Ashford and St. Peter's Hospitals
NHS Foundation Trust

REFEEDING GUIDELINE AND CHECKLIST FOR PATIENTS AT RISK OF REFEEDING SYNDROME INCLUDING THOSE WITH AN EATING DISORDER 8 – 18 years

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Guideline History

Date	Comments	Approved By
Nov. 2012		PNQCG Committee
Nov. 2017	• Title change to include all patients at risk of refeeding • Definition of patient categories at risk • In depth explanation of refeeding mechanism • Changes to risk stratification table – more comprehensive • Changes to drug doses • Removal of starting calorie intake 5 kcal/kg for severely high-risk patients	PNQCG Committee
July 2019	• QTC calculation • New Refeeding Checklist	PNQCG Committee
Mar. 2023	• New risk to life assessment framework • Refeeding syndrome high risk table • Updated guidance on starting Kcal/day, daily Kcal increase and blood monitoring • Involve diabetic team for T1DM patients	Paediatric Guidelines Meeting 20/03/2023

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REFEEDING GUIDELINE AND CHECKLIST FOR PATIENTS AT RISK OF REFEEDING SYNDROME INCLUDING THOSE WITH AN EATING DISORDER 8 – 18 years

1. Introduction

Refeeding syndrome consists of metabolic changes that occur on the reintroduction of nutrition to in those who are malnourished or in the starved state. The consequences of untreated re-feeding syndrome can be serious; causing hematologic abnormalities and result in death.

- Refeeding syndrome - Definition: Severe fluid and electrolyte shifts associated with initiating nutritional support in malnourished patients and the metabolic implications which occur as a result of this (Solomon and Kirby 1990)

- Patients at risk of Refeeding Syndrome:

  1. Those with little or no intake for > 4 days
  2. Those under 18 years old with WFH < 70%
  3. Those with weight loss > 10% in the past 3 – 6 months
  4. Those with unintentional weight loss greater than 15% within the last 3 to 6 months
  5. Those with morbid obesity with massive weight loss of 10% within 2 months
  6. Those with history of diuretic, laxative, antacids, chemotherapy, insulin, alcohol abuse/ misuse
  7. Those with chronic disease states e.g., oncological, IBD, AN
  8. Those with abnormal electrolytes particularly hypophosphataemia before refeeding are at highest risk of refeeding syndrome.

- During fasting body minimises protein and muscle breakdown. Glycogen supplies energy for 24 hours in absence of intake. Once stores depleted, amino acids mobilized from muscle and fatty acids from adipose tissue. BMR slows by 25%. Fatty acids produce fuel for peripheral tissues and other organs and brain switches to ketones. The intracellular space contracts and normal electrolytes can be falsely misleading.

