

## 1. Introduction and Who Guideline applies to

- 1.1 The use of feeding guidelines on Adult Intensive Care Unit (AICU) has been practised for a number of years and most AICUs within the UK have such guidelines. It is recommended that early enteral nutrition be initiated on Critical Care patients where possible and ideally, within 48 hours of AICU admission (Singer *et al*, 2018). Delivering early nutritional therapy is seen as a proactive therapeutic strategy that may reduce disease severity, diminish complications, decrease length of stay and have a favourable impact on patient outcomes. (McClave *et al*, 2016).
- 1.2 This clinical guideline is for use by medical and nursing teams to provide advice and information in order to start an enteral feed on an adult inpatient (over 16 years old) in University Hospital of Leicester (UHL) AICUs, who are to be fed via a nasogastric tube (NGT) prior to Dietetic assessment. This includes all levels of AICU patients.
- 1.3 This clinical guideline is **for use on UHL Adult Intensive Care** and applies to feeding by nasogastric tubes (NGTs) only.  
Please refer to the Guideline for Commencing Out of Hours Enteral Tube Feeding (Nasogastric) in Adult Inpatients (Trust Reference B55/2006) in all other ward areas including high dependency patients not on the AICU, with the exception of renal, where the Out of Hours Enteral tube feeding (Nasogastric) Starter Regimen for an Adult Inpatient with *Renal Failure* (Trust Reference C2/2015) should be followed.  
It is recommended that at the earliest opportunity patients commencing nasogastric feeding are verbally referred to an AICU Dietitian on the unit if at LRI or GH and via ICE if at LGH HDU.
- 1.4 This clinical guideline differs from the other out of hours nasogastric feeding guidelines in UHL due to:
- Differing energy and protein requirements of critically ill patients;
  - The use of gastric residual volumes as one marker of tolerance of enteral nutrition on critical care that is not routinely used in other ward areas;
  - Increased clinical monitoring of patient on UHL AICUs.
- 1.5 Medical and Nursing staff must follow the relevant critical care tube checks in the Insertion and Management of Nasogastric and Orogastric Tubes in Adults UHL Policy (Trust Ref B39/2005) before commencing any feed, and document on the safety checklist for NGT insertion.

## 2. Guideline Standards and Procedures

- 2.1 If a decision is made to commence nasogastric feeding for an adult inpatient (over 16 years old) on a UHL AICU prior to Dietitian assessment, this clinical guideline should be followed by medical and nursing staff. Enteral feeding **must not** be started prior to Dietitian assessment for those patients on specialised therapeutic diets such as Ketogenic diets (for intractable epilepsy) or for an inherited metabolic disorder

## **2.2 Food allergies and enteral feeds**

- a) **It is crucial to check the patients food allergy status.**
- b) Appendix 1 **must** be followed and used to assess patient allergy status and therefore, enteral feed suitability prior to starting enteral feeding. Care must be taken in patients who are known or suspected of being food allergic or food hypersensitive/intolerant.
- c) Approximately 11-26 million people in Europe are thought to have a food allergy (Pawankar, 2013). The most common allergens are nuts, peanuts, sesame seeds, fish, shellfish, cow's milk and eggs (Wright 2007).
- d) Specifically in respect of enteral feeds used in UHL (manufactured by Nutricia), this is in respect of cow's milk protein, fin fish, soya and pea legume food allergies/hypersensitivity but a patient may be hypersensitive/intolerant to other ingredients such as colourants, salicylate, sulphites etc.
- e) Appendix 2 should then be followed to commence enteral feeding and assess tolerance.
- f) As part of Appendix 2, reference should be made to Appendix 3 to guide assessment and management of refeeding syndrome risk with slower rate enteral feeding, serum electrolyte monitoring and supplementation with additional vitamins and minerals.

## **2.3 Cultural and Religious preferences**

- a) If a patient, relative or carer requests if an enteral feed is suitable for vegetarian or alternative cultural or religious dietary restriction, the restriction and the ingredients/contents of enteral feeding products as recommended in Appendix 1 should be discussed with the patient/relative and they can decide if the enteral feed is suitable or is acceptable as part of medical treatment for them.
- b) If a strict vegan diet is followed, it will not be possible to provide nutritionally complete enteral feeding with the products available in the hospital. Appendix 1 should be used to discuss with the patient/relative and they can decide if the enteral feed may be unsuitable for them.
- c) If there is any doubt or concern, refer to the AICU Dietitian at the earliest opportunity for further advice.

