacked a precise descriptive term. To differentiate this group, recent publications have introduced the term "nano-preterm" for infants born at 22⁺⁰ to 23⁺⁶ weeks and/or weighing less than 600g at birth.^{1,2} We adapted these criteria to define the nano-preterm population for our parenteral nutrition consensus. Using this definition, our consensus aims to standardize early parenteral nutritional support for the nano-preterm population during their first few days of life—a critical window when excessive fluid loss, hyperglycaemia, and azotaemia are highly prevalent. After this critical period, clinicians should transition these infants to the standard consensus preterm PN formulations that have been successfully utilized in our NICUs for years for infants born at 24 weeks' gestation and older.																		

Australasian Neonatal Parenteral Nutrition (ANPN) consensus group was established in 2010 and several standard AA/glucose and lipid emulsions were developed in 2012. Since then, 2 subsequent consensus updates occurred in 2017 and 2022 and formulations have been reviewed and updated since then.^{6,16} The updated formulations presented in this document reflect the outcomes of the consensus meeting convened in March–April 2026.

ANPN consensus March-April 2026

- Existing consensus formulations have been reviewed and validated for continued use.
- Recognized the critical need to develop targeted formulations for the growing population of infants born at 22 0/7 to 23 6/7 weeks' gestation or weighing <600g, specifically designed to mitigate their highest-risk early complications: extreme fluid loss, hyperglycaemia, and azotaemia.
- Designed 2 new formulations to provide optimal nutrition while explicitly addressing the unique fluid and metabolic risks of this population: These are named NANO-STARTER and NANO-STANDARD.
- NANO-STARTER formulation contains less AA (25g/L) and glucose content (5% glucose) in comparison to the existing STARTER formulation (37.5% AA and 10% glucose).
 - NANO-STARTER provides 1.5 g/kg/day of AA at 60 mL/kg/day on DAY 1 of life (In contrast to other preterm infants aiming for 2 g/kg/day at 60 mL/kg/day)
 - NANO-STARTER contains 5% glucose in comparison to other preterm formulations that contain 10% glucose.
- NANO-STANDARD formulation contains less AA (26g/L) and glucose (5% glucose) content in comparison to the existing STANDARD formulation (30g/L of AA and 10% glucose).
- NANO-STANDARD provides 3.5 g/kg/day of AA at 135 mL/kg/day (In contrast to STANDARD preterm formulation providing 4 g/kg/day at 135 mL/kg/day)
- With increasing postnatal age, it is at the clinicians' discretion to change from one formulation to another (example, NANO-STANDARD to STANDARD preterm).

Fluids

- NANO infants: These infants typically need 100-200 mL/kg/day of fluids in the first few days of life. The NANO consensus formulations are designed to provide adequate nutrients at 150 mL/kg/DAY. This includes 135 mL/kg/day of AA/Dextrose formulation and 3 g/kg/day of lipid emulsion (which is equivalent to 18 mL/kg/DAY, of which 15 mL/kg/day is water). Remaining fluid can be given as glucose solution (5% glucose, 2.5% glucose or other strengths of glucose based on blood glucose levels).
- Other preterm and term infants: The current standard consensus formulations provide recommended nutrient intakes in a total fluid intake of 150 mL/kg/day. This includes 135 mL/kg/day of AA/Dextrose formulation and 15 mL/kg/day water in the 20% lipid emulsion.
- For those infants on restricted fluid regimen, or unwell babies requiring infusions of inotropes and opioid analgesics, concentrated PN formulations (Starter-concentrated and concentrated preterm) can be used.

Energy

- In clinical practice, energy content is generally accepted as 4 kcal per g of carbohydrate and protein and 9 kcal per g of lipid.¹⁷ For our consensus formulations, we adopted the recommendations provided by the compounding facilities – 4 kcal/g of protein, 3.8 kcal/g of glucose, 9 kcal/g of lipid.

