Refeeding Syndrome Guideline

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Endorsing Body:	**Biochemistry**
Governance or Assurance Committee	**Area Drug and Therapeutics Committee**
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Responsible Person	**Rebecca Ritchie**

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Distribution:	• •

CHANGE RECORD			
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1. INTRODUCTION

Re-feeding syndrome is a description of the fluid and electrolyte shifts from the extracellular to intracellular compartments that take place in malnourished patients undergoing refeeding.

During starvation, insulin concentrations are low as liver stores of glycogen are mobilized. The glycogen is rapidly converted into glucose and gluconeogenesis activated, resulting in protein and lipid breakdown. Free fatty acids and ketones become the major source of energy.

When feeding is recommenced there is a switch back to carbohydrate based energy sources which results in insulin release. This stimulates cellular uptake of glucose, phosphate, potassium and water and anabolic protein synthesis. This process results in severe **hypophosphataemia** often accompanied by **hypokalaemia** and **hypomagnesaemia**. This can happen with oral, enteral and parenteral feeding.

Patients at Risk

Risk Category	How to identify patient
At risk patient	Any patient who has had little or no food intake for >5 days
High Risk patients	Any patient in a starved state is a higher risk of re-feeding syndrome if they have any of the following: - BMI <16kg/m^2 - Unintentional weight loss >15% in the last 3-6/12 - Little to no nutrition for >10 days - ↓ levels of potassium, magnesium, phosphate prior to feeding
High Risk patients	Or if a patient has 2 or more of the following: - BMI <18.5kg/m^2 - Unintentional weight loss >10% in the last 3-6/12 - Little to no nutrition for >5 days - A history of alcohol abuse or the use of some drugs including insulin, chemotherapy, antacids or diuretics
Extremely high risk patients	Patients in a starved state with BMI <14kg/m^2 Very little or no nutrition for >15 days

2. AIM, PURPOSE AND OUTCOMES

- To promote awareness of Refeeding Syndrome; its risks, prevention and optimum management of at risk patients.

- To ensure all patients admitted to an acute site in NHS Lanarkshire are assessed for malnutrition on admission and weekly thereafter to aid identification of at risk patients.

3. SCOPE

3.1 Who is the Policy intended to Benefit or Affect?

The policy will benefit all adult patients within NHS Lanarkshire.

3.2 Who are the Stakeholders?

All staff involved in clinical care of patients within NHS Lanarkshire, including acute sector and long term patients in primary care.

4. PRINCIPLE CONTENT

Clinical Consequences	Body Systems
Hypophosphataemia	**Cardiac** Altered Myocardial Function Cardiac Arrhythmia Congestive Heart Failure **Haematological** Haemolytic anaemia WBC Dysfunction Thrombocytopenia Haemorrhage **Hepatic** Liver Dysfunction **Respiratory** Acute ventilatory failure
Hypokalaemia	**Cardiac** Cardiac Arrhythmia Cardiac Arrest **Neuromuscular** Weakness, Paralysis, Rhabdomyolysis **Renal** Decreased Urinary Concentrating Ability Polyuria and Polydipsia Decreased GFR **GI** Constipation, Ileus **Hepatic** Exacerbation of hepatic Encephalopathy **Respiratory** Respiratory Depression
Hypomagnesaemia	**Cardiac** Tachycardia Cardiac Arrhythmia **Neuromuscular** Ataxia, Confusion, Muscle Tremors, Weakness, Tetany **GI** Abdominal pain, Anorexia, Diarrhoea, Constipation **Respiratory** Respiratory Depression
Altered Glucose Metabolism	Hyperglycaemia Hyperosmolar hyperglycaemic non-ketotoic coma Metabolic acidosis Osmotic diuresis Dehyration Hypotension
Fluid Balance	Cardiac failure Hypotension Pre-renal failure Sudden death
Vitamin Deficiency	Wernicke-Korsakoff syndrome Disorienatation/ Short term memory loss

	Nystagmus or other eye movement disorders

Assessment and management

- Recommend U&Es checked/ corrected, especially K, Mg, PO4. See later in document for information on replacement of electrolytes.
- For patients at risk of refeeding syndrome:
    - Dietetics will introduce feeding at maximum 50% requirements for first 2 days before increasing to full requirements if no biochemical abnormalities.
    - High risk patients start at maximum 10kcal/kg and an increase in energy provision will be dependent on trends in biochemistry. Aiming to meet full nutritional requirements between days 4-7.
    - Extremely high risk patients consider starting at 5kcal/kg and an increase in energy provision will be dependent on trends in biochemistry. Recommend ECG monitoring if possible in this patient group.
    - Dietetics will provide detailed plans on how to increase energy provision at their review of patients.