Use this flowchart below **before** starting enteral feed to assess the patient's food allergy and/or hypersensitivity status and feed suitability.

If a food allergy and/or hypersensitivity is known or suspected you need to identify and clarify the suspected or known food allergen(s) with the patient, their relatives or carers.



Allergens are identified in bold in the ingredients list – this is **not** a finite list as it only uses the 18 food allergens identified by the European Commission (EC).

For example, patients may have an allergy to pea protein, food preservatives etc. and these may not be listed. If the patient requires a gluten or lactose free feed, this information should be contained in the leaflet as well.



Check the ingredients listed on the leaflet attached to the pack of **Nutrison feed**.  
**CAUTION: Nutrison Protein Plus DOES contain cows milk protein, pea legume protein and fin fish as well as other allergens.**



**NO CONCERNS**



**CONCERNS**

If there are no concerns and **Nutrison Protein plus feed** is suitable, continue with following Appendix 2

If there are concerns and Nutrison Protein Plus feed is not suitable, check the ingredients listed on the leaflet attached to the pack of **Nutrison Soya feed**



**NO CONCERNS**



**CONCERNS**

If there are no concerns and **Nutrison Soya feed** is suitable, continue with following Appendix 2

If there are still concerns and Nutrison Soya feed is not suitable, do not start enteral feed. Refer to the AICU Dietitian on ICE or face to face

If in **any** doubt or the patient requires a more detailed assessment of their food allergy and/or hypersensitivity status:

**DO NOT START ENTERAL FEED  
&  
REFER TO YOUR AICU DIETITIAN**

**Does patient have a functioning, accessible gut?**

**NO**

Consider Parenteral Nutrition (PN) if patient at high nutritional risk or 5 or more days nil nutrition

**YES**

Insert 12 Fr combined drainage feeding tube unless contraindicated and refer to UHL Policy for Insertion of NG Feeding Tubes B39/2005

**Is patient at risk of re-feeding syndrome - see Appendix 3**

If yes, prescribe Vitamin B co strong 1 tablet TDS, Thiamine 100 mg BD and Forceval Soluble OD (unless contraindicated). If intravenous route is essential, prescribe one pair of Pabrinex OD for 5 days or until enteral route established

**Use Appendix 1 to assess food allergy/hypersensitivity status**

Use Nutrison Protein Plus or Nutrison Soya as per assessment from Appendix One and commence feed at 10-25 ml/hour (use lower end with patients at risk of refeeding syndrome, cardiac patients, bowel surgery or ECMO)

**After 4 hours, is patient tolerating feed?**

Check: gastric residual volumes, abdominal distension, vomiting or overt regurgitation (NOTE: gastric residual volumes should be  $\leq 400$ ml at LRI, LGH and GH **with the exception of** ECMO and cardiac surgery (up to 4 days) at GH **and** prone patients where  $\leq 200$  mls is used)

**NO**

Replace appropriate gastric residual volume amount and discard remaining volume  
**Maintain feed rate and re-check after 4 hours**

**YES**

Replace all gastric volume and increase feed by 10-25 ml/hour and recheck after 4 hours  
**Maximum rate 40 ml/hour under 50 kg and 50 ml/hour if over 50 kg**

**Is patient tolerating feed?**

**NO**

Replace appropriate gastric residual volume and reduce feed by up to 25 ml/hour. Consider prokinetics, discuss with Doctors and Dietitian

**For non-surgical patients:**

If a patient has been tolerating feed for 72 hours, reduce checking gastric volumes from 4 hourly, to 6 hourly, to 8 hourly to once daily. Reinstate to 4 hourly monitoring if any sign of poor feed toleration.

