Introduction
These guidelines have been written to provide guidance for medical and nursing staff managing patients with severe malnutrition and/or at risk of refeeding syndrome when specialist nutritional support is unavailable, i.e., out-of-hours and weekends. The guidelines do not replace specialist nutritional support by the dietitians, clinical nutrition nurses, or nutrition support team when available and patients should be referred as soon as possible to the appropriate individual during normal working hours.

The following guidelines are consistent with guidance from the Parenteral and Enteral Nutrition Group of the British Dietetic Association and National Institute for Health and Clinical Excellence.

Aims of the guidelines
1) To assist in the identification of patients at risk of refeeding syndrome.
2) Provide evidence-based guidance for the management of patients at risk of refeeding syndrome.

This guideline applies to all adult patients under the care of practitioners working for the NHS Trust/Primary Care Trusts listed below.

Definitions
The term “refeeding syndrome” describes a potentially fatal medical condition that may affect malnourished and/or ill patients in response to an inappropriately high protein-calorie intake. This commonly occurs following the institution of nutritional support, either parenteral (PN/TPN) or enteral (gastrically via NG/PEG or jejunally via NJ/PEJ/Surgical Jejunostomy etc) or unrestricted oral intake.

The pathophysiology of refeeding syndrome relates to the rapid rise in insulin production following a carbohydrate or protein “shock”, when protein-calories are administered at a rate above which the patient can tolerate. This can occur in those receiving even moderate dietary intake depending on their underlying nutritional, metabolic or physical condition and may arise with administration of glucose alone.

This insulin release, associated with possible increased insulin sensitivity, leads to increased cellular uptake of glucose, fluid and electrolytes with associated altered plasma availability of electrolytes. Refeeding syndrome can manifest as either metabolic changes (hypokalaemia, hypophosphataemia, hypomagnesaemia, altered glucose metabolism and fluid balance abnormalities) or physiological changes (ie arrhythmias, altered level of consciousness, seizures, cardiac or respiratory depression) and potentially death.

Electrolyte Abnormalities – Clinical Sequelae

Hypophosphataemia
Altered myocardial function, arrhythmias, congestive heart failure, acute ventilatory failure, liver dysfunction, lethargy, weakness, seizures, confusion, coma, paralysis, rhabdomyolysis, haematological disturbances

Hypokalaemia
Arrhythmias, cardiac arrest, respiratory depression, exacerbation of hepatic encephalopathy, decreased urinary concentrating ability, polyuria, dysuria, constipation, ileus, weakness, paralysis, rhabdomyolysis
Hypomagnesaemia
Arrhythmias, tachycardia, respiratory depression, abdominal pain, diarrhoea, constipation, ataxia, confusion, muscle tremors, weakness, tetany.

Algorithm 1: Initial assessment

**ASSESS AND IDENTIFY PATIENTS AT RISK OF REFEEDING SYNDROME**

Your patient is at risk of refeeding syndrome if there is:
- History of chronic malnutrition
- Acute weight loss (inc. following weight loss surgery) of greater than 10% of pre-morbid body weight.
- Little or no nutritional intake of any form for greater than 7-10 days

The risks of refeeding syndrome are higher in patients with:
- Significant co-morbidity, e.g. infection, surgery, pressure sores, cancer
- Evidence of physiological stress, e.g. post operatively or patients who require required critical care input
- Prolonged fasting
- Anorexia nervosa
- Chronic alcoholism
- Electrolyte abnormalities (Potassium/Magnesium/Phosphate)
- The elderly (due to the increased risk of malnutrition in this patient group).

**AT RISK**
Refer to Dietitian

**NOT AT RISK**
Refer to Dietitian and feed as per normal ward procedures

**HISTORY & CLINICAL EXAMINATION**

Nutritional Assessment:
1. Weight
2. Rate of weight loss
3. Dietary intake
4. Reasons for malnutrition - physiological impediment to oral or enteral intake, swallowing difficulties, impaired intestinal function etc.

Monitor:
1. Heart rate, pulse rate, blood pressure, respiratory rate and level of consciousness – 6 hourly for first 72 hours.
2. Daily temperature.
3. ECG if patient has:
   a. Irregular pulse
   b. Abnormal heart rate
   c. Serum potassium or phosphate level below normal range.

If evidence of cardiac abnormalities on assessment or during refeeding, patient will require cardiac monitoring. If necessary, transfer to appropriate ward.
Algorithm 2: Initial management

<table>
<thead>
<tr>
<th>INITIAL MANAGEMENT OF REFEEDING SYNDROME</th>
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</table>

1. **Identification and treatment of sepsis:**
   - May not be clinically apparent but may explain an acute deterioration.
   - Low threshold for septic screen
   - Low threshold for broad-spectrum antibiotics (orally or via NG tube if possible).

2. **Fluid resuscitation and monitoring fluid balance.**
   - Assess and carefully restore circulatory volume, monitor pulse rate, fluid intake and output. Malnourished patients have a reduced tolerance of intravenous fluids in moderate to high intakes (ie more than 2 litres per 24 hours) that can lead to heart failure.
   - Administration of intravenous fluids may be necessary in the initial 72 hours until sufficient oral intake is achieved.
   - If evidence of dehydration, consider careful rehydration ie 1-2 litres in the first 24 hours depending on response. Greater volumes only if severely dehydrated.
   - Total fluid intake (including intravenous, enteral and oral) should aim for a maximum of 30ml/kg per day (ie commonly 1.5 litre or less).
   - At least 6-hourly monitoring of blood pressure, pulse and respiratory rate is necessary to detect evidence of heart failure or inadequate intra vascular volume.

