

SPECIAL CONSIDERATIONS FOR THE NUTRITIONAL MANAGEMENT OF PATIENTS WITH STOMA

Basic Principles

- Enteral feeding should be commenced as early as possible following surgery, and advanced, to prevent liver dysfunction and encourage adaptation of the bowel in continuity.
- Position of stoma, length and condition of remaining bowel will give an indicator as to the likelihood of weaning PN and establishment of full enteral feeds.
- Tolerance to a feed may be influenced by feed choice, osmolality of feed, delivery of feeds (continuous v bolus feeds) and acute medical status.
- Tolerance and absorption of an enteral feed can be assessed by considering the frequency of vomiting episodes, volume and consistency of stoma output and electrolyte balance, but ultimately achieving good growth and less reliance on PN, is the true indicator of tolerance.
- Stoma output and consistency should be assessed daily, aiming for an output-below 30 ml/kg/day and particulate stool. Poor tolerance maybe indicated, (but not exclusively) by a stoma output > 30 ml/kg/day, This would be an indicator for starting/increasing pump time, if not already continuously feeding or change of milk type, if already continuously feeding.
- Infants with high stomas (jejunostomy) are at risk of electrolyte imbalance and should be monitored closely. Stoma output should be replaced if above 20 ml/kg. Urine sodium is a better indicator of adequate sodium stores than serum sodium, aim for > 20mmol/l in a random urine sample once weekly.
- Loperamide may be useful if stoma losses become difficult to manage despite continuous feeding and change in milk type. Discuss with Gastroenterologist before commencing.
- Intestinal Failure Associated Liver Disease is a serious life-threatening complication; monitor liver function as indicated below. Consider re-feeding stoma losses in this case.
- All infants with a stoma should be discussed at the MDT nutrition meeting on TMBU.

Choice of Enteral Nutrition

Milk Product Preference			
	Current Weight ≤ 1.5 kg	Current weight > 1.5 kg	
		High stoma	Low stoma
1. Choice	MEBM/DEBM	MEBM/DEBM	MEBM
2. Choice	SMA Pro Gold Prem 1	Pepti Junior	Nutriprem 2
3. Choice	NP 1 Hydrolysed	Puramino/Neocate	Pepti Junior

Practical Introduction of Feeds

1. Introduce enteral feeds as soon as possible, on agreement with surgeons. Start fresh MEBM if possible or DEBM if MEBM unavailable.
2. Start by bolus feed but once volume greater than trophic 24 ml/kg/day, always run feeds continuously via pump except for colostomas.
3. Increase feeds 1 ml 24 hourly to begin with aiming to keep stoma loss < 30 ml/kg/day and monitoring for electrolyte imbalance.
4. Adjust ratio of parenteral and enteral feeds according to total fluid allowance and tolerated enteral volume and growth. It is difficult to establish what the contribution of enteral feeds to the fluid and nutritional intake is in babies with stomas.
5. For babies ≤ 1.5 kg apply the same nutritional principles as for babies without stomas:
 - Prescribe combination feeding with Concentrated/Maintenance TPN and enteral feeds aiming for max. 165 ml/kg/day total fluid intake (building up gradually)

- At 130 ml/kg/day give at least 85 ml/kg/day Concentrated TPN and no more than 45 ml/kg/day EBM OR 130 ml/kg/day Maintenance TPN and no feeds/only trophic feeds (25 ml/kg/day)
 - At 150 ml/kg/day give at least 70 ml/kg/day Concentrated TPN and no more than 80 ml/kg/day EBM OR 150 ml/kg/day Maintenance TPN and no feeds/only trophic feeds (25 ml/kg/day)
 - At 165 ml/kg/day give at least 60 ml/kg/day Concentrated TPN and no more than 105 ml/kg/day EBM OR at least 115 ml/kg/day Maintenance TPN and no more than 50 ml/kg/day EBM
 - If the above minimum enteral volume cannot be achieved because of reaching the tolerance limit (stoma losses > 30 ml/kg/day), consider changing over to the next choice of milk product starting at the current volume amount and proceed in the same way until the minimum amount of enteral feeds and good growth has been achieved.
6. For babies > 1.5 kg consider increasing feeds until reaching the limit of tolerance (stoma output > 30 ml/kg/day) or full enteral feeds at 150 - 165ml/kg/day irrespective of growth. Once this has been established, consider changing over to the next milk type as indicated above and proceed in the same way until full feeds and good growth have been achieved.
 7. When changing over to formula use the same scheme for introduction of formula feeds as for babies without stoma (see Enteral and Parenteral Nutritional Care Guideline).
 8. Babies with colostomy and no evidence of intestinal disease (e.g. anal atresia) can be started on their respective age appropriate milk and fed by bolus like babies without stoma
 9. Prior to stoma closure it may be possible to collect the effluent from the proximal stoma and re-feed into the distal bowel via the mucous fistula (if patency has been established and agreed by surgeons). This has the potential advantage of improving enteral feed absorption thereby potentially allowing reduction in PN. It may also help to prevent atrophy of the unused section of bowel (see Replacement of Gastric and Stoma Losses Guideline)
 10. Wean feeding pump time once on full enteral feeds, stoma output < 30 ml/kg/day and good growth. For weaning follow Enteral and Parenteral Nutritional Care Guideline.

