Stoma losses and managing feed advancement in the neonate

Guideline Responsibilities and Authorisation

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Target Audience	NICU medical and nursing staff
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Guideline Review History

Version	Updated by	Date Updated	Summary of Changes
1	Maggie Rainbow	June 2024	New guideline

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Contents

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1 Overview

1.1 Purpose

To guide a standardised approach to the assessment and management of fluid, electrolyte and nutritional needs of neonates who have had intestinal surgery and formation of stoma.

1.2 Staff group

- NICU medical team, including SMO, RMO, NP, CNS
- Paediatric surgical team
- NICU nursing team

1.3 Patient / client group

All neonates with stoma especially focusing on small bowel stoma.

1.4 Exceptions / contraindications to enteral feeding

- Clinical suspicion of intestinal obstruction including Ileus
- Bilious/persistent vomiting (>3 episodes in 12 hours)
- Grossly blood-stained stoma output or stools
- Radiologic changes suggestive of ischaemic intestine
- No paediatric surgical clearance to feed

1.5 Definitions and acronyms

SMO	Senior Medical Officer
RMO	Resident Medical Officer
NP	Nurse Practitioner
CNS	Clinical Nurse Specialist
NICU	Newborn Intensive Care
NEC	Necrotising enterocolitis
EBM	Expressed breast milk
IV	Intravenous

1.6 Background

The neonate is particularly vulnerable to excessive fluid and electrolyte losses when they have a stoma formed following intestinal surgery. This is especially so for the preterm infant and small bowel stomas which typically have larger fluid output. This leaves the infant at risk of life-threatening fluid and electrolyte imbalances and nutritional depletion, resulting in a failure to thrive.

Stoma losses can lead to low serum potassium and sodium levels, disruption in the acid/base balance, therefore require careful monitoring and probable replacement of volume lost.

Acceptable physiologic intestinal fluid loss is calculated at 20-40ml/kg/day, hence this volume is not required to be replaced if other hydration assessments are stable.

This guideline is to provide a starting point at which to assess infants and develop an individualised fluid and electrolyte management plan for them.

2 Clinical management

2.1 Roles and responsibilities

Nurses
Measure and record as accurately as possible stoma losses each time bag emptied. Maintain 24-hour total of losses and fluid balance on daily fluid total chart. Report any significant change in volume of stoma losses to medical team.

Clinicians
Assess fluid losses at each ward round and adjust management appropriately to fluid loss replacement.

2.2 Competency required

NICU medical staff, SMO, RMO, NP, CNS and registered nurses.

2.3 Guideline/Management

- Following the formation of a surgical stoma each infant will have a stoma output chart to record 24-hour total stoma output (Appendix D).
- Urine output will be measured and calculated at ml/kg/hour over 24-hour period
- Daily blood gas analysis to assess electrolyte and acid/base balance until stable.

NOTE: Refer to the flow chart for ≤32/40 and/or ≤1500g or NEC (Pathway A) and flow chart for >32/40 and/or >1500g with no NEC (Pathway B)

This is due to the vulnerability of the low birthweight, preterm and unwell neonate prior to stoma formation, where there is greater risk of fluid and electrolyte imbalances.

2.3.1 Commencement and advancement of enteral feeds

All infants

- Once stoma starts functioning with regular stoma output, feeds can be initiated in consultation with operating Paediatric surgical team.
- Feeds to commence at 10ml/kg/day using EBM or hydrolysed formula e.g. peptijunior.
- Stoma losses measured and calculated 4-6 hourly, with daily total volume target <20ml/kg/day for infants ≤32/40, ≤1500g, and/or NEC,
- or <40ml/kg/day for infants>32/40, >1500g with no NEC
- Urine output calculated each nappy change, target >1ml/kg/hour
- When baby is able to tolerate the enteral feeds and meets above criteria, consider increasing the feeds by 10-30ml/kg/day, dependant on risk for NEC, and adjust the IV nutrition accordingly.
- Monitor for feed tolerance
- Continue to advance feeds as tolerated, fluid losses remain minimal and electrolyte balance maintained and appropriate weight gain until full feeds achieved.
- Consider continuous gastric feeds to mitigate rapid intestinal transit that can occur with increasing bolus feeds.

