Ashford and St. Peter's Hospitals
NHS Foundation Trust

Risk stratified approach to enteral feeding on NICU

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Guideline History		
Date	**Comments**	**Approved By**
2015	Initiating and increasing enteral feeds	Guideline group

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Enteral Feeding on NICU

Feeding babies enterally with expressed breast milk has many benefits for their short and long term health. Babies of all gestations and ages should be provided with enteral milk within 6 hours of birth unless there is a specific contraindication discussed with a consultant and documented clearly.

Maternal expressed breast milk is superior to donor milk in terms of its potential to protect the gut, support immunity and provide nutrition. Donor breast milk is a valuable commodity to help bridge the gap until a full quota of maternal milk is available, but is not suitable for long term use.

At admission infants should be risk stratified onto a feeding pathway.

EXTREMELY HIGH RISK	**HIGH RISK**	**MEDIUM RISK**	**LOW RISK**
≤ 26 weeks	26+1 – 29 weeks	29+1 – 32 weeks	>32+1 weeks
≤ 700g appropriately for gestation	701 – 999g appropriate for gestation	1000-1800g appropriately grown	>1800g appropriately grown
	Previous NEC/post GI surgery	Moderate or severe HIE	

Generally infants should be managed as per their highest risk factor.

Any of the following factors, automatically move you into the next highest risk pathway (e.g. from medium to high)

- **IUGR <9th centile**
- **Monochorionic twin**
- **Absent or reversed end diastolic flow**
- **Evidence of significant perinatal compromise**

Clinical concern can prompt a change at any time. Presence of two or more additional factors warrants careful consideration of risk stratification.

Risk Stratification on Day Three

Audit of NEC cases at St Peter's over the last five years has been reassuring that the majority of small babies are able to tolerate increasing feeds at 30ml/kg/d without problems. However there is increasing evidence that compromise around the time of birth can be later linked to an increased risk of necrotising enterocolitis – as part of a multi-hit causal hypothesis. For those infants who did develop NEC, there were some characteristics that were significantly more likely to be present. Using this work has enabled us to develop a tool for risk stratifying these infants, without compromising the progress of the majority of infants in our care.

The following risk factors have been identified as associated with an increased chance of diagnosis of NEC within our population, if present within the first 48 hours of life, see appendix 1. On the day 3 morning ward round, infants on the extremely high and high risk pathways should be risk stratified according to these criteria. Presence of these risk factors at any point in the first 48 hours should be counted; e.g. needing to be invasively ventilated (for more than just in/out surfactant) on the first day of life, even if extubated successfully by day 3.

