

PAEDIATRIC GUIDELINE:

REFEEDING GUIDELINE AND CHECKLIST FOR PATIENTS AT RISK OF REFEEDING SYNDROME INCLUDING THOSE WITH AN EATING DISORDER (6) 8 -18 years

History

Issue	Date Issued	Brief Summary of Change	Author
1	November 2012		Dr. G Baksh
2	November 2017	<ul style="list-style-type: none"> Title change to include all patients at risk of refeeding Definition of patient categories at risk Indepth 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 	Dr. G Baksh
3	July 2019	<ul style="list-style-type: none"> QTC calculation New Refeeding checklist 	Dr. G Baksh

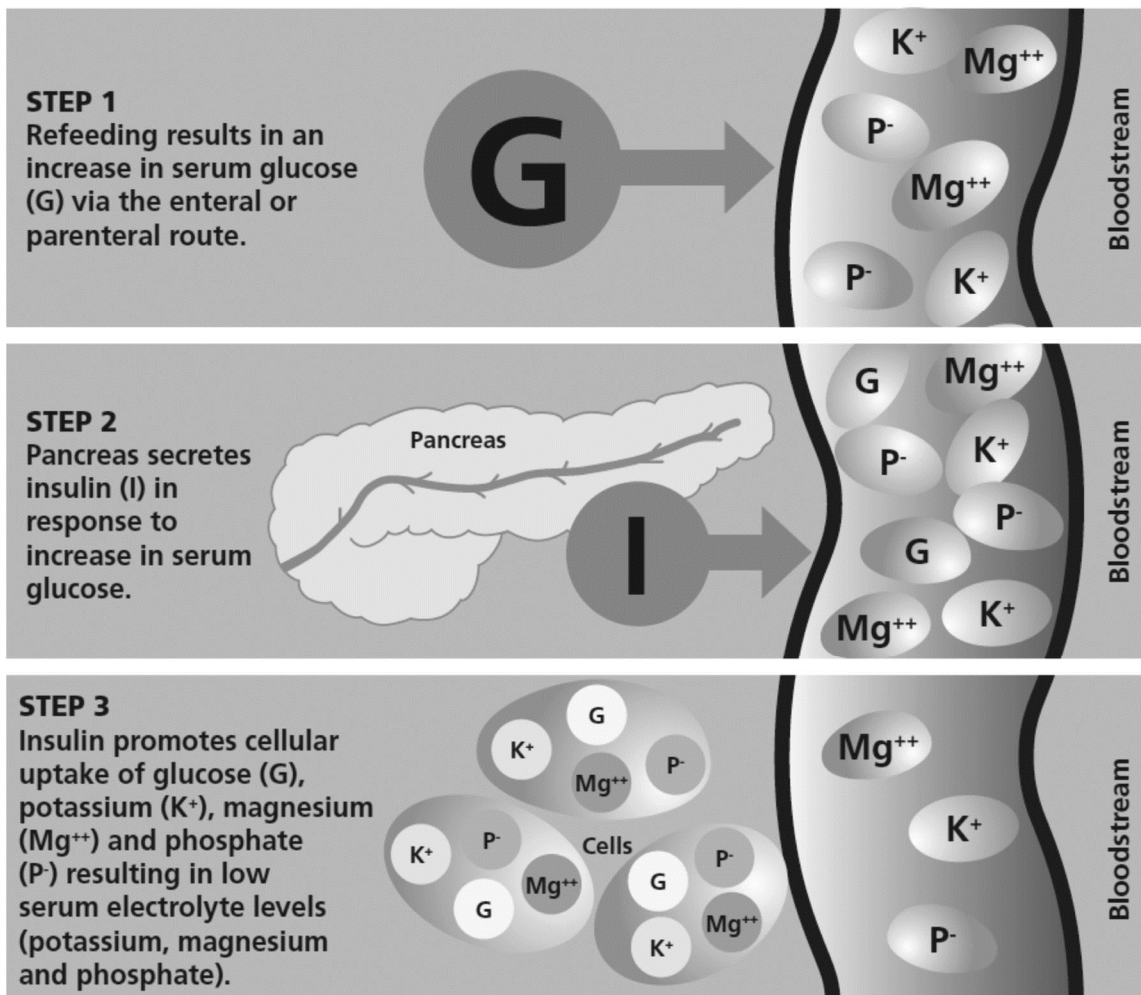
Guideline Author	Dr. G Baksh
Department/Directorate	WH&PGum
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Ratified by	PNQCG Committee
Audience	Staff managing paediatric patients