The current consensus formulations provide the following:

- NANO-STARTER PN at 60 mL/kg/day with 1 g/kg/day of lipid: 26.4 kcal/kg/day.
- NANO-STARTER PN at 60 mL/kg/day with 2 g/kg/day of lipid: 35.4 kcal/kg/day.
- Starter PN at 60 mL/kg/day with 1 g/kg/day of lipid: 42 kcal/kg/day.
- Starter PN at 60 mL/kg/day with 2 g/kg/day of lipid: 51 kcal/kg/day.
- NANO- Standard preterm PN at 135 mL/kg/day with 3 g/kg/day of lipid: 66.7 kcal/kg/day.
- Standard preterm PN at 135 mL/kg/day with 3 g/kg/day of lipid: 97 kcal/kg/day.
- 34 wk- term PN at 135 mL/kg/day with 3 g/kg/day of lipid: 93 kcal/kg/day.

Protein-energy Ratio (PER)

- ESPGHAN Recommends 30 to 40 Kcal/g of protein or 2.5-3.3 g of protein/100 kcal.⁵ NICE recommends 20-30 non-nitrogen calories/g of protein.¹⁸ However, optimal glucose and lipid intakes that maximize protein accretion and growth in preterm infants have not been determined at various parenteral amino acid intakes.⁵ It is also unclear whether these recommendations apply to NANO infants. Taking into consideration of potential intolerance to high protein and glucose intakes in NANO infants, consensus was to administer lower AA and glucose. This resulted in 19 kcal/g of protein in NANO-STANDARD formulation. For other preterm infants, current standard preterm and PN at 135 mL/kg/day and lipid emulsion at 3 g/kg/day provides 24 kcal/g of protein.

Amino acids (AA)

- The recommendations by ESPGHAN, ASPEN and NICE are below:

Parenteral protein intake (g/kg/DAY)				
Network	Preterm		Term	
	Initial	Goal	Initial	Goal
ESPGHAN	At least 1.5	2.5-3.5	At least 1.5	No higher than 3
ASPEN	≤3	3-3.5	2.5-3.0	2.5-3.0
NICE	1.5-2.0	3-4	1-2	2.5-3.0

NANO infants: Due to azotaemia, consensus NANO formulations are designed to provide 1.5 g/kg/Day of AA on day 1 and 3.5 g/kg/day during stable phase.

The Other starter, standard preterm and term formulations are designed to provide AA per the recommendations in the table

Carbohydrates

NANO formulations contain glucose 5% and other standard formulations contain 10% glucose.

Lipids

- The current Consensus is to commence Intravenous Lipid Emulsion (IVLE) on day 1 of PN administration.
- The current consensus is to commence at 1-2 g/kg/day and increase by 1 g/kg each day to 3 g/kg/day.
- The current consensus lipid formulation is SMOF lipid (Soy Oil, MCT Oil, Olive Oil, Fish Oil Mixture).
- The consensus IVLE formulations are designed to deliver:
 - o 1 g/kg/day at 6 ml/kg/day
 - o 2 g/kg/day at 12 ml/kg/day
 - o 3 g/kg/day at 18 ml/kg/day
- The contents of the consensus IVLE formulations are listed in Appendix 2.

Sodium (Na)

- No additional Na is added to starter formulations, however phosphate in the formulations is an organic sodium glycerophosphate organic phosphorus (sodium glycerophosphate). This contains 2 mmol sodium per 1 mmol of Phosphorus.
- Standard preterm formulations provide 5.4 mmol/kg/DAY of Na at 135 mL/kg/day.
- Standard 34wk-term formulation provides 3.4 mmol/kg/day of Na at 135 mL/kg/day.

Potassium (K)

- Starter formulation at 60 mL/kg/day: 0 mmol/kg/day
- Standard preterm formulation at 135 mL/kg/day: 3 mmol/kg/day
- 34 week-Term formulation at 135 mL/kg/day: 2.7 mmol/kg/day

Acetate

- Starter formulation at 60 mL/kg/day: 0 mmol/kg/day
- Standard preterm formulation at 135 mL/kg/day: 2 mmol/kg/day
- 34 wk-Term formulation at 135 mL/kg/day: 1.1 mmol/kg/day.