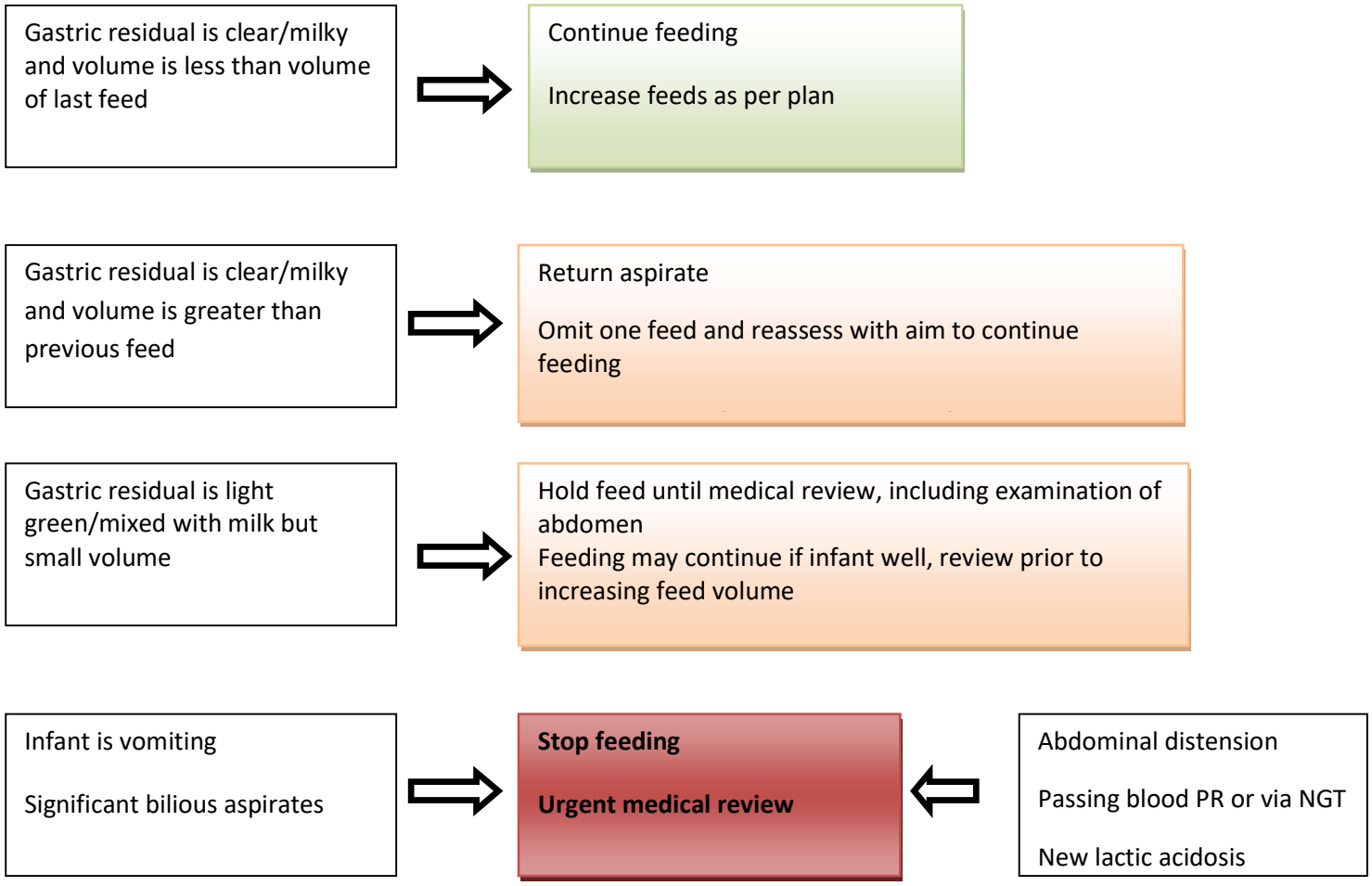
- Sepsis (CRP>4)
- A need for mechanical ventilation
- Hyperglycaemia >12mmol
- A need for packed red cell transfusion
- Feed intolerance (bilious aspirates, abdominal distension, inability to progress with feeds)

Feed intolerance

Feed intolerance can cover a whole spectrum of symptoms and causes. Most commonly feed intolerance is due to dysmotility of prematurity – immature gut. However, feed intolerance can be a herald sign for potentially serious conditions, some primarily gastrointestinal (perforation, NEC), and some due to problems outside the abdomen (sepsis, respiratory failure, haemodynamically significant PDA). In the extremely preterm, growth restricted or unwell infant feed intolerance should be taken as significant until proven otherwise. The following approach is suggested.

Continuous assessment via observations of clinical status – heart rate, saturations etc
4 hourly nursing assessment of:

- Gastric residual
- Abdominal distension
- Passing stool
- Vomiting



Breast Milk Fortifier

Premature infants have a significant metabolic requirement in order to grow. Though breast milk is undoubtedly the best milk for them, it is designed with the nutritional content that best supports term infants that have already been through the growth spurt of the third trimester. There is good evidence that increasing the volume of breast milk does not necessarily increase the macronutrient content, especially of protein. Additionally, the infants may not be able to tolerate increased volume, leading to increasing diagnosis and active management of gastro-oesophageal reflux.

	Energy kcal/kg/d	Protein g/kg/d	Fat g/kg/d
ESPGHAN 2010 Preterm infants <1.8kg	110-135	3.5-4.5	4.8-6.6
150ml/kg/d EBM	103	1.9	6.2
180ml/kg/d EBM	124	2.3	7.4
150ml/kg/d EBM + 2% BMF	126	3.8	6.2

In line with evidence world-wide, we take a proactive approach with routine fortification in order to prevent a nutritional deficit; to promote healthy steady weight gain and avoid postnatal growth failure. All infants <32 weeks gestation should be commenced on 2% (half strength) breast milk fortifier once they have been tolerating feeds at 150ml/kg/d for 24 hours. There is no causal evidence that use of breast milk fortifier increases the risk of NEC.