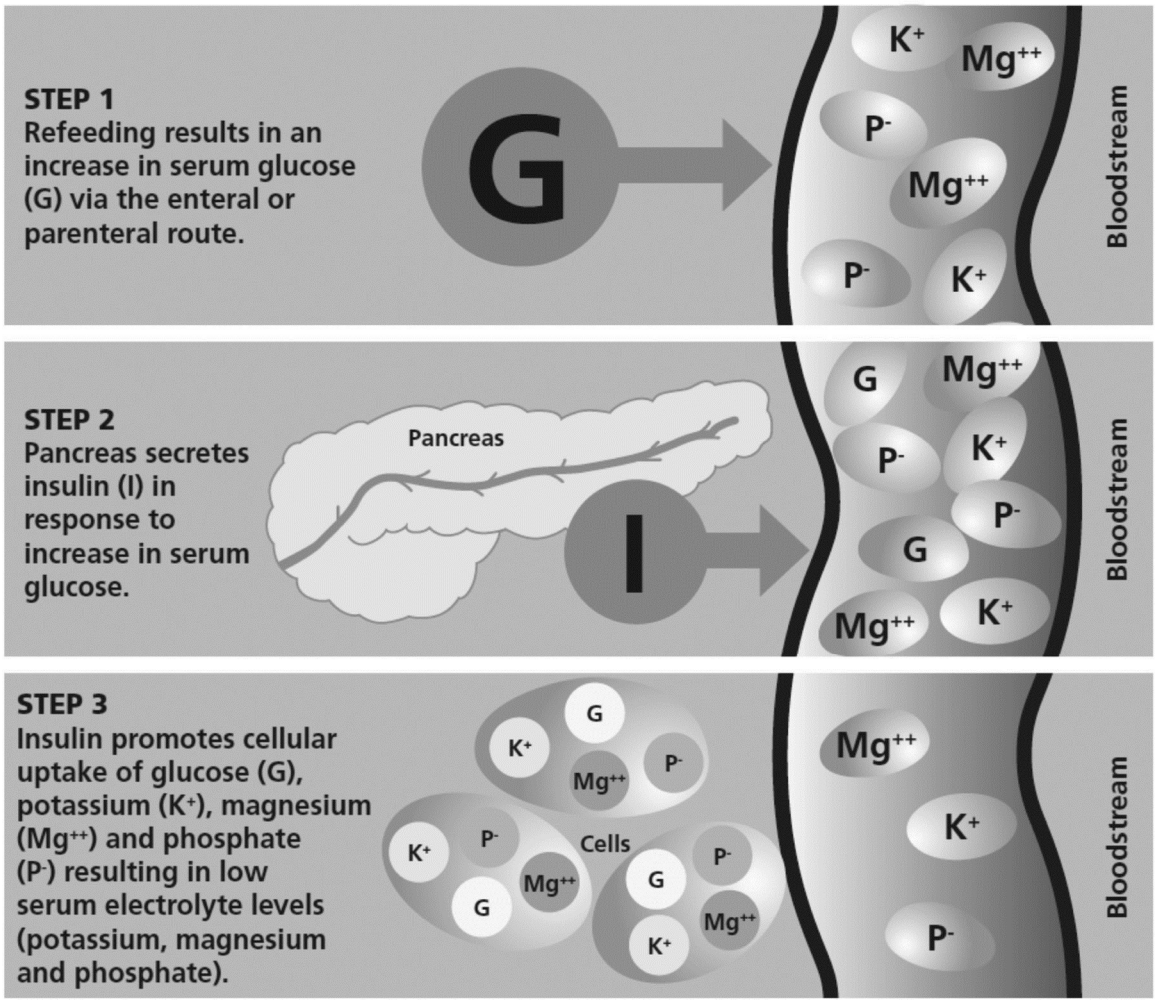
- The body stores of Thiamine are small and depletion can occur within 28 days of starvation. Increased glucose load increases Thiamine requirement.

- Sudden reversal of prolonged starvation switch from catabolism to anabolism…Affects glucose, protein and fat metabolism…resulting in Thiamine and other vitamin deficiencies Sudden requirement for electrolytes involved in metabolism…shift from extracellular to intracellular phosphate, potassium, magnesium, needed as cotransporters for ATPase… Phosphate and other electrolytes levels fall rapidly within the 1st week of refeeding

- Potentially fatal and can occur when refeeding orally, enterally or parenterally

- Clinical consequences of refeeding syndrome include cardiac and/or respiratory failure, oedema, gastrointestinal problems, muscle weakness, delirium, seizures, coma, and death.

REFEEDING



Refeeding oedema:

- Some patients develop peripheral oedema in the early stages of refeeding. This appears to be particularly common in those who have misused laxatives or induced vomiting prior to admission. In severe cases it can lead to rapid weight gain of several kilograms, and can lead to pulmonary oedema and cardiac failure Refeeding peripheral oedema should be distinguished from cardiac failure.

- The aetiology of refeeding oedema is at present obscure: dysregulation of vasopressin and/or aldosterone secretion may be implicated. Hypoalbuminaemia does not appear to be a major factor in most cases. During starvation the intracellular space contracts and serum protein breakdown decreases thus albumin levels are maintained.