Calcium (Ca), phosphorus (P)

- The current consensus formulations provide the following Calcium and Phosphorus intakes:

PN formulation	Rate	Ca, mmol/kg/DAY	P, mmol/kg/DAY	Ca:P ratio
Starter	60 mL/kg/day	0.8	1.0	0.8:1.0
Standard preterm	135 mL/kg/day	2.7	2.7	1:1
34wk-Term	135 mL/kg/day	1.2	1.2	1:1

Magnesium (Mg)

The consensus formulations provide 0.2 mmol/kg/day of Magnesium.

Trace Elements (TE)

The current consensus is to use the new Baxter trace element formula as the preferred Trace Elements formula and add extra Zinc and Selenium to optimise intakes. (Refer to Appendices 1, 3 and 4).

Heparin

- The consensus AA/Dextrose formulations have heparin 0.5 IU/mL of heparin.

Physicochemical stability

- Physicochemical stability of the latest AA/dextrose formulations have been tested by Baxter Pharmaceuticals and confirmed to be stable for up to 61 days at 2-80C and 5 days at below 250C.

Hanging time

Based on established clinical practice within our NICUs and supported by majority consensus, the standard hang time for both parenteral nutrition (PN) solutions and lipid emulsions is 48 hours.

Route of administration

Consensus: PN formulations with osmolality below 1000 mOsm/L can be administered peripherally for short term use provided that close monitoring of the IV site for any extravasation/phlebitis is followed.^{19,20}

	In view of the dearth of evidence, the consensus group agreed to continue the peripheral PN formulation in case of concerns regarding the amount of calcium infused through peripheral veins. <u>Late preterm (34+0 to 36+6 weeks) and term neonates</u> The current consensus: PN is widely used in Australian facilities in late preterm and term neonates who are not enterally fed. The consensus group followed the human milk approach to develop the PN formulations for this group and nutrient intake estimates are based on the average composition and intake of human milk.²¹ <u>PN during transition to enteral feeds</u> Consensus group acknowledged the inadequate nutrients during enteral feed increase and weaning of PN. Consensus group recommends switching over from standard formulation to concentrated formulations once enteral feed volumes reach 50-60 mL/kg/day. <u>Cessation of PN</u> • Amino acid/Dextrose infusion: There is no clear evidence to guide the practice. The risk of late onset sepsis with intravenous access and the cost of PN are to be considered. The 2015 consensus survey revealed that majority of the NICUs in ANZ cease AA/Dextrose formulation once the infant tolerates 120-140 ml/kg/day of enteral feeds.¹⁴ • Lipids: Mature human milk contains 3.5 g of fat per 100 mL. 2015 consensus survey reported majority of NICUs cease IV lipids once the infant tolerates 100 - 120 mL/kg/day of enteral feeds.¹⁴ <u>PN in non-tertiary neonatal facilities</u> • Many non-tertiary nurseries manage moderate to late preterm and growth restricted term neonates often requiring partial PN. No clearcut guidelines can be drawn from the literature for this setting. • The benefits of PN in this group need to be balanced against the potential risks of therapy, skill mix and the resource availability. • Short term PN via peripheral cannula can be given for these infants if enteral feeding cannot be established by day 3-5 of life.
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Appendix 1 - Preterm neonates <34 weeks - 2026 consensus formulations and ESPGHAN 2018 recommendations

Unit/kg/day	ESPGHAN 2018 Day 1	ESPGHAN 2018 Growing	Australasian 2022 consensus: 135 mL/kg/day of standard preterm and 3 g/kg/day of lipid formulation
Energy, Kcal NANO infants	45-55	90-120	97 66.7
Protein, g NANO infants Other preterm	≥1.5	≤3.5	1.5 on day 1 and 3.5 growing 4
Carbohydrate, g	5.8-11.5	5.8-17.3	13.5
Fat, g	0-1	3-4	3
Na, mmol	0-2	3-5	5.4
K, mmol	0-3	2-5	3
Cl, mmol	0-3	3-5	1.7
Acetate, mmol			2.0
Ca, mmol	0.8-2.0	1.6-3.5	2.7
P, mmol	1.0-2.0	1.6-3.5	2.7
Ca:P ratio	0.8:1.0	1:1	1:1
Mg, mmol	0.2	0.2	0.2
Iron, µg	0	50-200	-
Zn, µg [§]	400-500	400-500	441
Cu, µg [§]	40	40	27
Se, µg [§]	7	7	6
I, µg [§]	1-10	1-10	1.4
Cr, µg	0	0	-
Mo, µg	1 Long term PN	1 Long term PN	-
Mn, µg	<1 Long term PN	<1 Long term PN	-
Vit A, IU	700-1500	700-1500	920
Vit D, IU	80-400	80-400	160
Vit E, IU	2.8-3.5	2.8-3.5	2.8
Vit K, µg	10	10	80 [#]
Thiamine, µg	350-500	350-500	310
Riboflavin, µg	150-200	150-200	360 [#]
Niacin, mg	4.0-6.8	4.0-6.8	4
Pyridoxine, µg	150-200	150-200	400 [#]
Folate, µg	56	56	40 [*]
Vit B12, µg	0.3	0.3	0.5 [#]
Pantothenate, mg	2.5	2.5	1.5 [*]
Biotin, µg	5-8	5-8	6
Vit C, mg	15-25	15-25	10 [*]
Acetate, mmol			3.51