Section 1	Current Version is held on the Intranet	First ratified: Nov 12	Review date: July 2023	Issue 3	Page 1 of 10
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REFEEDING GUIDELINE FOR PATIENTS AT RISK OF REFEEDING SYNDROME INCLUDING THOSE WITH AN EATING DISORDER (6) 8-18 years

- 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 an intake of < 500 kcal/dy for > 5 days
 2. Those who have had little or no intake for more than 10 days
 3. Those with profound weight loss of 5-10% in the past 1-2 months
 4. Those with WFH < 70%
 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 Juice (125ml)supplement if meal or snack is not completed (30 minutes for meal, 20 minutes for snack).
- There is no evidence based or consensus guidelines for refeeding e.g. NICE 2006 recommends starting at 10 kcal/kg, WHO 1999 at 40 kcal/kg.
- 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 level of refeeding risk

Guidance : Risk assessment framework for young people with eating disorders (Junior MARSIPAN Jan12)

	Red (severely high risk)	Amber (high risk)	Green (moderate risk)	Blue (low risk)
BMI and Weight For Height	WFH <70% (approx. below 0.4th BMI centile) Recent loss of weight of 1 kg or more/week for 2 consecutive weeks	WFH 70–80% (approx. between 2nd and 0.4th BMI centile) Recent loss of weight of 500– 999 g/week for 2 consecutive weeks	WFH 80–85% (approx. 9th– 2nd BMI centile) Recent weight loss of up to 500 g/week for 2 consecutive weeks	WFH >85% (approx. above 9th BMI centile) No weight loss over 2 weeks
CVS Health	Heart rate (awake)<40 bpm	Heart rate (awake) 40–50 bpm	Heart rate (awake) 50– 60 bpm	Heart rate (awake) >60 bpm
		Sitting blood pressure: systolic <0.4th centile (84–98 mmHg depending on age and gender); diastolic <0.4th centile (35–40 mmHg depending on age and gender)	Sitting blood pressure: systolic <2nd centile (98–105 mmHg depending on age and gender); diastolic <2nd centile (40–45 mmHg depending on age and gender)	Normal sitting blood pressure for age and gender with reference to centile charts

	History of recurrent syncope; marked orthostatic changes (fall in systolic blood pressure of 20 mmHg or more, or below 0.4th– 2nd centiles for age, or increase in heart rate of >30 bpm)	Occasional syncope; moderate orthostatic cardiovascular changes (fall in systolic blood pressure of 15 mmHg or more, or diastolic blood pressure fall of 10 mmHg or more within 3 min standing, or increase in heart rate of up to 30 bpm)	Pre-syncope symptoms but normal orthostatic cardiovascular changes	Normal orthostatic cardiovascular changes
	Irregular heart rhythm (does not include sinus arrhythmia)			Normal heart rhythm
			Cool peripheries; prolonged peripheral capillary refill time (normal central capillary refill time)	
ECG abnormalities	QTc>460 ms (girls) or 400 ms (boys) with evidence of bradyarrhythmia or tachyarrhythmia (excludes sinus bradycardia and sinus arrhythmia); ECG evidence of biochemical abnormality	QTc>460 ms (girls) or 400 ms (boys)	QTc<460 ms (girls) or 400 ms (boys) and taking medication known to prolong QTc interval, family history of prolonged QTc or sensorineural deafness	QTc<460 ms (girls) or 400 ms (boys)
Hydration Status	Fluid refusal Severe dehydration (10%): reduced urine output, dry mouth, decreased skin turgor, sunken eyes, tachypnoea, tachycardiac	Severe fluid restriction Moderate dehydration (5–10%): reduced urine output, dry mouth, normal skin turgor, some tachypnoea, some tachycardia, peripheral oedema	Fluid restriction Mild dehydration (<5%): may have dry mouth or not clinically dehydrated but with concerns about risk of dehydration with negative fluid balance	Not clinically dehydrated
Temperature	<35.5°C tympanic or 35.0°C axillary	<36°C		
Biochemical	Hypophosphataemia,	Hypophosphataemia,		