- For patients at risk of refeeding syndrome and commencing Parenteral Nutrition, please speak to the ward dietitian or pharmacist for advice regarding the volume and type of TPN to be administered. For patient's starting on TPN in the out of hours period, please contact the Emergency Duty Pharmacist for advice.

- For high risk patients starting on oral or enteral nutrition give oral thiamine 100mg 3 times a day and vitamin B compound strong 2 tablets 3 times a day orally or a pair of Pabrinex® ampoules intravenously once daily if the patient is unable to swallow tablets alongside a multivitamin/trace element supplement (Forceval®) for first 10 days of feeding.

- For patients receiving TPN give a pair of Pabrinex® ampoules intravenously before feeding commences and continue for a further 4 days. Multivitamins and trace elements will be added to TPN daily by pharmacy.

- Monitor glucose especially in Diabetic patients

- Monitor and adjust fluid balance carefully.

Monitoring

- Take a **baseline** (Day 1) sample prior to starting any feeding regime – request U&E, LFT, Mg, PO4, Ca, Glucose and CRP (to assess acute phase response)
- Commence oral/enteral/ parenteral feeding
- Repeat U&E, LFT, Mg, PO4, Ca, and Glucose on Days 2 and 3 – a significant reduction in phosphate should alert to the possibility of refeeding syndrome.
- Check that electrolyte status is being maintained and observe patient
- Check temperature, stool, fluid balance and drug charts regularly
- Repeat U&E, LFT, Mg, PO4, Ca, and Glucose until stable and thereafter at least twice weekly.

More frequent monitoring will be required in high-risk individuals; those who fail to stabilise biochemically or clinically and those displaying re-feeding.

Phosphate Replacement (normal dietary intake 25mmol/day)

There have been no randomised controlled trials for the treatment of refeeding syndrome, and the optimal regimen therefore remains to be determined. The amount of phosphate supplementation depends on the result, the anticipated requirement, the renal function. In renal failure, the use of haemofiltration, and if it is likely to be continuous, or stopped abruptly, are important.

Severe (serum phosphate <0.3 mmol/L) - replace intravenously

- Sodium glycerophosphate solution (20 mL) is recommended; this contains
  - 20 mmol phosphate (1 mmol/mL)
  - 40 mmol sodium (2mmol/mL)
- 20 mL of Sodium glycerophosphate (20 mmol phosphate) should be added to 500ml of sodium chloride 0.9% or glucose 5% and given peripherally or centrally over 12 hours. **If renal function poor i.e. <20mls/min, give 50% of this dose over 12hours**.
- If patient is fluid restricted, hypernatraemic or a faster rate of administration required, contact pharmacy.
- This regimen should not be given to individuals with hypercalcaemia because of the risk of metastatic calcification.
- If after 12-24 hours the serum phosphate remains low (<0.64 mmol/l) or falls, further phosphate should be administered.

Moderate (serum phosphate 0.3 - 0.5 mmol/l)

- Phosphate-Sandoz® dispersible tablets can be given orally or via enteral tube for supplementation
  - Each tablet contains 16 mmol phosphate, 3 mmol potassium, 20 mmol sodium
- Moderate asymptomatic hypophosphataemia can be managed with 1-2 tablets three times daily
- If patients are symptomatic or nil by mouth replace intravenously as above and recheck serum phosphate after 24 hours

Mild (serum phosphate 0.5 mmol/L - 0.69 mmol/l)

- No treatment required but recheck serum phosphate after 24 hours

Monitoring

Serum phosphate and calcium levels should be monitored every 12-24 hours during IV administration.
Monitor renal function regularly.

Adverse effects

Oral: Diarrhoea is a common side effect and may necessitate a reduction in dose

IV: Hypotension, hyperphosphataemia, hypocalcaemia, hypernatraemia, dehydration, metastatic calcification

Magnesium replacement (normal dietary intake 15-20mmol/day)

Moderate- severe hypomagnesaemia (<0.3mmol/l) or symptomatic of hypomagnesaemia

Treat with intravenous magnesium - Magnesium Sulphate 50% (2mmol/ml)

- 10ml (20mmol) in 500ml sodium chloride 0.9% of glucose 5% given centrally or peripherally over 12-24 hours
- Contact pharmacy if patient is fluid restricted, has renal impairment (eGFR <20ml/min) or a faster rate of administration is required.
- Check serum magnesium daily.
- Magnesium is mainly an intracellular ion and most of the magnesium administered intravenously will be excreted in the urine
- Infusion may require to be repeated for up to 5 days to replete deficit

Mild hypomagnesaemia (0.3-0.7mmol/l) (Asymptomatic)

- Magnesium Glycerophosphate (4mmol per tablet) – 2 tablets 3 times a day for 2 weeks
- Magnaspartate 243mg (10mmol per sachet) – 1 sachet 2-3 times daily for 3 days
- Use may be limited by diarrhoea – switch to intravenous regimen
- Check magnesium level daily

Monitoring

Serum magnesium levels should be monitored every 12-24 hours during IV administration. Monitor renal function regularly.