Further increase in concentration of BMF should be decided by the consultant based on growth parameters, renal function and overall clinical condition of the baby. By early fortification, we aim to achieve good growth by 34 weeks, so babies can stop the fortifier before discharge. A small proportion of babies with poor growth, will go home with fortifier. Further advice is available in the ‘going home with fortifier’ guideline.

Appendix One

Risk factors comparison for NEC cases vs control

Characteristic	NEC Cohort	Control Cohort	Significance
N =	61	58	
Gestation	25.6 (23-31)	25.6 (23 – 27)	
Weight	743g	799g	
Centile (mode)	25	25	
Infants <9th centile	28/61 (46%)	16/58 (28%)	P = 0.057
Sex M:F	40:21	28:30	P = 0.066
MgSO4 received	44/61	48/58	
Day full feeds reached	10.6 (n=25)	6.6 (n= 50)	P = 0.0002
Admission Temp	36.9	37.1	
1 min APGAR	5.0	5.6	
5 min APGAR	7.2	7.8	
Worst CRP in 1st 48 hours	12.5	4.6	P = 0.023
Ventilated in 1st 48hours	49/61	27/58	P = 0.00014
Inotropes in 1st 48 hours	12/61	7/58	P = 0.32
Hyperglycaemia in 1st 48 hours	29/61	13/58	P = 0.0068
PRBC Transfusion in 1st 48 hours	27/61	5/58	P = 0.0000098

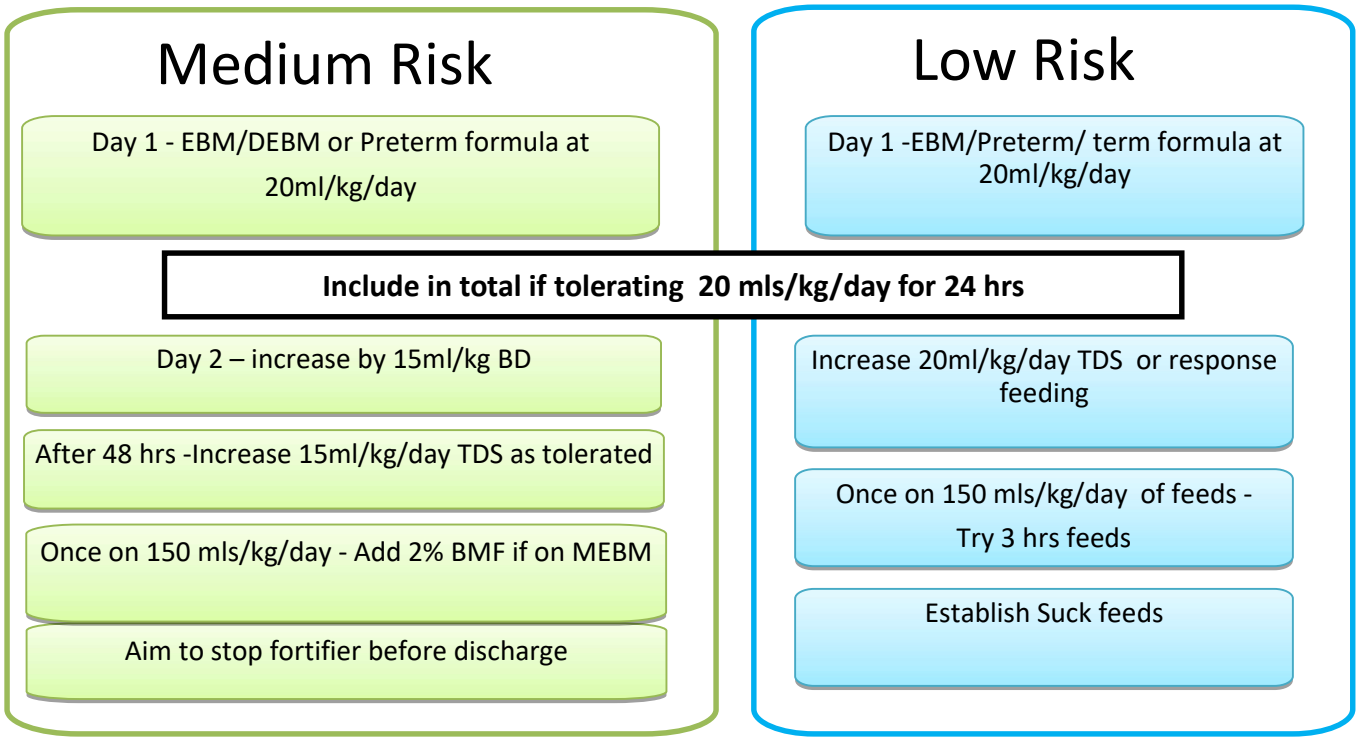
	NEC	No NEC	Significance
No characteristics	6	26	0.00002203
One characteristic	11	14	0.5
Two characteristics	19	13	0.31
Three characteristics	20	3	0.00013191
Four characteristics	5	2	0.44