NOTE: If there is persistent vomiting, significant abdominal distension OR blood in stools at any time, an urgent clinical review is warranted to exclude NEC or a surgical emergency

2.3.2 Managing increased stoma output

Infants ≤32/40, ≤1500g or NEC = 20 to 40ml/kg/day

- Stoma losses measured and calculated 4-6 hourly
- Urine output calculated each nappy change target >1ml/kg/hour
- Assess for clinical signs of dehydration
- Daily blood gas to assess electrolyte and acid/base balance
- Continue current rate of feeds, do not increase.
- Continue to monitor stoma losses, urine output and electrolytes
- Commence IV fluid replacement of losses with 0.9% sodium Chloride consider potassium replacement with 10mmol per 500ml, for losses above 20ml/kg/day ml for ml (e.g. 30ml/kg/day losses measured = 10ml/kg/day losses replaced).
- Minimal to moderate stoma losses can be considered to be measured and replaced over 24 hours
- Reassess next 24 hours as to increasing enteral feed volume.
- Consider continuous feeds, type of milk feed i.e. EBM, hydrolysed formula (peptijunior) or elemental formula (neocate).
- Consider refeeding in consultation with paediatric surgeons where appropriate.

Infants >32/40, >1500g no NEC = 40 to 70ml/kg/day

- Stoma losses measured and calculated 4-6 hourly
- Urine output calculated each nappy change target >1ml/kg/hour
- Assess for clinical signs of dehydration
- Daily blood gas to assess electrolyte and acid/base balance
- Continue current rate of feeds, do not increase.
- Continue to monitor stoma losses, urine output and electrolytes
- Commence IV fluid replacement of losses with 0.9% sodium Chloride consider potassium replacement with 10mmol per 500ml, for losses above 40ml/kg/day ml for ml (e.g. 50ml/kg/day losses measured = 10ml/kg/day losses replaced).
- Minimal to moderate stoma losses can be considered to be measured and replaced over 24 hours
- Reassess next 24 hours as to increasing enteral feed volume.
- Consider continuous feeds, type of milk feed i.e. EBM, hydrolysed formula (peptijunior) or elemental formula (neocate)
- Consider refeeding in consultation with paediatric surgeons

2.3.3 Managing stoma losses:

Infants ≤32/40, ≤1500g or NEC = >40ml/kg/day, or urine output <1ml/kg/hour and/or signs of dehydration

- Stoma losses measured and calculated 3-4 hourly
- Urine output measured each nappy change 3-4 hourly
- Assess for signs of dehydration
- Daily blood gas to assess electrolyte and acid /base balance, consider more frequent evaluations e.g. 8-12 hourly.
- Reduce feeds to previous step or consider withholding feeds. Adjust intravenous nutrition accordingly.
- Commence IV fluid replacement of all losses over 20ml/kg/day with 0.9% sodium chloride with potassium 10mmol per 500ml, ml for ml (e.g. 60ml/kg/day losses measured = 40ml/kg/day losses replaced)

Infants >32/40, >1500g no NEC = >70ml/kg/day or urine output <1ml/kg/hour and/or signs of dehydration

- Stoma losses measured and calculated 3-4 hourly
- Urine output measured each nappy change 3-4 hourly
- Assess for signs of dehydration
- Daily blood gas to assess electrolyte and acid /base balance, consider more frequent evaluations e.g. 8-12 hourly.
- Reduce feeds to previous step or consider withholding feeds. Adjust intravenous nutrition accordingly.
- Commence IV fluid replacement of all losses over 40ml/kg/day with 0.9% sodium chloride with potassium 10mmol per 500ml, ml for ml (e.g. 60ml/kg/day losses measured = 20ml/kg/day losses replaced).

Note: This plan maybe too conservative for the late preterm and term infants and feeding management should be adjusted to their individual clinical presentation.

2.4 Calculating stoma losses

Stoma losses are to be calculated each time the stoma bag is emptied to assess for sudden changes in output.

Sudden increase in output can result in rapid dehydration and electrolyte derangement and require prompt assessment by medical team.