Adverse effects

Elderly patients and those with renal impairment are at risk of hypermagnesaemia. Treatment should be discontinued if the following signs appear

- Hypotension
- Bradycardia
- Respiratory depression
- ECG abnormalities
- Depressed mental state

Potassium replacement (Normal dietary intake 50-100mmol/day)

Oral potassium supplementation

1. For serum K+ 3.0 - 3.5 mmol/l (approximate potassium deficit 200 mmol):

- Sando-K® (12mmol/tab) 2 tablets 3 times daily

2. Serum K+ 2.5 - 2.9 mmol/l and ECG normal (approximate potassium deficit 200 - 400 mmol):

- Sando-K® (12mmol/tab) 3 tablets 3 times daily

Note

- Monitor serum K+ daily until serum K+ > 2.9 mmol/l and then manage as above.

- Once serum K+ stable or if serum K+ > 4.5 mmol/l, reassess requirement for supplementation

3. Serum K+ < 2.5 mmol/L (approximate deficit > 400 mmol) or <3.5mmol/l with cardiac arrhythmia: *Intravenous supplementation is usually required.*

- **Intravenous potassium supplementation** is indicated if patients cannot eat, are unlikely to absorb oral potassium or have profound hypokalaemia
- Where possible, use pre-prepared infusion bags. These are available as:

20 mmol KCl in 500 ml sodium chloride 0.9% or 5% glucose
40 mmol KCl in 500ml sodium chloride 0.9% or 5% glucose

Sodium chloride 0.9% preferred as glucose increases insulin secretion and can lower serum potassium .

- ***The rate of infusion should not normally exceed 10 mmol/hour***
- Ampoules of potassium chloride containing 20 mmol potassium per 10ml ampoule are **only** available in intensive care areas and **should not be used in ward areas** unless in exceptional circumstances and under close supervision. These must be ordered in the controlled drug requisition book.
- If concentrations other than those mentioned above are required, contact your Clinical Pharmacist or Medicines Information for advice.

5. ROLES AND RESPONSIBILITIES

Medical staff/ Non-medical prescribers:

- Identifying patients at risk of re-feeding syndrome with an aim to prevent and manage refeeding syndrome before nutritional support commenced.
- Prescribing thiamine+ vitamin B co strong+ Forceval/ Pabrinex depending on oral/intravenous access before starting nutritional support in patients at risk of refeeding syndrome.
- Ensuring biochemical monitoring undertaken daily on commencement of feed and supplementation of electrolytes when appropriate.
- Assessing whether oral/enteral/ parenteral nutrition required and liaising with dietetics/ pharmacy team to ensure the prescribed regimen is based on individual patient requirements.

Nursing staff:

- Ensuring all patients are screened on admission using the Malnutrition Universal Screening Tool (MUST) and reviewed on a weekly basis thereafter.
- Ensuring patients are referred to the Dietetic department if they have a MUST score of 2 or more
- Note also extended role above for nurse prescribers.

Pharmacy staff:

- Ensuring at risk patients are prescribed oral/intravenous B vitamins prior to commencement of nutritional support.
- Providing advice on electrolyte supplementation.
- Note extended role above for pharmacist independent prescribers.

Dietetic staff

- Identifying patients at risk of Refeeding Syndrome with an aim to prevent and manage refeeding syndrome before nutritional support commenced.
- Assessing individual patient risk of Refeeding Syndrome and calculating requirements based on individual patient needs.
- Note also extended role above for dietetic prescribers.

6. RESOURCE IMPLICATIONS

There should be no further resource implications at present.

7. COMMUNICATION PLAN

This policy will be published on NHS Lanarkshire's intranet, FirstPort and will be available to all staff

8. QUALITY IMPROVEMENT – Monitoring and Review

The Policy will be reviewed every two years or sooner if further national guidance is published.

9. EQUALITY AND DIVERSITY IMPACT ASSESSMENT

This policy meets NHS Lanarkshire's EDIA. A completed copy has been sent to hina.sheikh@lanarkshire.scot.nhs.uk

[x] (tick box)

10. Summary or Frequently Asked Questions (FAQs)

Please ensure you send a summary of your policy or a frequently asked questions with your completed policy

11. REFERENCES

References:

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