*Below Recommended dietary intake (RDI), #Above RDI. [§]TE intakes are achieved by adding 1 mL Baxter paediatric TE formula with additional 1270 µg Zn and 15 µg Se in 1 Litre.

Appendix 2 - Term neonates - 2026 consensus formulations and ESPGHAN 2018 recommendations

Nutrient, Unit/kg/day	ESPGHAN 2018			Australasian 2022 consensus: 135 mL/kg/day of 34 week- Term PN and 3 g/kg/day of lipid formulation
	Day 0	≤30 days	1-12 months	
Energy, Kcal		90-100	90-100	93
Protein, g	≥1.5	≤3.0	1.0-2.5	3.1
Carbohydrate, g	3.6-7.2	3.6-17.3	8.6-14	16.2
Fat, g		3.0-4.0	3.0-4.0	3
Sodium, mmol	0-3.0 (0-7days)	2.0-5.0	2.0-3.0	3.4
Potassium, mmol	0-2.0 (0-7days)	1.0-3.0	1.0-3.0	2.7
Chloride, mmol	0-5.0 (0-7days)			3.1
Calcium, mmol	0.8	0.8		1.2
Phosphate, mmol	0.5	0.5		1.2
Magnesium, mmol	0.2	0.2	0.2-0.3	0.2
Iron, µmol	0	0(<3 weeks)	1.8-3.6	0
Zn, µg	250	250	100 (>3 months)	257
Cu, µg	20	20	20	20.3
Se, µg	2-3	2-3	2-3	3.0
I, µg	≥1	≥1	≥1	1.0
Cr, µg	0	0	0	
Mo, µg	0.25 Long term PN	0.25 Long term PN	0.25 Long term PN	0
Mn, µg	<1 Long term PN	<1 Long term PN	<1 Long term PN	0
Vit A, IU	462-989	462-989	462-989	920
Vit D, IU	40-150	40-150	40-150	160
Vit E, IU	2.8-3.5	2.8-3.5	2.8-3.5	2.8
Vit K, µg	10	10	10	80 [#]
Thiamine, µg	350-500	350-500	350-500	310
Riboflavin, µg	150-200	150-200	150-200	360 [#]
Niacin, mg	4.0-6.8	4.0-6.8	4.0-6.8	4
Pyridoxine, µg	150-200	150-200	150-200	400 [#]
Folate, µg	56	56	56	40 [*]
Vit B12, µg	0.3	0.3	0.3	0.5 [#]
Pantothenate, mg	2.5	2.5	2.5	1.5 [*]
Biotin, µg	5-8	5-8	5-8	6
Vit C, mg	15-25	15-25	15-25	10 [*]

*Below Recommended dietary intake (RDI), [#]Above RDI. [§]TE intakes are achieved by adding 0.75 mL Baxter paediatric TE formula with additional 400 µg Zn in 1 Litre.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