3. **Correction of electrolyte abnormalities**
   - Ensure recent (last 48 hours) electrolyte levels are available. These should include: urea and electrolytes, phosphate, calcium, magnesium (add to standard blood profile), liver function tests, full blood count.
   - If electrolytes are deranged consider and treat possible causes.
   - Perform ECG if: Potassium is less than 3.5mmol/l or Phosphate is less than 0.80mmol/l.
   - Organise supplementation if: Phosphate is less than 0.8mmol/l, Potassium is less than 3.5 mmol/l, Magnesium is less than 0.5mmol/l or adjusted Calcium is less than 2.0mmol/l.
   - Caution should be used in renal patients due to the reduced excretion of these electrolytes.
   - If very low plasma electrolyte values are demonstrated, eg Phosphate is less than 0.32mmol/l, Potassium is less than 2.5mmol/l, Magnesium is less than 0.5mmol/l, then the institution of feeding or nutritional support may result in a further drop of these electrolytes to possibly critical levels. Electrolyte correction with oral or intravenous supplementation is required to achieve levels above these thresholds before the institution of feeding.

4. **Correction of Hypoglycaemia/Blood Sugar Control:**
   - Monitor blood glucose once to twice daily unless more frequent tests are indicated (ie for those patients with know diabetes or IGT).
   - If hypoglycaemic replace intravenous fluids with 5% glucose.

5. **Management of hypothermia**
   - Monitor body, and if necessary core, temperature at least daily.
   - Hypothermia is commonly associated with malnutrition. Its correction should be simultaneous with fluid rehydration and can include provision of heated drinks and blankets.

6. **Correction/Prevention of micronutrient deficiencies**
   - Administer Thiamine 100mg orally or crushed via feeding tube three times daily for 10 days or until recommended feeding rate reached with the first dose being administered at least 30 minutes before instituting feeding.
   - If enteral route not available, patient has anorexia nervosa or has chronic alcoholism; administer Pabrinex IVHP * - 1 pair of ampoules 30 minutes before instituting feeding and then daily until recommended feeding rate reached.
   - Administer vitamin B compound strong (one tablet three times daily) and Sanatogen Gold (one tablet daily) orally or crushed via feeding tube.
**Algorithm 3: Commencing feeding in patients at risk of refeeding syndrome**

**COMMENCE FEEDING SLOWLY**

**Weekdays**
- Commencement of feeding should be according to a planned regime in association with the dietitian/nutrition nurse
- Feeding must be within the context of appropriate electrolyte supplementation.

**Weekends and Bank Holidays**
- Institution of feeding in at risk patients should be cautious and individualised.
- Feeding an at risk patient with 10kcal/kg/24 hours for the first 48 hours is safe in most clinical situations but slower rates may be indicated in those at greater risk.
- Feed should be delivered within the context of careful fluid balance with intravenous fluids being reduced or discontinued as required. Fluid balance should be carefully monitored.
- **Ensure referred to dietitian for review as soon as possible**

**Enteral feeding regimen:**
Feeding must be increased slowly, in accordance with the regimen below, following thiamine administration:

<table>
<thead>
<tr>
<th>Date/Day No.</th>
<th>Feed Type</th>
<th>Rate (ml/hour)</th>
<th>Duration (hours)</th>
<th>Volume (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Water</td>
<td>30</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Fresubin Original</td>
<td>15</td>
<td>20</td>
<td>300</td>
</tr>
<tr>
<td>Day 2</td>
<td>Water</td>
<td>30</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Fresubin Original</td>
<td>20</td>
<td>20</td>
<td>400</td>
</tr>
<tr>
<td>Day 3</td>
<td>Water</td>
<td>30</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Fresubin Original</td>
<td>25</td>
<td>20</td>
<td>500</td>
</tr>
</tbody>
</table>

- Recommended rates are to guide but not contravene medical opinion.
- **Do NOT** recommend to start nutritional supplement drinks (e.g. Fresubin energy, etc) at the same time as starter regimen.
- **DO NOT** bolus feed

**MONITORING – minimum 72 hours**

- Serum urea & electrolytes, adjusted calcium, phosphate, liver function tests at least daily
- Serum Magnesium – baseline, every 3 days and then weekly once stable
- Fluid balance daily
- Blood glucose once to twice daily unless more frequent tests are indicated.
- Temperature, pulse, respiration, heart rate; daily
- Blood pressure 6 hourly
- ECG if abnormal heart rate or pulse. If evidence of cardiac abnormalities on assessment or during refeeding patient will require cardiac monitoring. If necessary transfer to appropriate ward

**Clinical deterioration may reflect over rapid feeding, too little is always safer than too much, halve rate of feeding and observe.**
Evidence Base
The recommendations in this guideline are based on published evidence and national guidelines.

References:

Tim Trebble, Consultant Gastroenterologist; Laura Purvis, Dietitian; Jacqueline Collett, Lead Clinical Nurse Specialist and Andrew Prowse, Divisional Pharmacist for Surgery manage this guideline. See Trust Policy for the Production of Drug Therapy Guidelines

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