**Checklist to determine risk of refeeding syndrome (see Appendix 4)**

<b>S Number:</b>		
<b>Surname:</b>		
<b>First Name:</b>		
<b>Date of Birth:</b>		
<b>Patient has <u>one or more</u> of the following: (please circle yes / no)</b>		
• A Malnutrition Universal Screening Tool (MUST) score of 4 or more	<b>YES</b>	<b>NO</b>
• BMI less than 16 kg/m <sup>2</sup> <b>See MUST</b>	<b>YES</b>	<b>NO</b>
• Unintentional weight loss greater than 15% within the last 3-6 Months <b>See MUST</b>	<b>YES</b>	<b>NO</b>
• little or no nutritional intake for more than 10 days	<b>YES</b>	<b>NO</b>
• <i>low levels of potassium, phosphate or magnesium prior to feeding *see note below</i>	<b>YES</b>	<b>NO</b>
<b>Or patient has two or more of the following: (please circle yes / no)</b>		
• BMI less than 18.5 kg/m <sup>2</sup> <b>See MUST</b>	<b>YES</b>	<b>NO</b>
• Unintentional weight loss greater than 10% within the last 3-6 Months <b>See MUST</b>	<b>YES</b>	<b>NO</b>
• Little or no nutritional intake for more than 5 days	<b>YES</b>	<b>NO</b>
• A history of alcohol abuse or drug abuse *	<b>YES</b>	<b>NO</b>
<b>Is patient at risk of developing re-feeding problems</b>	<b>YES</b>	<b>NO</b>
<p><b>If Yes (*with caveat of note above) - needs Thiamine 100 mg BD, Vitamin B co-strong 1 tablet TDS, and Forceval Soluble OD prescribing and daily bloods including potassium, phosphate and magnesium until stable.</b></p> <p><b>Note:</b> IV High potency vitamins B and C (Pabrinex®) to be used only if Parenteral route is essential as may cause serious allergic reactions during or shortly after administration. Pabrinex® to be given over 20-30 minutes, at least ½ hour before feed commences- see UHL IV Pabrinex Monograph) and must be prescribed as such. Prescribe Pabrinex One Pair of Ampoules OD for 5 days or until enteral route established.</p> <p><b>Start feeding as using appendix 2 ensuring assessment of patient allergen status. Consider glucose sources already prescribed if at risk of refeeding syndrome.</b></p>		
<b>Completed By (Print Name):</b>	<b>Signature</b>	
<b>Job title</b>		

\*The NICE guidance for Nutrition support in adults was not written specifically for patients on critical care units. In the absence of specific guidelines for assessing risk of refeeding in critical care there is consensus for this guideline that the NICE guidance (see table below) can be used with the caveat that the two criteria - low levels of potassium, phosphate and magnesium (commonly seen in patients admitted to the critical care units for reasons other than refeeding) and use of insulin, antacids and/or diuretics (frequently used in patients on critical care) are not as useful in the critical care setting for helping to determine refeeding risk. In fact use of these criteria could lead to an over diagnosis of refeeding risk and lead to an increased use of intravenous B vitamins which poses a risk in itself. It is noted that the regular monitoring and correction of electrolytes as currently takes place within the critical care setting would be key here.

### 1. Summary

- 1.1 Re-feeding syndrome is defined as severe fluid and electrolyte shifts and metabolic complications resulting in decreased plasma levels of phosphate, potassium and magnesium. Feeding without adequate thiamine can lead to Wernickes Encephalopathy.
- 1.2 Medical staff should use this information to assess if the patient is at risk of re-feeding problems or not. N.B. any inpatient who has had very little or no food for > 5 days is at some risk of re-feeding problems. ( Mehanna et al 2008)
- 1.3 **Medical staff should assess re-feeding risk, using Table One in Appendix 3.** If patients are not at risk of re-feeding problems ask registered nurse to commence nasogastric tube feed as per the flowchart. Thiamine and Vitamin B co – strong and Forceval Soluble would not be required in this case. Copies of the flow charts for individual patients are available by printing out the table.