NANO-STARTER PN

	NANO-STARTER PN								
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg
Amino acids, g	25	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8
Glucose, g	50	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
Sodium, mmol	34	1.4	1.7	2.0	2.4	2.7	3.1	3.4	3.7
Potassium, mmol	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calcium, mmol	14	0.6	0.7	0.8	1.0	1.1	1.3	1.4	1.5
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Phosphate, mmol	17	0.7	0.9	1.0	1.2	1.4	1.5	1.7	1.9
Chloride, mmol	4.8	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
Acetate, mmol	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zn, microg	3250	130.0	162.5	195.0	227.5	260.0	292.5	325.0	357.5
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0
GIR, mg/kg/min		1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.8
Energy, kcal/kg/day	290	11.6	14.5	17.4	20.3	23.2	26.1	29.0	31.9
Osmolarity (mOsm/L)	569								
Bag volume, mL	500								
Solution pH									

Alert - below minimal recommended amino acid if no enteral intake

Alert - above maximal starter amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

NANO-STANDARD PN

	NANO- STANDARD PN													
	1000 ml	40 mL/kg	50 ml/kg	60 ml/kg	70 ml/kg	80 ml/kg	90 ml/kg	100 ml/kg	110 ml/kg	120 ml/kg	130 ml/kg	135 ml/kg	140 ml/kg	150 ml/kg
Amino acids, g	26	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.5	3.6	3.9
Glucose, g	50	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	6.8	7.0	7.5
Sodium, mmol	40	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.4	5.6	6.0
Potassium, mmol	22	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.0	3.1	3.3
Calcium, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Chloride, mmol	11.8	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Acetate, mmol	15.1	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.0	2.1	2.3
zinc, ug	3250	130.0	162.5	195.0	227.5	260.0	292.5	325.0	357.5	390.0	422.5	438.8	455.0	487.5
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	28.0	30.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.8	4.2	4.5	4.7	4.9	5.2
Energy, kcal/kg/day	294	11.8	14.7	17.6	20.6	23.5	26.5	29.4	32.3	35.3	38.2	39.7	41.2	44.1
Osmolarity (mOsm/L)	648													
Bag volume, mL	500													
Solution pH														

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

STARTER PN

	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg
Amino acids, g	37.5	1.5	1.9	2.3	2.6	3.0	3.4	3.8	4.1
Glucose, g	100	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0
Sodium, mmol	34	1.4	1.7	2.0	2.4	2.7	3.1	3.4	3.7
Potassium, mmol	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calcium, mmol	14	0.6	0.7	0.8	1.0	1.1	1.3	1.4	1.5
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Phosphate, mmol	17	0.7	0.9	1.0	1.2	1.4	1.5	1.7	1.9
Chloride, mmol	7.1	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8
Acetate, mmol	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zn, microg	3250	130.0	162.5	195.0	227.5	260.0	292.5	325.0	357.5
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0
GIR, mg/kg/min		2.8	3.5	4.2	4.8	5.5	6.3	6.9	7.6
Energy, kcal/kg/day	530	21.2	26.5	31.8	37.1	42.4	47.7	53.0	58.3
Osmolarity (mOsm/L)	944								
Bag volume, mL	500								
Solution pH	5.96								

Alert - above maximal starter amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

STARTER – Concentrated PN

	STARTER - concentrated PN								
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg
Amino acids, g	50	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
Glucose, g	125	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8
Sodium, mmol	50	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
Potassium, mmol	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calcium, mmol	21	0.8	1.1	1.3	1.5	1.7	1.9	2.1	2.3
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Phosphate, mmol	25	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8
Chloride, mmol	9.5	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.0
Acetate, mmol	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zn, microg	4250	170.0	212.5	255.0	297.5	340.0	382.5	425.0	467.5
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3
Iodine, ug	15	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7
Copper, ug	300	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0
GIR, mg/kg/min		3.5	4.4	5.2	6.1	6.9	7.8	8.7	9.5
Energy, kcal/kg/day	675	27.0	33.8	40.5	47.3	54.0	60.8	67.5	74.3
Osmolarity (mOsm/L)	1226								
Bag volume, mL	500								
Solution pH	5.99								

Alert - above maximal starter amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