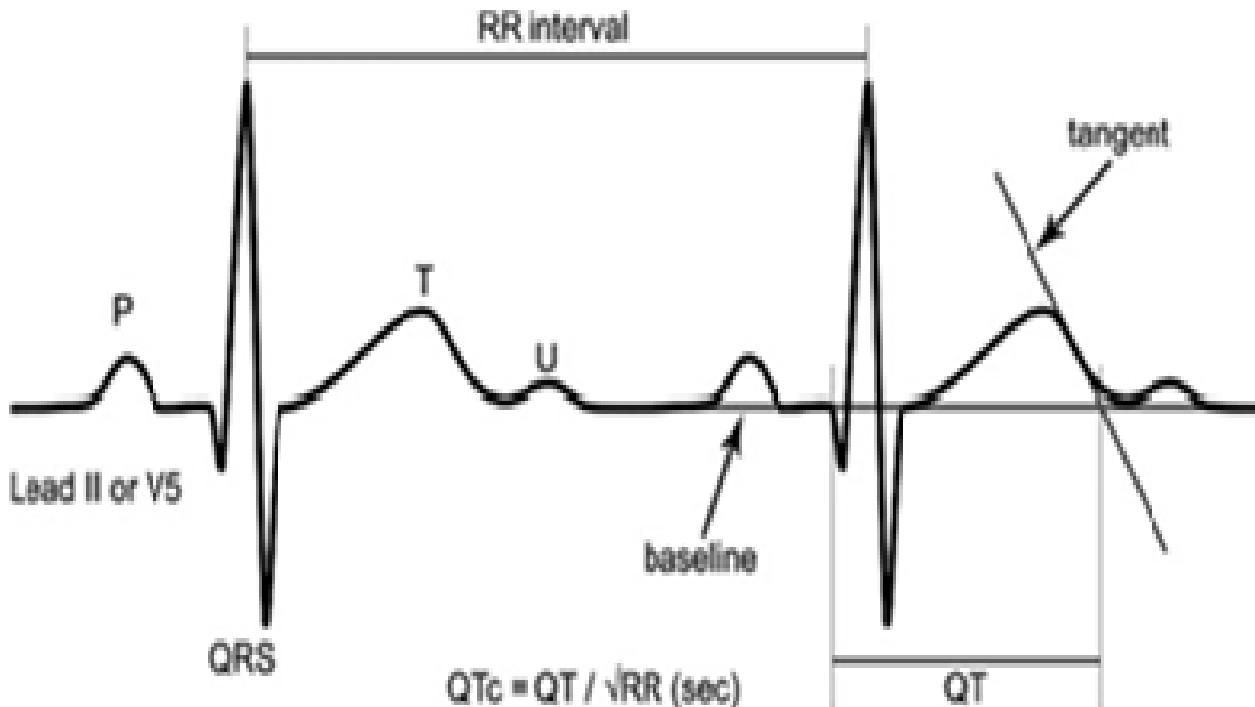
abnormalities	hypokalaemia, hypoalbuminaemia, hypoglycaemia, hyponatraemia, hypocalcaemia	hypokalaemia, hyponatraemia, hypocalcaemia		
Disordered eating behaviours	Acute food refusal or estimated calorie intake 400–600 kcal per day	Severe restriction (less than 50% of required intake), vomiting, purging with laxatives	Moderate restriction, bingeing	
Engagement with management plan	Violent when parents try to limit behaviour or encourage food/fluid intake, parental violence in relation to feeding (hitting, force feeding)	Poor insight into eating problems, lacks motivation to tackle eating problems, resistance to changes required to gain weight, parents unable to implement meal plan advice given by healthcare providers	Some insight into eating problems, some motivation to tackle eating problems, ambivalent towards changes required to gain weight but not actively resisting	Some insight into eating problems, motivated to tackle eating problems, ambivalence towards changes required to gain weight not apparent in behaviour
Activity and exercise	High levels of uncontrolled exercise in the context of malnutrition (>2 h/day)	Moderate levels of uncontrolled exercise in the context of malnutrition (>1 h/day)	Mild levels of uncontrolled exercise in the context of malnutrition (<1 h/day)	No uncontrolled exercise
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		
Other mental health diagnoses		Other major psychiatric codiagnosis, e.g. OCD, psychosis, depression		
Muscular weakness – SUSS Test:				
Sit up from lying flat	Unable to sit up at all from lying flat (score 0)	Unable to sit up without using upper limbs (score 1)	Unable to sit up without noticeable difficulty (score 2)	Sits up from lying flat without any difficulty (score 3)
Stand up from squat	Unable to get up at all from squatting (score 0)	Unable to get up without using upper limbs (score 1)	Unable to get up without noticeable difficulty (score 2)	Stands up from squat without any difficulty (score 3)
Other	Confusion and	Mallory–Weiss tear,	Poor attention	