Unexpected decreases in stoma losses can indicate intestinal obstruction proximal to stoma and require prompt assessment by medical team.

2.4.1 Calculate stoma losses

Daily volume calculation
Total Volume measured over 24 hours ÷ infant working weight

For example:

- Infant weighing 1.5kg with stoma loss of 60ml in 24 hours = 40ml/kg/day stoma loss
- Infant weighing 650g with stoma loss of 60ml in 24 hours = 92ml/kg/day stoma loss

Hourly stoma loss calculation
Volume stoma loss measured ÷ working weight ÷ number of hours since last measure

For example:

- Infant weight 1.5kg, latest stoma output measured 10ml over 4 hours

  10 ÷ 1.5 ÷ 4 = 1.67ml/kg/hour this can then be multiplied by 24 to calculate daily losses to compare like with like.

  1.67 x 24 = 40ml/kg/day

- Infant weight 650g latest stoma output measured 10ml over 4 hours

  10 ÷ 0.65 ÷ 4 = 3.8ml/kg/hour

  3.8 x 24 = 91ml/kg/day

2.5 Potential complications

- Fluid imbalance resulting in dehydration or circulatory overload
- Electrolyte imbalance especially hypokalaemia or hyper/hyponatraemia

3 Evidence base

3.1 Summary of Evidence, Review and Recommendations

- New Zealand National Intestinal Failure and Rehabilitation Service (NZIFRS) Guideline for advancing enteral feeds in preterm babies and neonates with a small bowel stoma https://media.starship.org.nz/advancing-enteral-feeds-neonate%26preterm/Advancing_enteral_feeds_neonate_preterm.pdf