STANDARD PRETERM PN

	Standard Preterm PN													
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg	120 mL/kg	130 mL/kg	135 mL/kg	140 mL/kg	150 mL/kg
Amino acids, g	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Glucose, g	100	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.5	14.0	15.0
Sodium, mmol	40	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.4	5.6	6.0
Potassium, mmol	22	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.0	3.1	3.3
Calcium, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Chloride, mmol	12.7	0.5	0.6	0.8	0.9	1.0	1.1	1.3	1.4	1.5	1.7	1.7	1.8	1.9
Acetate, mmol	15.1	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.0	2.1	2.3
Zn, microg	3267	130.7	163.4	196.0	228.7	261.4	294.0	326.7	359.4	392.0	424.7	441.0	457.4	490.1
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	28.0	30.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		2.8	3.5	4.2	4.8	5.5	6.3	6.9	7.6	8.3	9.0	9.4	9.7	10.4
Energy, Kcal/kg/day	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
Osmolarity (mOsm/L)	957													
Bag volume, mL	750													
Solution pH	6.21													

Alert - above maximal recommended amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

Concentrated PRETERM PN

	Concentrated preterm PN								
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg
Amino acids, g	40	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
Glucose, g	125	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8
Sodium, mmol	54	2.2	2.7	3.2	3.8	4.3	4.9	5.4	5.9
Potassium, mmol	35	1.4	1.8	2.1	2.5	2.8	3.2	3.5	3.9
Calcium, mmol	27	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Phosphate, mmol	27	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0
Chloride, mmol	16.6	0.7	0.8	1.0	1.2	1.3	1.5	1.7	1.8
Acetate, mmol	26	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9
Zn, microg	4700	188.0	235.0	282.0	329.0	376.0	423.0	470.0	517.0
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3
Iodine, ug	15	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7
Copper, ug	300	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0
GIR, mg/kg/min		3.5	4.4	5.2	6.1	6.9	7.8	8.7	9.5
Energy, kcal/kg/day	635	25.4	31.8	38.1	44.5	50.8	57.2	63.5	69.9
Osmolarity (mOsm/L)	1242								
Bag volume, mL	750								
Solution pH	6.17								

Alert - above maximal recommended amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

High sodium PRETERM PN

	High sodium PRETERM													
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg	120 mL/kg	130 mL/kg	135 mL/kg	140 mL/kg	150 mL/kg
Amino acids, g	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Glucose, g	100	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.5	14.0	15.0
Sodium, mmol	60	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.1	8.4	9.0
Potassium, mmol	22	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.0	3.1	3.3
Calcium, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Chloride, mmol	21.7	0.9	1.1	1.3	1.5	1.7	2.0	2.2	2.4	2.6	2.8	2.9	3.0	3.3
Acetate, mmol	26	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.5	3.6	3.9
Zn, microg	3267	130.7	163.4	196.0	228.7	261.4	294.0	326.7	359.4	392.0	424.7	441.0	457.4	490.1
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	28.0	30.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		2.8	3.5	4.2	4.8	5.5	6.3	6.9	7.6	8.3	9.0	9.4	9.7	10.4
Energy, kcal/kg/day	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
Osmolarity (mOsm/L)	997													
Bag volume, mL	750													
Solution pH	6.21													

Alert - above maximal recommended amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

7.5% Glucose PRETERM PN

	7.5% glucose Preterm PN													
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg	120 mL/kg	130 mL/kg	135 mL/kg	140 mL/kg	150 mL/kg
Amino acids, g	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Glucose, g	75	3.0	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8	10.1	10.5	11.3
Sodium, mmol	40	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.4	5.6	6.0
Potassium, mmol	22	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.0	3.1	3.3
Calcium, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Chloride, mmol	12.7	0.5	0.6	0.8	0.9	1.0	1.1	1.3	1.4	1.5	1.7	1.7	1.8	1.9
Acetate, mmol	15.1	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.0	2.1	2.3
Zn, microg	3267	130.7	163.4	196.0	228.7	261.4	294.0	326.7	359.4	392.0	424.7	441.0	457.4	490.1
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	28.0	30.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		2.1	2.6	3.1	3.6	4.2	4.7	5.2	5.7	6.3	6.8	7.0	7.3	7.8
Energy, kcal/kg/day	405	16.2	20.2	24.3	28.4	32.4	36.5	40.5	44.6	48.6	52.7	54.7	56.7	60.8
Osmolarity (mOsm/L)	818													
Bag volume, mL	750													
Solution pH	6.22													