Milk Product Characteristics				*partially hydrolysed (3-10 kDa)				
Feeds per 100ml	Energy (kcal)	Protein (g) (%hydrolysis < 3 kDa)	CHO (g) (source)	Fat (g) (%MCT)	Na (mg)	Ca (mg)	P (mg)	Osmolality (mOsm/kg H ₂ O)
EBM (term)	69	1.3	7.2 (Lactose 100%)	4 (5)	15	34	15	300
SMA GP 1	80	2.9 (56%)*	8.1 (Lactose 45%, Maltodextrin)	4 (39.5)	51	116	77	308
NP1 Hydrolysed	80	2.6 (77%)	8.4 (Lactose 62%, Maltodextrin)	4 (15)	79	97	55	395
NP 2	75	2 (0 %)	7.5 (Lactose 75%)	4 (0)	28	116	63	340
Pepti-Junior (12.8%)	66	1.8 (66%)	6.8 (Lactose < 1%, Glucose)	3.5 (46)	50	50	37	210
Infatrini Peptisorb	100	2.6 (69%)	10.3 (Lactose < 1%, Maltodextrin)	5.4 (50)	32	80	40	350
Neocate (13.8%)	67	1.8 (100%)	7.2 (Lactose free, Glucose)	3.4 (0)	26	65	47	340
Puramino	68	1.9 (100%)	7.2 (Lactose free, Glucose)	3.6 (33)	32	64	35	350

Vitamins and Drugs for Babies with Intestinal Failure Associated Liver Disease

- Below are the suggested additional vitamins needed if an infant has significant liver dysfunction.
- Consideration should also be made as to whether they are necessary, if PN is providing a significant proportion.
- Ursodeoxycholic acid may be considered if an adequate intake of enteral feed is being given

Vitamin	Product	Age	Daily Dose
Multi vitamin (incl. A and D)	Abidec/Dalivit PO (Abidec preferred as lower vitamin A content)	Birth-1year	0.6 ml
	Dalivit used if patient has peanut allergy)		
Vitamin E	Alpha tocopherol	Birth-12 years	10 mg/kg up to 100 mg/kg (max 200 mg/kg/day)
Vitamin K	Phytomenadione PO	< 1 year	1mg
Vitamin D	Colecalciferol PO	1-12 months 1 month-12 years > 12 years	1000 IU (max 3000 IU) 6000 IU in solution 6400 IU, if can swallow capsules (max 25 000 IU) 9600 IU (max 40 000 IU)
	Alfacalcidol PO (second line or in severe cholestatic liver disease)	< 1 month 1 month-12 years	20 ng/kg < 20 kg 15-30 ng/kg (max 500 ng/day)
	Ergocalciferol (intramuscular)	n/a	Dose based on Vitamin D level: < 10 (nmol/l) 60 000 IU 10-20 (nmol/l) 45 000 IU > 20 < 50 (nmol/l) 30 000 IU > 50 (nmol/l) use oral suppl.

Monitoring Biochemistry of Infants on Longterm Parenteral Nutrition

Parameter	Frequency of Monitoring
Blood glucose	On starting and with every change of PN bag until stable intake and values
Na, K, Cl, Ca, P	On starting and when increasing PN Twice weekly when stable values
Triglycerides	On starting and when increasing lipids When critically unwell Weekly when stable values
Ferritin, iron and transferrin saturation	After 28 days on PN
LFT's including ALT, AST, GGT, ALP, Bilirubin and conjugated Bilirubin	More frequent if concerns or abnormal values Weekly when stable values
Zn, Cu, Mn, Se	Monthly
Urine sodium	Weekly