	delirium, acute pancreatitis, gastric or oesophageal rupture	gastrooesophageal reflux or gastritis, pressure sores	and concentration	
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- a. Patients with inappropriately high heart rate for degree of underweight are at even higher risk (hypovolaemia). Heart rate may also be increased purposefully through the consumption of excess caffeine in coffee or other drinks.
 - b. An inappropriately normal or elevated heart rate in an underweight young person is of concern
2. If moderate and high risk start feeding at 20 kcal/kg/day
If severely high risk start feeding at 10 kcal/kg/day
Increase daily from baseline intake by 250kcal/day until total energy requirement achieved usually within 4-7 days
 3. Remember to ensure that starting intake is not lower than that before admission
 4. If at risk of refeeding, subtract the calories from the Glucogel from total daily requirement.
 5. Check baseline Ca, PO₄, Mg, U+Es, Glucose, FBC, LFTs, Clotting
Recheck bloods 6 – 12 hours after start of refeeding
Blood tests daily day 2-5, repeated after 5-7 days if normal day 5; if not normal day 5 continue daily until stable for 48 hours then repeat after 5 days.
 6. 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 vials 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)
 7. If minor or moderate abnormalities in LFTs feeding can continue to be increased
 8. If phosphate level drops (usually within the first week of refeeding) **intake should be static not reduced, until it stabilises**
 9. If electrolytes abnormal still feed but give supplements po, iv, NGT as follows:
 - Potassium 1-2 mmol/kg/day slow iv; 0.5-1 mmol/kg po bd
 - 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)
 - Magnesium 0.2 mmol/kg 12 hourly po as necessary (1 month – 11 years) ; 4 -8 mmol po tds (12-18 years)
 (BNF for children)
 10. 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.
 11. Monitor clinical status including mental status very closely

12. 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

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 250 kcal/day (unless phosphate levels low) aiming to achieve total daily expected intake within a week
- Aim for a weight gain of 1 kg per week if inpatient and (500g if outpatient)

*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 $\geq 1\%$ 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.
- $\geq 2\%$ 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

References:

1. Junior MARSIPAN: Management of Really Sick patients under 18 with Anorexia Nervosa, January 2012. (www.rcpsych.ac.uk/foles/pdfversion/CR168.pdf)
2. NICE guideline CG9 Jan 04: <http://guidance.nice.org.uk/CG9>
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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
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Management of patients aged 8-18 years at risk of Refeeding Syndrome Check List

This checklist should be completed during inpatient stay of any young person who is assessed to be **at risk** of refeeding syndrome as per the Refeeding Syndrome guidelines which can be found on TrustNet. All patients must have bloods taken and reviewed daily for the first 5 days of admission as well as a daily ECG. Please attach results with this checklist and place in patients' notes upon admission.

Date of Admission:

Patient Name:

DOB:

NHS Number:

Hospital Number:

Please check the box and sign below once task completed:

	Day 1	Day 2	Day 3	Day 4	Day 5
Date:					
Bloods taken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bloods reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ECG done	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ECG reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>