- The problem can usually be managed with explanation and reassurance; diuretics should be avoided if possible as they may exacerbate the problem. It may be helpful to ensure adequate protein intake. Sodium restriction has been advocated to prevent or treat refeeding oedema, although there is no research evidence to support this practice.

- It is probable that many of the untoward consequences of refeeding can be minimised or avoided by starting the patient on relatively small amounts of food and increasing progressively. A sudden increase in the metabolic load may precipitate biochemical decompensation and unmask hidden deficiencies.

- Dietetic input is vital in devising a safe meal plan which should comprise of solid food being offered first followed by supplements 1.5kcal/ml e.g. Fortini or Paediasure Plus Juce (125ml) supplement if meal or snack is not completed (30 minutes for meal, 20 minutes for snack).

- The most up-to-date evidence suggests that for adolescents, starting at 1,400–2,000kcal/day, and increasing by at least 200kcal/day up to around 2,400kcal/day (some patients require higher calorie intakes to gain weight), is safe for all except patients at highest risk, provided that medical parameters are closely monitored.

- In the early stages meal plans should not start lower than the intake prior to admission.

- The estimated average energy requirement in the UK for healthy girls aged 11–18 years ranges from 1845 kcal to 2110 kcal (7750–8860 kJ) per day; for boys of the same age the range is 2220 kcal to 2755 kcal (9325–11 570 kJ) per day (Department of Health, 1991).

- A patient with an eating disorder will need an extra 1000 kcal /day in order to increase weight by 1 kg in 1 week.

Management of refeeding

1. Determine the risk to life and need for refeeding.

TABLE 1: Risk assessment framework for assessing impending risk to life (MEED Guidance May 2022)

	Red: High impending risk to life	Amber: Alert to high concern for impeding risk to life	Green: Low impending risk to life
BMI and weight	Under 18 years: WFH <70%	Under 18 years: WFH 70–80%	Under 18 years: WFH >80%
Weight loss	Recent loss of weight of ≥1kg/week for 2 weeks (consecutive) in an undernourished patient* Rapid weight loss at any weight, e.g., in obesity or ARFID	Recent loss of weight of 500–999 g/week for 2 consecutive weeks in an undernourished patient	Recent weight loss of up to 500g/week for 2 consecutive weeks
CVS Health			
Heart rate (awake)	<40 bpm	40–50 bpm	>50
Blood pressure	Standing systolic BP <0.4th centile for age	Standing systolic BP <0.4th centile for age	Normal standing BP for age and gender with reference to centile charts
ECG abnormalities	<18 years: QTc >460ms (female), 450ms (male) And any other significant ECG abnormality	<18 years: QTc >460ms (female), 450ms (male) And no other ECG anomaly Taking medication known to prolong QTc interval	<18 years: QTc <460ms (female), 450ms (male)
Orthostatic changes	History of recurrent syncope Postural drop in systolic BP of >20 mmHg or increase in heart rate of >30 bpm (35bpm in <16 years)	Occasional syncope Postural drop in systolic BP of >15 mmHg or increase in heart rate of up to 30 bpm (35bpm in <16 years)	Normal orthostatic cardiovascular changes Normal heart rhythm
Hydration status	Fluid refusal Severe dehydration (10%): reduced urine output, dry mouth, postural BP drop (see above), decreased skin turgor,	Severe fluid restriction Moderate dehydration (5–10%): reduced urine output, dry mouth, postural BP drop (see above), normal skin turgor,	Minimal fluid restriction No more than mild dehydration (<5%): may have dry mouth or concerns about risk of dehydration with negative fluid balance