Chance of NEC with having certain characteristics: raised CRP >4 in 1st 48 hours, Ventilated in 1st 48 hours, Hyperglycaemia in first 48 hours, Packed cell transfusion in 1st 48 hours

Appendix Two Feeding pathways

Medium and Low Risk Pathways (no need to print for individual patients)

First 6 hrs : Aim for first feed within 6 hrs, ideally with maternal EBM



HIGH RISK FEEDING PATHWAY

First 24 hours

First MEBM (DEBM)* by 6 hours

Give extra EBM at 15ml/kg/d

See reverse for feed tolerance assessment

24-48 hours

Increase by 15ml/kg/d OD

After 48 hours

RISK FACTORS

- Sepsis ☐
- Ventilated ☐
- Transfusion ☐
- Feed Intolerance ☐
- Hyperglycaemia ☐

1 RISK FACTOR

Increase by 15ml/kg BD

2 RISK FACTORS

Increase by max 10ml/kg BD

3 or more RISK FACTORS or clinical judgement

Consider stopping feeds, holding or

Increase only by 10ml/kg OD

Include feeds from 20ml/kg/d

Commence 2% BMF 24 hours after achieving full feeds

Continue to increase at this rate until 150ml/kg/d as tolerated

- **Maternal milk is superior to donor milk. Give DEBM if no MEBM available at 6 hours*
- *Support maternal expressing immediately after birth and ensure correct settings are on their expressing kit. Seek extra support early.*

EXTREMELY HIGH RISK FEEDING PATHWAY

First 24 hours

First MEBM (DEBM)* by 6 hours

Give extra MEBM at 10ml/kg/d

See reverse for feed tolerance assessment

24 - 48 hours

Increase by 10ml/kg/d as extra if tolerated

After 48 hours

RISK FACTORS

CRP >4 ☐

Ventilation ☐

Transfusion ☐

Feed Intolerance ☐

Hyperglycaemia ☐

1 RISK FACTOR

Increase by 15ml/kg BD

2 RISK FACTORS

Increase by max 10ml/kg BD

3 or more RISK FACTORS or clinical judgement

Consider stopping feeds, holding or

Increase only by 10ml/kg OD

Include feeds from 20ml/kg/d

Continue to increase at this rate until 150ml/kg/d as tolerated

Commence 2% BMF 24 hours after achieving full feeds

- **Maternal milk is superior to donor milk. Give DEBM if no MEBM available at 6 hours*
- *Support maternal expressing immediately after birth and ensure correct settings are on their expressing kit. Seek extra support early.*

2. Supporting References

- Dorling J, Abbott J, Berrington J, et al. Controlled Trial of Two Incremental Milk-Feeding Rates in Preterm Infants. *N Engl J Med*. 2019;381(15):1434–1443. doi:10.1056/NEJMoa1816654
- Oddie SJ, Young L, McGuire W. Slow advancement of enteral feed volumes to prevent necrotising enterocolitis in very low birth weight infants. *Cochrane Database Syst Rev*. 2017;8(8):CD001241. Published 2017 Aug 30. doi:10.1002/14651858.CD001241.pub7
- Paul SP, Kirkham EN, Hawton KA, Mannix PA. Feeding growth restricted premature neonates: a challenging perspective. *Sudan J Paediatr*. 2018;18(2):5–14. doi:10.24911/SJP.106-1519511375
- Amissah EA, Brown J, Harding JE. Protein supplementation of human milk for promoting growth in preterm infants. Cochrane Database of Systematic Reviews 2018, Issue 6. Art. No.: CD000433. DOI: 10.1002/14651858.CD000433.pub2

3. Supporting relevant trust guidelines

NICU neonatal nutrition bundle

Discharge planning – NG feeds and BMF at home

4. Guideline Governance

a. Scope

This guideline in relevant to all staff caring for babies in neonatal intensive care.

