Nutritional principles following neonatal (small bowel) stoma formation

This is a short guide outlining the general principles to be considered when managing milk feeding in infants with a small bowel stoma. It should be used in conjunction with the 'Feeding chart for infants with stomas'.

It is not possible to produce an evidence-based guideline in this area, largely due to patient heterogeneity and the sparse evidence available to base a guideline on. Each patient requires an individualised approach to their nutrition, and to the timing of their stoma reversal.

1. General management principles following neonatal small bowel stoma formation:

- The ultimate nutritional aim is adequate growth velocity and is not achieving enteral autonomy (demonstrable growth velocity on full milk feeds)
- Most babies with an ilesotomy will need medium term parenteral nutrition (PN) in order to meet their nutritional requirements
    - The degree to which the remaining intestine can undergo an adaptive process to compensate for the resected bowel is the greatest determinant of whether there will be short bowel syndrome and resultant PN dependence
    - The part of the small intestine with the most robust adaptive process is the ileum. The jejunum and duodenum do not adapt as well as the ileum
    - Because most neonatal pathology involves the ileum, and therefore most diseased or resected small bowel is the ileum, this leaves proportionally more jejunum, which is less efficient at adaptation
- Infants with jejunostomies are even less likely to achieve enteral autonomy and many will only tolerate small amounts of milk feed
- Once enteral threshold has been established (see below), aim to increase the feeds once a week by an agreed increment, because the bowel grows over time, and the enteral threshold tolerance therefore increases

- Medium and long term PN use is associated with significant morbidity, in particular liver-related and central line related. We should therefore always be aiming to maximise enteral nutrition and reducing PN as the negative effects of PN are dose-related
    - All babies with small bowel stomas should have regular (weekly) conjugated bilirubins to allow us to monitor for liver effects
    - Strict attention to asepsis should be always adhered to to avoid episodes of line-related sepsis

2. Stoma Red Flags

- Stoma output >20ml/kg/day
- Rising stoma output over several consecutive days, even if less than 20ml/kg/day
- Very watery stoma effluent
- Leaking stoma bag / bursting stoma bag
- Skin breakdown around stoma or wound (usually due to excessive losses)
- Faltering growth

3. Practice points on introducing milk feeds after small bowel stoma

- Regimen C is not appropriate for babies with stomas and should not be used
- Start feeds when the stoma is starting to work and surgical team are in agreement to commence trophic feeds
- Suggest starting with hourly NG bolus of (unfortified) breast milk
- Suggest minimum of 48 hours of trophic feeding but longer may be appropriate
- Starting milk volume is suggested below

	Weight ≤ 500g at stoma	**Weight at stoma 501g - 1kg**	**Weight at stoma 1.01kg - 1.5kg**	**Weight at stoma >1.51kg**
Starting volume / hour	0.25ml	0.5ml	0.75ml	1ml

4. Practice points for increasing milk feed volumes

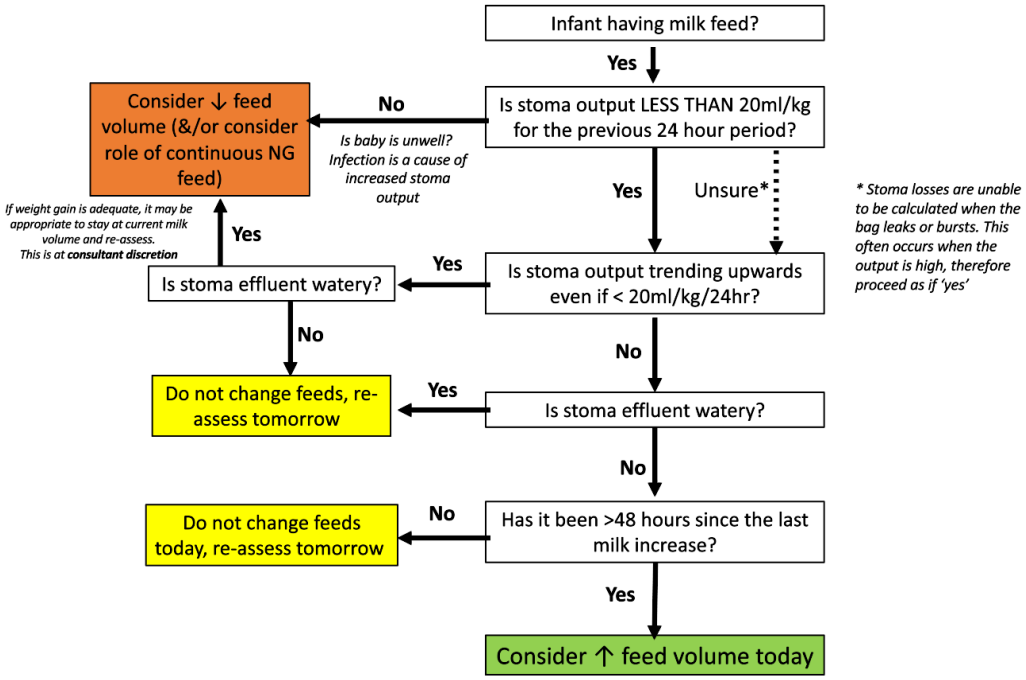
- Increasing milk feeds is an individualised decision based upon the enteral feed tolerance (see later section)
- **Suggest increments in milk volume occur no more frequently than every 48 hours and depending on enteral feed toleration (**See flow chart)
- It would be reasonable to use the starting volume as the increment volume, if this is tolerated.
- If any **red flags,** do NOT increase milk feeds