	sunken eyes, tachypnoea, tachycardia	some tachypnoea, some tachycardia, peripheral oedema	
Temperature	<35.5°C tympanic or 35.0°C axillary	<36°C	>36°C
Muscular Function			
Sit up from lying flat	Unable to sit up from lying flat, or only by using upper limbs to help (score 0 or 1)	Unable to sit up from lying flat without noticeable difficulty (score 2)	Able to sit up from lying flat with no difficulty (Score 3)
Stand up from squat	Unable to sit up from squat, or only by using upper limbs to help (score 0 or 1)	Unable to stand up from squat without noticeable difficulty (score 2)	Able to stand up from squat with no difficulty (Score 3)
Haematology abnormalities			
	Low white cell count Haemoglobin <10g/L		
Biochemical abnormalities			
	Hypophosphataemia and falling phosphate Hypokalaemia (<2.5mmol/L) Hypoalbuminaemia Hypoglycaemia (<3mmol/L) Hyponatraemia Hypocalcaemia Transaminases >3x normal range Inpatients with diabetes mellitus: HbA1C >10% (86mmol/mol)		
Other clinical state			
	Life-threatening medical condition, e.g., severe haematemesis, acute confusion, severe cognitive slowing, diabetic ketoacidosis, upper gastrointestinal perforation, significant alcohol consumption	Non-life-threatening physical compromise, e.g., mild haematemesis, pressure sores	Evidence of physical compromise, e.g., poor cognitive flexibility, poor concentration
Disordered eating behaviours	Acute food refusal or estimated calorie intake <500kcal/day for 2+ days		

Engagement with management plan	Physical struggles with staff or parents/carers over nutrition or reduction of exercise Harm to self Poor insight or motivation Fear leading to resistance to weight gain Staff or parents/carers unable to implement meal plan prescribed	Poor insight or motivation Resistance to weight gain Staff or parents/carers unable to implement meal plan prescribed Some insight and motivation to tackle eating problems Fear leading to some ambivalence but not actively resisting	Some insight and motivation to tackle eating problems May be ambivalent but not actively resisting
Activity and exercise	High levels of dysfunctional exercise in the context of malnutrition (>2h/day)	Moderate levels of dysfunctional exercise in the context of malnutrition (>1h/day)	Mild levels of or no dysfunctional exercise in the context of malnutrition (<1h/day)
Purging behaviours	Multiple daily episodes of vomiting and/or laxative abuse	Regular (=>3x per week) vomiting and/or laxative abuse	
Self-harm and suicide	Self-poisoning, suicidal ideas with moderate to high risk of completed suicide	Cutting or similar behaviours, suicidal ideas with low risk of completed suicide	

*** Patients losing weight at higher BMI should be assessed for other signs of medical instability and weight loss strategies to determine risk.**

2. Determine the risk of refeeding syndrome.

TABLE 2: Factors associated with the risk of refeeding syndrome (MEED Guidance May 2022)

Clinical feature	High risk level
Extremely low weight	Under 18 years: WFH <70%
Prolonged low intake	Little or no intake for >4 days
Deranged baseline electrolytes	Low potassium, phosphate, magnesium
Low white blood cell count	<3.8
At risk of low thiamine (The precise requirement for thiamine is not known)	Low thiamine and other vitamins
Medical comorbidities and / or complications	Infection, e.g., pneumonia, cardiac disease, liver disease, alcohol misuse, other serious disease

3. If low or medium risk start refeeding at 1,400kcal/day and increase by 200kcal daily to 2,400kcal/day if needed.
   If high risk start refeeding at 1,400kcal/day and increase by 200kcal every 1-2 days (depending on risk) to 2,400kcal/day if needed.

4. Remember to ensure that starting intake is not lower than that before admission and that some patients may require higher calorie intakes to gain weight (0.5 – 1Kg/ week).

5. If at risk of refeeding, subtract the calories from the Glucogel from total daily requirement.

6. Check baseline Ca, PO4, Mg, U+Es, Glucose, CK, FBC, LFTs, Clotting profile.
   If at ow or medium risk of refeeding syndrome check refeeding blood tests 1-2 weekly.