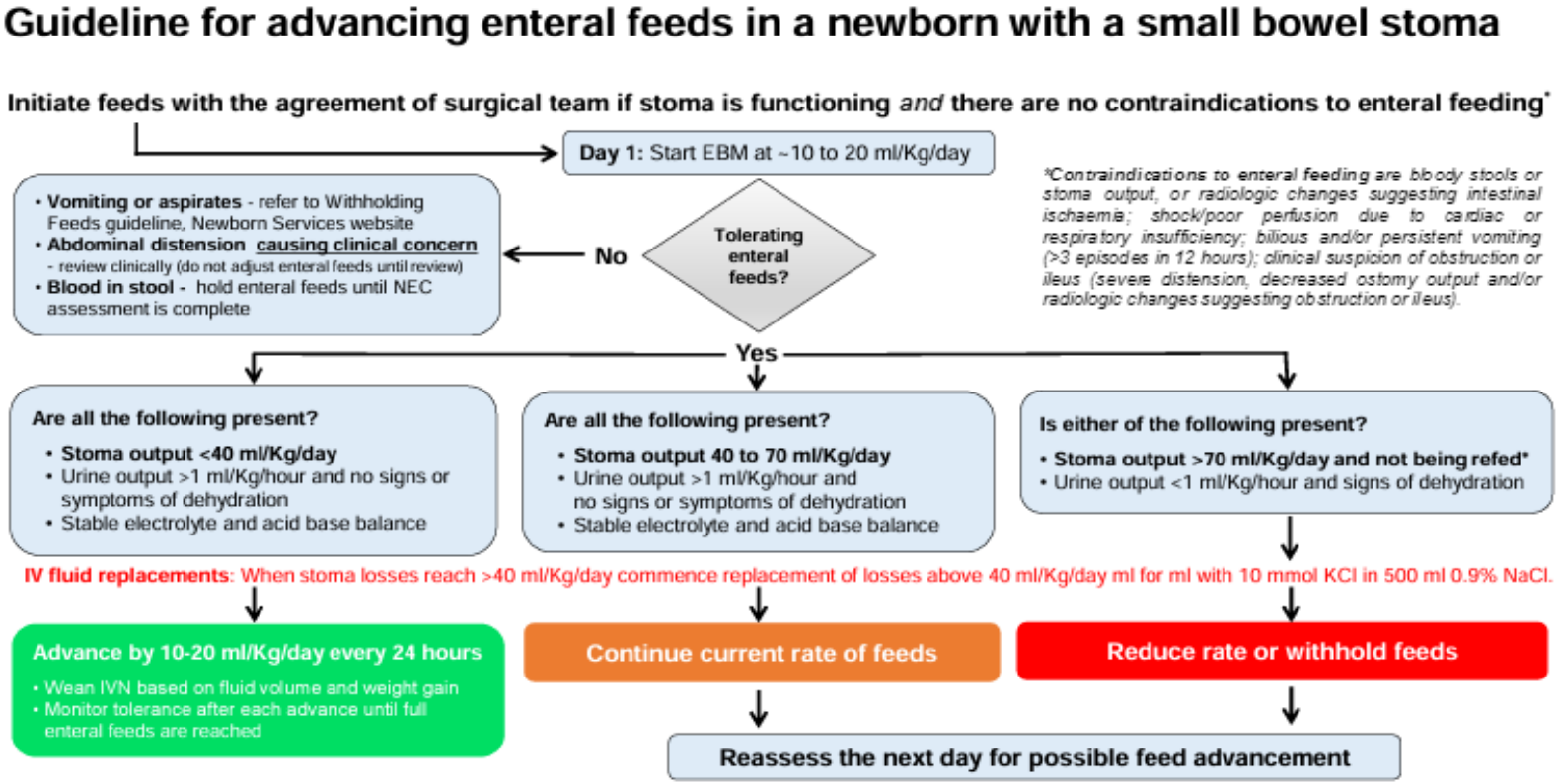
3.2 Bibliography / References

- DR Shores et al. Implementation of feeding guidelines in infants at risk of intestinal failure Journal of Perinatology (2015) 35, 941–948

3.3 Associated Health NZ Waikato Documents

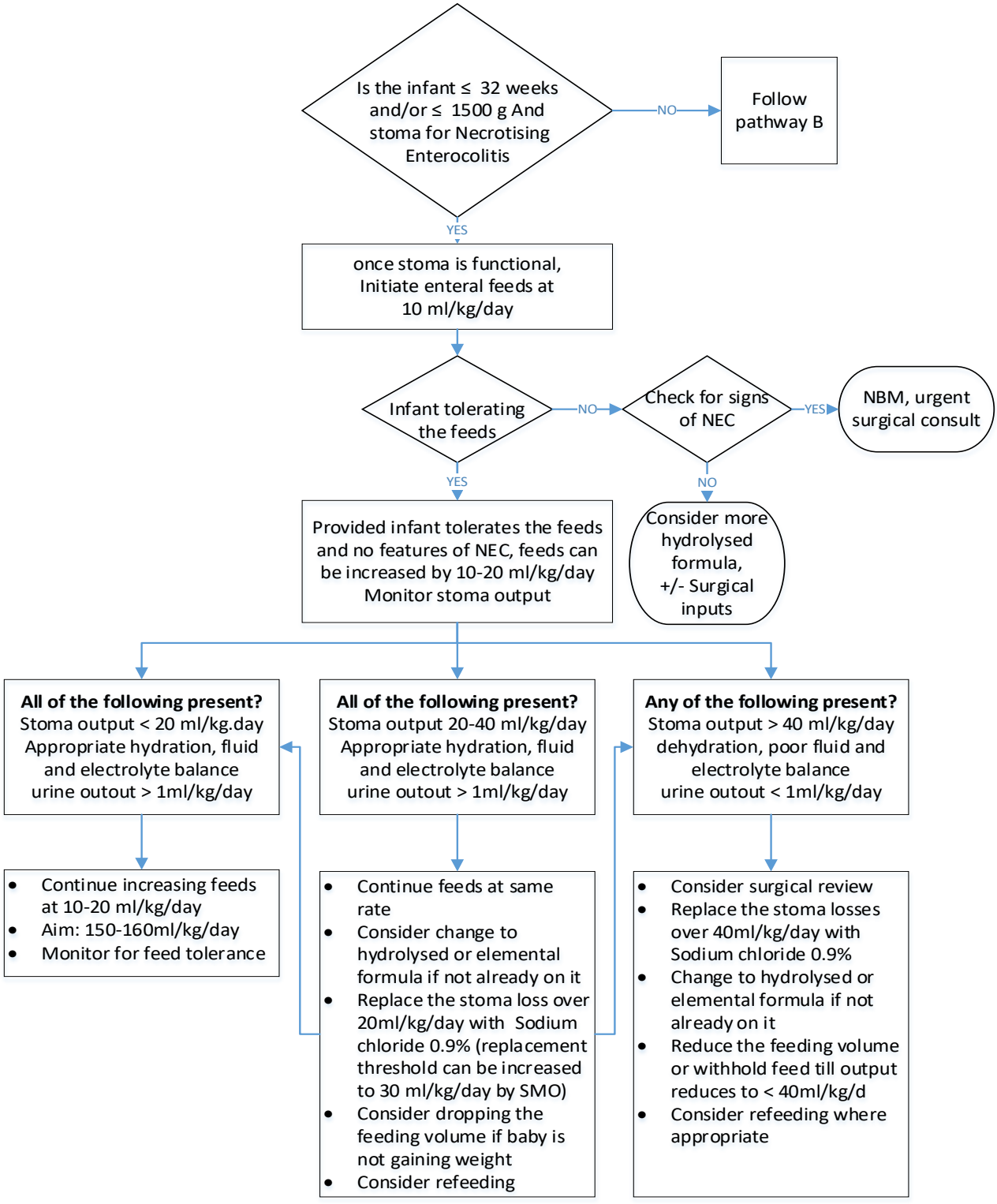
- Enteral Feeding Standardisation in Newborn Intensive Care Unit (NICU) (Ref. 6172)