Alert - above maximal recommended amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

5% Glucose PRETERM PN

	5% glucose Preterm PN													
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg	120 mL/kg	130 mL/kg	135 mL/kg	140 mL/kg	150 mL/kg
Amino acids, g	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Glucose, g	50	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	6.8	7.0	7.5
Sodium, mmol	40	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.4	5.6	6.0
Potassium, mmol	22	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.0	3.1	3.3
Calcium, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Chloride, mmol	12.7	0.5	0.6	0.8	0.9	1.0	1.1	1.3	1.4	1.5	1.7	1.7	1.8	1.9
Acetate, mmol	15.1	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.0	2.1	2.3
Zn, microg	3267	130.7	163.4	196.0	228.7	261.4	294.0	326.7	359.4	392.0	424.7	441.0	457.4	490.1
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	28.0	30.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.8	4.2	4.5	4.7	4.9	5.2
Energy, kcal/kg/day	310	12.4	15.5	18.6	21.7	24.8	27.9	31.0	34.1	37.2	40.3	41.9	43.4	46.5
Osmolarity (mOsm/L)	680													
Bag volume, mL	750													
Solution pH	6.22													

Alert - above maximal recommended amino acid intake

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

Peripheral PRETERM PN

	Peripheral Preterm PN													
	1000 mL	40 mL/kg	50 mL/kg	60 mL/kg	70 mL/kg	80 mL/kg	90 mL/kg	100 mL/kg	110 mL/kg	120 mL/kg	130 mL/kg	135 mL/kg	140 mL/kg	150 mL/kg
Amino acids, g	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Glucose, g	100	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.5	14.0	15.0
Sodium, mmol	40	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.4	5.6	6.0
Potassium, mmol	22	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.4	2.6	2.9	3.0	3.1	3.3
Calcium, mmol	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Chloride, mmol	21.7	0.9	1.1	1.3	1.5	1.7	2.0	2.2	2.4	2.6	2.8	2.9	3.0	3.3
Acetate, mmol	26	1.0	1.3	1.6	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.5	3.6	3.9
Zn, microg	3267	130.7	163.4	196.0	228.7	261.4	294.0	326.7	359.4	392.0	424.7	441.0	457.4	490.1
Selenium, ug	30	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.1	4.2	4.5
Iodine, ug	10	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5
Copper, ug	200	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	28.0	30.0
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		2.8	3.5	4.2	4.8	5.5	6.3	6.9	7.6	8.3	9.0	9.4	9.7	10.4
Energy, kcal/kg/day	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
Osmolarity (mOsm/L)	919													
Bag volume, mL	750													
Solution pH	5.92													

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 3. 2026 Consensus Amino acid - Glucose formulations

34 week-Term PN

	34 week-Term PN													
	1000 mL	40mL/kg	50mL/kg	60 mL/kg	70mL/kg	80mL/kg	90 mL/kg	100mL/kg	110mL/kg	120mL/kg	130mL/kg	135mL/kg	140mL/kg	150mL/kg
Amino acids, g	23	0.9	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.8	3.0	3.1	3.2	3.5
Glucose, g	100	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.5	14.0	15.0
Sodium, mmol	25	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8	3.0	3.3	3.4	3.5	3.8
Potassium, mmol	20	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.8	3.0
Calcium, mmol	9	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.2	1.3	1.4
Magnesium, mmol	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Phosphate, mmol	9	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.2	1.3	1.4
Chloride, mmol	22.9	0.9	1.1	1.4	1.6	1.8	2.1	2.3	2.5	2.7	3.0	3.1	3.2	3.4
Acetate, mmol	8.5	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3
Zn, microg	1896	75.8	94.8	113.8	132.7	151.7	170.6	189.6	208.6	227.5	246.5	256.0	265.4	284.4
Selenium, ug	22.5	0.9	1.1	1.4	1.6	1.8	2.0	2.3	2.5	2.7	2.9	3.0	3.2	3.4
Iodine, ug	7.5	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.1
Copper, ug	150	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	20.3	21.0	22.5
Heparin, units	500	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	67.5	70.0	75.0
GIR, mg/kg/min		2.8	3.5	4.2	4.8	5.5	6.3	6.9	7.6	8.3	9.0	9.4	9.7	10.4
Energy, kcal/kg/day	472	18.9	23.6	28.3	33.0	37.8	42.5	47.2	52.0	56.6	61.4	63.7	66.1	70.8
Osmolarity(mOsm/L)	846													
Bag volume, mL	1200													
Solution pH	5.94													

