AA 16. What is the recommended parenteral intake of: sodium, potassium, chloride, acetate, calcium, phosphorus, magnesium, iron, zinc, selenium, chromium, copper, manganese, molybdenum, fluoride, iodine and vitamins

Source recommendation	Back to question list
Source guideline title and developer	ESPGHAN 2018 **Sodium, potassium, chloride** https://doi.org/10.1016/j.clnu.2018.06.948 Jochum F, Moltu SJ, Senterre T, Nomayo A, Goulet O, Iacobelli S, ESPGHAN/ESPEN/ESPR/CSPEN Working Group on Pediatric Parenteral Nutrition. ESPGHAN/ESPEN/ESPR guidelines on pediatric parenteral nutrition: fluid and electrolytes. Clin Nutr 2018;37:2344e53. **Calcium, phosphate, magnesium** https://www.sciencedirect.com/science/article/pii/S0261561418311695?via%3Dihub Mihatsch W, Fewtrell M, Goulet O, Molgaard C, Picaud JC, Senterre T, ESPGHAN/ESPEN/ESPR/CSPEN Working Group on Pediatric Parenteral Nutrition. ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: calcium, phosphorus and magnesium. Clin Nutr 2018;37: 2360e5. **Trace elements** https://www.sciencedirect.com/science/article/pii/S0261561418311683?via%3Dihub Domellöf M, Szitanyi P, Simchowitz V, Franz A, Mimouni F, ESPGHAN/ESPEN/ESPR/CSPEN Working Group on Pediatric Parenteral Nutrition. ESPGHAN/ESPEN/ESPR guidelines on pediatric parenteral nutrition: iron and trace minerals. Clin Nutr 2018;37:2354e9. **Vitamins** https://www.clinicalnutritionjournal.com/article/S0261-5614(18)31170-1/fulltext Bronsky J, Campoy C, Braegger C; ESPGHAN/ESPEN/ESPR/CSPEN working group on pediatric parenteral nutrition. ESPGHAN/ESPEN/ESPR/CSPEN guidelines on pediatric parenteral nutrition: Vitamins. Clin Nutr. 2018 Dec;37(6 Pt B):2366-2378. doi: 10.1016/j.clnu.2018.06.951
Existing guidelines recommendation	Sodium: 2–7 mmol/kg/day (<1,500 g) 2–5 mmol/kg/day (>1,500 g) Potassium: 2–3 mmol/kg/day Chloride: 2–5 mmol/kg/day Calcium: 1.6–3.5 mmol/kg/day Phosphorus: 1.6–3.5 mmol/kg/day Magnesium: 0.2–0.3 mmol/kg/day Iron: 200-500 µg/kg/day Zinc: 400-500 µg/kg/day Copper: 40 µg/kg/day Iodine: 1-10 µg/kg/day Selenium: 7 µg/kg/day Manganese: ≤1 µg/kg/day Molybdenum: 1 µg/kg/day Chromium: nil Biotin: 5-8 µg Vitamin A: 227-455 µg (700-1500 IU) Vitamin D: 2-10 µg (80-400 IU)

	Vitamin E: 2.8-3.5 mg Vitamin K: 10 µg Vitamin C: 15-25 mg Thiamin: 350-500 µg Riboflavin: 150-200 µg Pyridoxine: 150-200 µg Vitamin B12: 0.3 µg Niacin: 4-6.8 mg Folic acid: 56 µg Pantothenic acid: 2,500 µg
Year published	2018
Search updated/assessment of new evidence	August 2025. No new evidence was identified.
Strength and direction of recommendation	Provide electrolytes and micronutrients within recommended ranges based on weight and gestational age.
GRADE certainty of evidence	Moderate (varies by nutrient)
Were EtD and SoF available?	No
Is the recommendation recent and credible AGREE II score:	Yes AGREE II score: 79%
Assessment of suitability for adolopment	
Is the recommendation relevant to local setting (population/ intervention/comparator)?	Yes
Are the judgements in the source EtD acceptable without modification?	Yes
Are any local contextual factors different (e.g. cost, equity, feasibility)?	Access to individual trace elements may be limited in some units, requiring compounded solutions or adjustments. Aotearoa New Zealand soil is deficient in iodine, selenium and zinc.