b. Purpose

i. This guidelines aims to facilitate a common approach to the management of babies admitted under neonatal care. At times deviation from the guideline may be necessary, this should be documented and is the responsibility of the attending consultant.

ii. This guideline is subject to regular review to ensure ongoing evidence based practice.

c. Duties and Responsibilities

All staff caring for neonates have a duty to be aware of the contents of this guideline, how to risk assess; and to have knowledge of the signs and symptoms of feed tolerance and its associated problems.

d. Approval and Ratification

This guideline will be approved and ratified by the Neonatal Guidelines Group.

e. Dissemination and Implementation

i. This guideline will be uploaded to the trust intranet 'Neonatal Guidelines' page and thus available for common use.
ii. This guideline will be shared as part of ongoing education within the Neonatal Unit for both medical and nursing staff.
iii. All members of staff are invited to attend and give comments on the guideline as part of the ratification process.

f. Review and Revision Arrangements

a. This policy will be reviewed on a 5 yearly basis.
b. If new information comes to light prior to the review date, an earlier review will be prompted.
c. Amendments to the document shall be clearly marked on the document control sheet and the updated version uploaded to the intranet. Minor amendments will be ratified through the Neonatal Guidelines Group. A minor amendment would consist of no major change in process, and includes but is not limited to, amendments to documents within the appendices.

g. Equality Impact Assessment

Background • Who was involved in the Equality Impact Assessment
Neonatal guidelines group
Methodology • A brief account of how the likely effects of the policy was assessed (to include race and ethnic origin, disability, gender, culture, religion or belief, sexual orientation, age) • The data sources and any other information used • The consultation that was carried out (who, why and how?)
No concerning features identified on review
Key Findings • Describe the results of the assessment • Identify if there is adverse or a potentially adverse impacts for any equalities groups
No concerning features identified on review
Conclusion • Provide a summary of the overall conclusions
No concerning features identified on review
Recommendations • State recommended changes to the proposed policy as a result of the impact assessment • Where it has not been possible to amend the policy, provide the detail of any actions that have been identified • Describe the plans for reviewing the assessment
Policy suitable for implementation

h. Document Checklist

To be completed (electronically) and attached to any document which guides practice when submitted to the appropriate committee for approval or ratification.

Title of the document: Risk stratification of enteral feeding on NICU

Policy (document) Author: Samantha Edwards

		Yes/No/ Unsure/NA	Comments
1.	**Title**		
	Is the title clear and unambiguous?	**Y**	
	Is it clear whether the document is a guideline, policy, protocol or standard?	**Y**	
2.	**Scope/Purpose**		
	Is the target population clear and unambiguous?	**Y**	
	Is the purpose of the document clear?	**Y**	
	Are the intended outcomes described?	**Y**	
	Are the statements clear and unambiguous?	**Y**	
3.	**Development Process**		
	Is there evidence of engagement with stakeholders and users?	**Y**	
	Who was engaged in a review of the document (list committees/ individuals)?	**Y**	
	Has the policy template been followed (i.e. is the format correct)?	**Y**	
4.	**Evidence Base**		
	Is the type of evidence to support the document identified explicitly?	**Y**	
	Are local/organisational supporting documents referenced?	**Y**	
5.	**Approval**		
	Does the document identify which committee/group will approve/ratify it?	**Y**	
	If appropriate, have the joint human resources/staff side committee (or equivalent) approved the document?	**Na**	
6.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?	**Y**	

		Yes/No/ Unsure/NA	Comments
	Does the plan include the necessary training/support to ensure compliance?	**Y**	**Theme of the week**
7.	**Process for Monitoring Compliance**		
	Are there measurable standards or KPIs to support monitoring compliance of the document?	**NA**	
8.	**Review Date**		
	Is the review date identified and is this acceptable?	**Y**	
9.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for coordinating the dissemination, implementation and review of the documentation?	**Y**	
10.	**Equality Impact Assessment (EIA)**		
	Has a suitable EIA been completed?	y	

Committee Approval (Neonatal Guidelines Committee)			
If the committee is happy to approve this document, please complete the section below, date it and return it to the Policy (document) Owner			
Name of Chair	**Samantha Edwards**	**Date**	**3rd Feb 2020**
Ratification by Management Executive (if appropriate)			
If the Management Executive is happy to ratify this document, please complete the date of ratification below and advise the Policy (document) Owner			
Date: n/a			