Stability up to 61 days @ 2-8°C that includes 4 days (96 hours) below 25°C

1g of AA = 4 kcal and 1g of glucose = 3.8 kcal (Estimates used by Baxter Healthcare Pty Ltd)

Numbers are rounded off to 1 decimal point where appropriate.

Appendix 4. Glucose solutions and Glucose infusion rate (GIR)

2.5% glucose*
***Hypotonic solution**

2.5% Glucose									
	ml/kg/day								
ml/kg/day	40	50	60	70	80	90	100	110	120
GIR, mg/kg/min	0.7	0.9	1.0	1.2	1.4	1.6	1.7	1.9	2.1
Energy, Kcal/kg/day	4	5	6	7	8	9	10	11	12
Osmolarity, mOsm/L	139								
Shelflife	No stability data from Baxter Healthcare Pty Ltd								

Numbers are rounded off to 1 decimal point where appropriate.

2.5% glucose in 0.225% sodium chloride*
***Hypotonic solution**

2.5% Glucose in 0.225% sodium chloride									
	ml/kg/day								
ml/kg/day	40	50	60	70	80	90	100	110	120
GIR, mg/kg/min	0.7	0.9	1	1.2	1.4	1.6	1.7	1.9	2.1
Sodium, mmol/Kg/day	1.6	2	2.3	2.7	3.1	3.5	3.9		
Energy, kcal/kg/day	4	5	6	7	8	9	10	11	12
Osmolarity, mOsm/L	216								
Shelf life	90 days in room temeperature								

Numbers are rounded off to 1 decimal point where appropriate.

2.5% Glucose in 0.45% sodium chloride*
***Isotonic, but watch sodium intake from the solution**

2.5% Glucose in 0.45% sodium chloride									
	ml/kg/day								
ml/kg/day	40	50	60	70	80	90	100	110	120
GIR, mg/kg/min	0.7	0.9	1	1.2	1.4	1.6	1.7	1.9	2.1
Sodium, mmol/Kg/day	3.1	3.9	4.6	5.4	6.2	6.9	7.7		
Energy, kcal/kg/day	4	5	6	7	8	9	10	11	12
Osmolarity, mOsm/L	294								
Shelf lfe	18 months. Store below 30 degree celsius. Do NOT FREEZE								

Numbers are rounded off to 1 decimal point where appropriate.

5% glucose

5% Glucose									
	ml/kg/day								
ml/kg/day	40	50	60	70	80	90	100	110	120
GIR, mg/kg/min	1.4	1.7	2.1	2.4	2.8	3.1	3.5	3.8	4.2
Energy, Kcal/kg/day	8	10	12	14	16	18	20	22	24
Osmolarity, mOsm/L	278								

10% glucose

10% Glucose													
	ml/kg/day												
ml/kg/day	40	50	60	70	80	90	100	110	120	130	135	140	150
GIR, mg/kg/min	2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.6	8.3	9.0	9.4	9.7	10.4
Energy, Kcal/kg/day	16	20	24	28	32	36	40	44	48	52	54	56	60
Osmolality, mOsm/L	556												

Appendix 5. Consensus Lipid emulsion

Lipid emulsion - SMOFlipid (Compounded and supplied by Fresenius-Kabi Pty Ltd)

Content	45mL syringe (for ≤1 Kg)	50mL syringe (for ≤1 Kg)	151mL bag (for >1 Kg)
SMOFlipid	32.5 mL	36 mL	109 mL
Soluvit N	2.5 mL	2.8 mL	8.4 mL
Vitalipid N infant	10 mL	11.2 mL	33.5 mL
FK Code	FKS045V	FKS045V	FKS045V
Stability	13 days at 2 ⁰ -8 ⁰ C	13 days at 2 ⁰ -8 ⁰ C	13 days at 2 ⁰ -8 ⁰ C