EtD Criterion	Summary of local evidence or context	Judgement	Notes
Problem	Preterm infants have low stores of electrolytes and trace elements and are at risk of deficiencies when on parenteral nutrition.	Yes	
Desirable effects	Supports metabolic stability, growth, neurodevelopment and bone health.	Favourable	
Undesirable effects	Risk of toxicity if not appropriately dosed or monitored, particularly in cholestasis.	Manageable	Particular concern with manganese and copper.
Certainty of evidence	Evidence is based on estimated requirements, expert consensus and observational data from neonatal units.	Low	
Values and preferences	Neonatal clinicians value accurate provision and monitoring of micronutrients.	Possibly some uncertainty	
Balance of effects	Benefits of adequate nutrition clearly outweigh risks.	Favourable	

Resources required	Micronutrient solutions are available but may require compounding and incur additional cost.	Moderate	
Certainty of resource evidence	Resource estimates vary between settings.	Low	
Cost-effectiveness	No available studies	Likely	Cost-effective if deficiencies and complications are prevented.
Equity	Regional centres may have reduced access to specific trace element products.	Possibly reduced	Equity gaps may exist between tertiary and regional centres.
Acceptability	Provision is standard practice and supported by clinicians.	Yes	
Feasibility	Feasible with pharmacy support.	Yes	
Judgement criteria for EtD			
Decision Type	☑ Adopted as is ☐ Adapted ☐ De novo recommendation required		
Explanation of adaptation	Recommendation consistent with ESPGHAN and NICE guidance. Adopt as is with minor local contextual comment.		
Final Recommendation			

Provide parenteral electrolytes, minerals trace elements and vitamins in accordance with ESPGHAN 2018 recommendations for preterm infants. As Aotearoa New Zealand soil is deficient in iodine, selenium and zinc, use mid to upper half of recommended intake:

Nutrient	Recommended intake/kg/day	Vitamin	Recommended intake/kg/day
Sodium	2–7 mmol (<1500 g) 2–5 mmol (>1500 g)	Vitamin A	227–455 µg (700-1500 IU)
Potassium	2–3 mmol	Vitamin D	2–10 µg (80-400 IU)
Chloride	2–5 mmol	Vitamin E	2.8-3.5 mg
Calcium	1.6–3.5 mmol	Vitamin K	10 µg
Phosphorus	1.6–3.5 mmol	Vitamin C	15–25 mg
Magnesium	0.2–0.3 mmol	Thiamin	350–500 µg
Iron	200–500 µg	Riboflavin	150–200 µg
Zinc	400–500 µg	Pyridoxine	150–200 µg
Copper	40 µg/	Vitamin B12	0.3 µg
Iodine	1–10 µg	Niacin	4–6.8 mg
Selenium	7 µg	Folic acid	56 µg
Manganese	≤1 µg	Pantothenic acid	2500 µg
Molybdenum	1 µg		
Chromium	nil		

Recommendation statement (adapted)	
Strength	Conditional
Certainty of evidence	Low
Basis for decision	Consensus from international guidelines and knowledge of local soil deficits.
Subgroup Considerations	Adjustments may be needed in cases of cholestasis or renal impairment.
Implementation Considerations	Routine standard solutions and monitoring protocols can facilitate standardisation. Provide guidance on refeeding syndrome testing and phosphate supplementation.
Monitoring and Evaluation	Routine monitoring of biochemical markers and growth parameters is necessary. Monitor clinical parameters of refeeding syndrome, particularly during the first 5-7 days, especially in infants with birthweight <1,500 g or <10th centile.
Research Priorities	RCTs to determine optimal dosing for micronutrients in extremely preterm and growth-restricted infants.