   If at high risk of refeeding syndrome check refeeding blood tests 1-2 daily (days 2-5)

If electrolytes abnormal, correct and consider slowing refeeding, repeat 12 hourly and supplement as needed (see below).

Repeat blood electrolytes after 7 – 10 days to look for evidence of late refeeding syndrome.

(Refeeding blood test should include Na, K, Ur, Cr, PO_4, Mg, Ca)

7. Give the following before refeeding is started and daily until on full feeds for 24-48 hours:
   Thiamine tablets 100 mg PO TDS and Vitamin B Co Strong tablets 1 or 2 tabs PO TDS or Pabrinex ampoules 1 and 2 IV daily
   Multivitamins- Forceval Soluble Junior 1 tablet dissolved in water (125-200ml) > 6 -12 years
   Forceval capsules 1 capsule od (>12 years)

8. If minor or moderate abnormalities in LFTs feeding can continue to be increased

9. If phosphate level drops (usually within the first week of refeeding) **intake should be static not reduced, until it stabilises.**

10. If electrolytes abnormal still feed but give supplements PO, IV, NGT as follows (BNF for children):

    POTASSIUM CHLORIDE:

    0.5 – 1 mmol/kg PO BD; 1 – 2 mmol/kg/day IV [Dose to be adjusted according to plasma

    potassium concentration]

    PHOSPHATE:

    2 – 3 mmol/kg/day PO (max 97 mmol per day) in 2-4 divided doses (5 – 18 years); 0.4 mmol/kg/day IV (2 – 18 years) [Doses to be adjusted as necessary]

    MAGNESIUM GLYCEROPHOSPHATE:

    Initially 0.2 mmol/kg PO TDS (1 month – 11 years); Initially 4 – 8 mmol PO TDS (12-18 years)

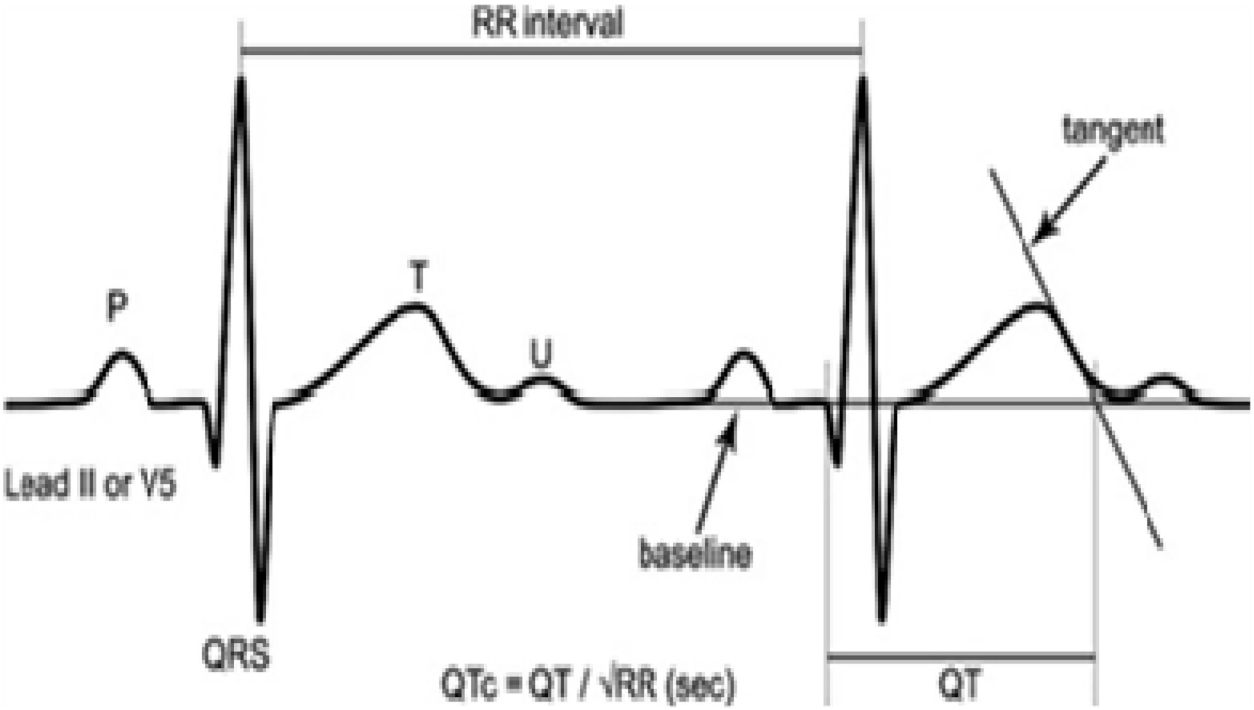
    [Dose to be adjusted as necessary]