### 2. Re-feeding Problems - Background

- 2.1 The definition of re-feeding syndrome is severe fluid and electrolyte shifts and related metabolic complications in malnourished patients undergoing re-feeding (Solomon et al 1990). It was first identified after the Second World War when prisoners of war were re-fed after prolonged starvation and suffered cardiac insufficiency, neurological complications, peripheral oedema, hypertension and death (Solomon et a 1990, Melchoir 1998).
- 2.2 In starvation, synthesis of insulin is reduced, and glucagon levels rise. This results in changes in the production of glucose from carbohydrate and an increase in protein and lipid breakdown. Patients who are starved, break down lean body mass, and become depleted in water and minerals (Nightingale 2001).
- 2.3 During re-feeding, metabolism is switched from lipid back to carbohydrate. Insulin is released, and there is an increased uptake of glucose, phosphorous, potassium, and water into the cells and protein is synthesised. Thiamine is an essential co-enzyme in carbohydrate metabolism and feeding without sufficient body stores of this vitamin can lead to Wernicke's encephalopathy definitions.
- 2.4 Re-feeding problems encompass life-threatening acute micronutrient deficiencies, fluid and electrolyte imbalance, and disturbance of organ function and metabolic regulation that may result from over-rapid or unbalanced nutrition support. They can occur in any severely malnourished individuals but are particularly common in those who have had very little or no food intake, even including overweight patients who have eaten nothing for protracted periods.
  - a) The problems arise because starvation causes adaptive reductions in cellular activity and organ function accompanied by micronutrient, mineral and electrolyte deficiencies. Abnormalities in malnourished individuals may, therefore, include: deficiencies of vitamins and trace elements;
  - b) whole body depletion of intracellular potassium, magnesium and phosphate;
  - c) increased intracellular and whole body sodium and water;
  - d) low insulin levels and a partial switch from carbohydrate metabolism to ketone metabolism to provide energy;
  - e) impaired cardiac and renal reserve with less ability to excrete an excess salt and water load.
  - f) abnormalities of liver function.
- 2.5 Giving nutrients and fluid to malnourished patients will reverse these changes but in doing so leads to an increase in demands for electrolytes and micronutrients, and a simultaneous shift of sodium and water out of cells. Over-rapid or unbalanced nutrition support can, therefore, precipitate acute micronutrients deficiencies and dangerous changes in fluid and electrolyte balance.
- 2.6 Enteral tube feeding can precipitate re-feeding problems since excessive feeding levels can be achieved easily. The problem can also be exaggerated if the products do not include adequate vitamins, phosphate or electrolytes.
- 2.7 Provision of intravenous fluids containing glucose may also precipitate re-feeding problems

### 3. Education and Training

Awareness training of this updated guideline is needed. Critical Care Dietitians will lead on this with support from the Critical Care Clinical Educators, Critical Care Link Nurses, displays and training on the unit.

### 4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Max rate of 50 ml hour is not exceeded prior to Dietetic Review	First 5 patients from start of audit period	Critical Care Dietitian on Site	Annual	Via team meetings
Feeding rate is not reduced on first gastric residual volumes	First 5 patients from start of audit period	Critical Care Dietitian on Site	Annual	Via team meetings
Correct feed is being used	First 5 patients from start of audit period	Critical Care Dietitian on Site	Annual	Via team meetings
Use of refeeding checklist	First 5 patients from start of audit period	Critical Care Dietitian on site	Annual	Via team meetings

### 5. Supporting References (maximum of 3)

- McClave SA, Taylor BE et al (2016) Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (ASPEN)
- NICE (National Collaborating Centre for Acute Care). 2006 Nutritional Support in Adults: Oral supplements, enteral and Parenteral feeding – Clinical Guideline. Updated 2017 [www.nice.org.uk](http://www.nice.org.uk)
- Pawankar R, C. G. (2013). The WAO White Book on Allergy (Update 2013).
- Singer P, Blaser AB et al (2018)– ESPEN guideline on clinical nutrition in the intensive care unit: Clinical Nutrition, <https://doi.org/10.1016/j.clnu.2018.08.037>
- Solomon, S.M., Kirby, D.F., (1990) The refeeding syndrome: a review. *Journal of Parenteral & Enteral Nutrition* 14(1): 90-97.
- Stanga, Z., Brunner, A., Leuenberger, M., Grimble, R.F., Shenkin, A., Allison, S.P., Lobo, D.N. (2008) Nutrition in clinic practice – the refeeding syndrome: illustrative cases and guidelines for prevention and treatment. *European Journal of Clinical Nutrition* 62: 687-694.
- Wright T (2007) Food Allergies- Enjoying life with a severe food allergy. 2<sup>nd</sup> ed, Class Publishing London pages 5-9.
- Guideline for Commencing Out of Hours Enteral Tube Feeding (Nasogastric) in Adult Inpatients (Trust Reference B55/2006)
- Out of Hours Enteral tube feeding (Nasogastric) Starter Regimen for an Adult Inpatient with Renal Failure (Trust Reference C2/2015)
- Insertion and Management of Nasogastric and Orogastric Tubes in Adults UHL Policy (Trust Ref B39/2005)

### 6. Key Words

Critical Care feeding, Intensive care feeding, ICU, NG guideline, critical care, feeding protocol

CONTACT AND REVIEW DETAILS	
Guideline Lead (Moira Dawson AICU ACP Dietitian)	Executive Lead
<b>Details of Changes made during review:</b> Format in line with Trust policy and Trust wide enteral feeding guidelines Updated allergy sections in line with Trustwide enteral feeding guidelines Updated gastric residual volumes to be 400 mls at GH as well as LRI and LGH with the exception of ECMO patients and cardiac surgery patients (up to 4 days post op) and proned patients	