Appendix A – Guideline for advancing enteral feeds



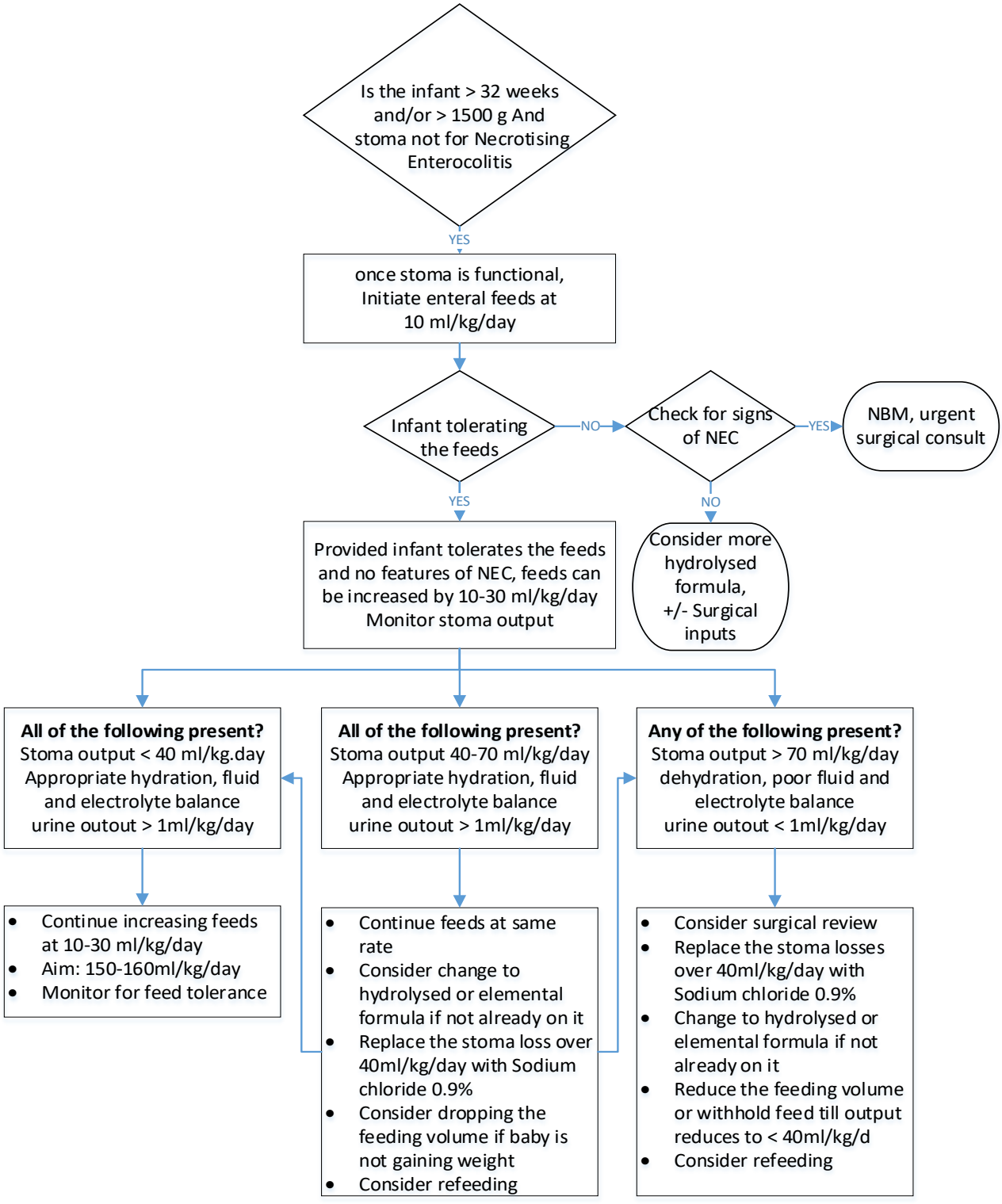
Adapted from: Brenn M, Gura K, Duggan C. Intestinal failure. In: Manual of Pediatric Nutrition, 5th ed, Sonneville K, Duggan C (Eds), People's Medical Publishing House, Shelton, CT 2013.Graphic 108756 Version 1.0 and Shores DR, Bullard JE, Aucott SW, et al. Implementation of feeding guidelines in infants at risk of intestinal failure. J Perinatol 2015;35:941-8 by Barbara Cormack, Neonatal Dietitian, Starship Child Health, February 2018, updated October 2023.