11. If hypovolaemic restore circulatory volume slowly (48 hours) and monitor fluid balance very closely. Avoid IV boluses as this can lead to acute pulmonary oedema or cardiac failure.

12. Monitor clinical status including mental status very closely

13. Continuous ECG monitoring is strongly recommended in all cases of electrolyte disturbance and during intravenous replacement. In other cases, a daily 12 lead ECG is required. A QTc > 460 msec is concerning and seek cardiac advice.

Figure 1: RR interval



Abnormal QTc: under 15 years of age (males and females) an abnormal QTc is >460ms. Over 15 years of age in males abnormal is >450ms; in females abnormal >460ms

14. If patient has type 1 DM discuss early with local paediatric diabetic team

Underfeeding

- Underfeeding can lead to further weight loss and can be fatal in the seriously malnourished

- Avoid underfeeding by assessing intake daily and increasing calories by 200 kcal/day
(unless phosphate levels low) aiming to achieve total daily expected intake within a week.

- Aim for a weight gain of 0.5 – 1kg per week

[*]British Nutrition Foundation- Nutrition Bulletin- Hydration and health: a review B. Benelam, L. Wynes. Vol 35 Iss 1 March 2010, pgs 3-25

- Body water is controlled under normal circumstances and fluctuates by < 1%/dy.
- Dehydration is defined as ≥ 1% loss of body mass (assuming no food restriction).
- Loss of body mass of approximately 1% occurs after 13 hours of fluid restriction, 2% after 24 hours, 3% after 37 hours.
- Mild dehydration is defined as 1-2% body mass loss.
- ≥ 2% body mass loss can result in impaired cognition (Ritz and Berrit 2005).

European Food safety Authority 2008

- 6-8 glasses of fluid are required daily for healthy functioning
- 120 – 150 ml glasses for younger children and 250 – 300 ml glasses for teenagers
- On average males and females 4 -8 years old require 1.6 l/dy
- Males 9 – 13 years 2.1 l/dy
- Females 9 – 13 years 1.9 l/dy
- Males > 14 years 2.5 l/dy
- Females > 14 years 2.0 l/dy

2. Supporting References

1. Medical Emergencies in Eating Disorders: Guidance on Recognition and Management. May 2022: https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr233-medical-emergencies-in-eating-disorders-(meed)-guidance.pdf?sfvrsn=2d327483_52
2. NICE guideline CG9 Jan 04: http://guidance.nice.org.uk/CG9
3. NICE guideline NG69 May17: http://guidance.nice.org.uk/CG9
4. Academy of Eating Disorders Report 2011
5. Guideline for the Nutritional Management of Anorexia Nervosa, Council Report CR130: Royal College of Psychiatrists London 2004
6. Norrington A, Stanley R, Tremlett M, Birrell G.Medical management of acute severe anorexia nervosa. ADsCh Education and Practice 2012;Volume 97 Issue 2:48-54
7. Febrile neutropenia and refeeding syndrome.Arch Dis Child Educ Pract Ed. 2016 Dec;101(6):296-303. doi: 10.1136/archdischild-2015-308850. Epub 2016 Jul 7.