- If red flags are persistent, consider starting continuous feeding or reducing feed volume (or both)
- Specialised formula milk is commonly used in infants with stomas. This can be for a variety of different reason; weight considerations, lack of maternal breast milk, inadequate growth with donor breast milk or to improve toleration by increasing gut contact time. When formula milk is used, consider partially hydrolysed preparation, and continuous gastric feeding, as this increases gut contact time and encourages enteral growth. This decision should be made in conjunction with neonatal dietician
- If feeds are stopped for reasons other than feed toleration (eg, ROP laser) it would be reasonable to build back up to the previous feed volume quicker than suggested above. The speed should be judged by the attending consultant at the time in conjunction with the stoma losses
- At 28 days post stoma formation, if an infant is still on PN, discuss with GI team

5. Enteral feed toleration and how to assess

- This refers to acceptable stoma losses (consistently <20ml/kg/day) AND demonstration of adequate growth velocity
- Enteral feed toleration can change:
    - It can improve as the GI tract grows with advancing postnatal age
        - Once enteral threshold has been established, aim to try to increase the feed once a week (in conjunction with dietician on the nutrition WR)
    - It can also worsen, often in relation to intercurrent illness which is usually transient (see below for causes of high output stoma) or if the enteral threshold has been exceeded
- **Stoma output** and **stoma effluent consistency** are the two main considerations when judging enteral feed toleration.
    - Stoma output of < 20ml/kg/24hr is generally acceptable
    - Stoma losses > 20ml/kg/24hr risk fluid and electrolyte imbalances, and often losses above this threshold will be replaced with intravenous fluid containing electrolytes
    - Stoma effluent will vary in consistency depending on the anatomical location of the stoma. It is important to judge a change in stoma effluent from the baseline for that particular baby
    - Ileostomy effluent is loose but is not usually watery
    - Watery effluent suggests that the intestine proximal to the stoma is not absorbing the nutrients in the enteral feed, and usually implies that enteral feeds should be reduced (see Flow chart)

6. Flow Chart for assessing feed toleration and to guide milk feeding



7. Calculating stoma losses:

- Go into Fluids and Feeding > Outputs > Stoma
- Scroll across to 0700 and note the number in the 'Stoma net balance' column
    - This is the total daily amount of stoma effluent in mls for the preceding 24 hours
- Take this number and DIVIDE by the baby's current weight to give you a stoma output in ml/kg/24hours
    - Eg, if the stoma net balance is 48.5ml and the baby weighs 1.9kg, the stoma output is 48.5 / 1.9 = 25.5ml/kg/day (high)

8. Documentation on WR for infants with stomas:

In the days from operation until feeds start:

- Has stoma started working yet
- NG losses (volume and colour)

- Decision to remain NBM or commence trophic feed

Once enteral feeds introduced:

- Total daily fluid volume
- Amount of milk per hour (if applicable)
- Amount of milk in ml/kg/24hr
- PN (standard or concentrated)
- Stoma losses for the previous 24 hours
- Stoma effluent consistency (formed, seedy, loose, watery)
- Skin integrity around stoma, especially if stoma effluent watery

9. High output stoma

Causes of a high output stoma:

1. Enteral absorptive capacity exceeded
2. Infection
3. Drugs/medications
4. Rota-virus immunisation

Treatment of high output stoma:

- Try to understand the underlying reason
    - This is important as it affects the rate of increasing feeds if there is an alternative explanation
- Consider reducing feeds
    - Often this needs to be a reduction of several steps to regain control
- If infection, treat likely sources
- Monitor for fluid and electrolyte imbalance
- Replace excess fluid losses with 0.9%sodium chloride and additional potassium chloride
    - Usually replace stoma losses that are >20ml/kg/24hrs