Appendix B – Stoma created for ≤ 32 weeks and/or ≤ 1500 g infants for Necrotising Enterocolitis Pathway



DISCLAIMER: This algorithm is mainly designed for the management of stoma losses during the initial feeding phase of the infant. Please use it cautiously when an infant with stable stoma fluid losses has a sudden increase in losses.

Appendix C – Stoma created for indications other than NEC for > 32 weeks and/or >1500 g



DISCLAIMER: This algorithm is mainly designed for the management of stoma losses during the initial feeding phase of the infant. Please use it cautiously when an infant with stable stoma fluid losses has a sudden increase in losses.

Appendix D – Stoma output form (A1304HWF)

A1304HWF

Date _____

Name _____

Birthweight _____

Today's Weight _____

Waikato District Health Board

NEWBORN INTENSIVE CARE

Fluid Loss/Replacement

	FLUID LOSS				FLUID REPLACEMENT		
TIME	1-4 hourly Measure	4 hourly Drainage	4 hourly Total	24 hourly Running Total	Hrly Volume over 4 hours	4 hourly Total	24 hourly Running Total
0800 0900 1000 1100			A			F	
1200 1300 1400 1500			B			A	
1600 1700 1800 1900			C			B	
2000 2100 2200 2300			D			C	
2400 0100 0200 0300			E			D	
0400 0500 0600 0700			F			E	
			TOTAL OUT			TOTAL IN	

Fluid Losses Column

1. Measure fluid loss at prescribed interval (usually 4 hourly) and place volume obtained in column headed 1-4 hourly measure.
2. Measure amount of free drainage at prescribed interval (usually 4 hourly) and note in 4 hourly Drainage column.

Total the two and place in column headed 4 hourly Total. This volume now needs to be replaced over the next 4 hours.

Fluid Replacement

The volume in the column headed 4 hourly Total now needs to be replaced over the next 4 hours, i.e. 4 hourly Total Fluid Loss A corresponds with 4 hourly Total Fluid Replacement A.

Chart as on the Fluid Sheet the hourly volume pushed through via the I.V. pump and have the running total in the 4 hourly Running Total column so that at the end of the 4 hours the previous 4 hour's loss has been replaced. Place the 4 hourly Running Total into the 24 hourly Running Total column and keep a running total for the 24 hours.

Reviewed: September 2005