3. Supporting relevant trust guidelines

To be used in conjunction with the following departmental documents: -

A&E Clerking Proforma for Eating Disorders (to use in A&E)

Eating Disorders Ward refeeding Booklet (for MDT use on ward)

Guideline for the management of anorexia nervosa / eating disorder including risk assessment

Eating Disorders Booklet – Parents

Eating Disorders Booklet – Patient

Eating Disorders Meal Plan – Standard Template

Feeding Against Consent

Detailed guidance for ward management of patients admitted with known or suspected anorexia nervosa including patient / parent care plan

4. Guideline Governance

a. Scope

This guideline is relevant to all staff caring for all children from 0-18 years old across the emergency department, inpatient ward and outpatient department.

b. Purpose

i. This guidelines aims to facilitate a common approach to the management of children. 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 healthcare professionals responsible for the care of all children 0-18years should be aware of practice according to this guideline.

d. Approval and Ratification

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

e. Dissemination and Implementation

i. This guideline will be uploaded to the trust intranet 'Paediatric Guidelines' page and thus available for common use.
ii. This guideline will be shared as part of ongoing education within the Paediatric Department 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 3 yearly basis by the appropriate persons.
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 Paediatric 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
Dr N Siva & Dr E Paraskevopoulou
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?)
All groups of staff and patients were taken into consideration and there is no bias towards or against any particular group.
Key Findings • Describe the results of the assessment • Identify if there is adverse or a potentially adverse impacts for any equalities groups
There is no evidence of discrimination.
Conclusion • Provide a summary of the overall conclusions
There is no evidence of discrimination.
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
This guideline is appropriate for use.

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: Refeeding guideline and checklist for patients at risk of refeeding syndrome including those with an eating disorder 8 -18 years

Policy (document) Author: Dr N Siva & Dr E Paraskevopoulou

Executive Director: N/A

		Yes/No/ Unsure/NA	Comments
1.	**Title**		
	Is the title clear and unambiguous?	**Yes**	
	Is it clear whether the document is a guideline, policy, protocol or standard?	**Yes**	
2.	**Scope/Purpose**		
	Is the target population clear and unambiguous?	**Yes**	
	Is the purpose of the document clear?	**Yes**	
	Are the intended outcomes described?	**Yes**	
	Are the statements clear and unambiguous?	**Yes**	
3.	**Development Process**		
	Is there evidence of engagement with stakeholders and users?	**Yes**	
	Who was engaged in a review of the document (list committees/ individuals)?		Reviewed at the Paediatric Guidelines Meeting (doctors/nurses)
	Has the policy template been followed (i.e. is the format correct)?	**Yes**	
4.	**Evidence Base**		
	Is the type of evidence to support the document identified explicitly?	**Yes**	

		Yes/No/ Unsure/NA	Comments
	Are local/organisational supporting documents referenced?	**Yes**	
5.	**Approval**		
	Does the document identify which committee/group will approve/ratify it?	**Yes**	
	If appropriate, have the joint human resources/staff side committee (or equivalent) approved the document?	**Yes**	
6.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?		Presented at the Paediatric Guidelines Meeting (doctors/nurses)
	Does the plan include the necessary training/support to ensure compliance?	**N/A**	
7.	**Process for Monitoring Compliance**		
	Are there measurable standards or KPIs to support monitoring compliance of the document?	**N/A**	
8.	**Review Date**	**March 2027**	
	Is the review date identified and is this acceptable?	**N/A**	
9.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for coordinating the dissemination, implementation and review of the documentation?	**Yes**	**Dr E Paraskevopoulou**
10.	**Equality Impact Assessment (EIA)**		
	Has a suitable EIA been completed?	**Yes**	

Committee Approval (Paediatric Guidelines Group)			
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	**Dr Claire Mitchell**	**Date**	**20/03/2023**
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			