

Nutritional Management of patients at risk for Refeeding Syndrome (Adult only)

Site Applicability

All VCH & PHC Acute Care sites

Practice Level

RD: Basic skill

Goal

To prevent and/or minimize the complications associated with refeeding syndrome.

Policy Statement

All patients in acute care that are identified as being at risk of developing refeeding syndrome will be assessed by the dietitian.

Need to Know

Refeeding syndrome is the combination of metabolic and physiologic processes that occur as a result of depletion during starvation and repletion during aggressive feeding.^{1,4,5,12,14} Refeeding syndrome involves a shift from the use of the body's fat and protein stores as energy sources during starvation, to the use of carbohydrate as an energy source during refeeding.^{3-5,13,14} This has the potential to cause fatal shifts in fluids and electrolytes that may occur in malnourished patients receiving oral, enteral or parenteral nutrition.^{1,2,6,9,10,12} When nutritional repletion begins and patients are fed carbohydrates, glucose triggers insulin secretion and a shift from endogenous to exogenous energy, leading to cellular uptake of phosphate, magnesium, potassium and thiamine.^{2-5,7,9,10,14} Potentially life-threatening metabolic and physiologic processes may arise including: hypophosphatemia, hypokalemia, hypomagnesaemia, sodium retention/fluid overload, glucose abnormalities and vitamin deficiencies which may then lead to heart failure, respiratory failure, hepatic dysfunction, neurologic and musculoskeletal abnormalities, and death.^{1-7,9,10,12-14}

Refeeding syndrome has been most frequently described in chronically starved, metabolically unstressed patients. The syndrome can also arise in patients who are metabolically stressed and acutely starved.¹²

Risk factors for developing refeeding syndrome (NICE, 2006):

One or more of the following:	OR	Two or more of the following:
<ul style="list-style-type: none"> BMI less than 16 kg/m² Unintentional weight loss greater than 15% in previous 3 to 6 months Little/no nutrient intake for greater than 10 days Low levels of potassium, phosphate, magnesium prior to feeding 		<ul style="list-style-type: none"> BMI less than 18.5 kg/m² Unintentional weight loss greater than 10% within the last 3 to 6 months Little or no nutritional intake for greater than 5 days A history of alcohol abuse or drugs, including insulin, chemotherapy, antacids, or diuretics*

*a history of alcohol abuse, misuse of insulin, chronic use of antacids or diuretics and chemotherapy

Other risk factors to consider are: ^{3,4,9,14}

- Starvation-related malnutrition (ex. Anorexia nervosa), chronic disease-related malnutrition, and acute disease or injury-related malnutrition
- Chronic substance abuse
- Significant visible fat and muscle wasting
- Significant weight loss (even in morbidly obese patients):
 - greater than 5 % Total Body Weight (TBW) in 1 month
 - greater than 7.5 % TBW in 3 months
 - greater than 10 % TBW in 6 months
- Chronic malabsorptive disease states such as Crohn's, cystic fibrosis, short bowel syndrome, chronic diarrhea secondary to infection or antibiotic use
- Chronic diseases such as cancer, severe obstructive airway disease, liver cirrhosis

Management

Through nutrition screening and assessment, the role of the dietitian is to identify patients at risk of developing refeeding syndrome, and recommend nutrition regimens that will not unduly precipitate or worsen this syndrome. It is far better to err on the side of caution and start low and go slow. ^{3-5,9-11,14}

Further management of refeeding syndrome includes ongoing correction of biochemical abnormalities and fluid imbalances in conjunction with an appropriate feeding regimen. ^{3,4,9,11}

Practice Guideline

Nutrition Intervention

To determine the risk of developing refeeding syndrome and assess baseline nutritional status *prior* to beginning oral, enteral, or parenteral nutrition support, the dietitian should screen all patients at high nutrition risk or who have one or more refeeding syndrome risk factors. There is currently no consensus in the literature on the best way to refeed patients who are at risk of refeeding syndrome as global guidelines vary widely. ^{1,3-6,9-11,14} The following table represents recommendations supported by expert opinions and clinical research to date. ^{1,3-6,9-11,14}

Nutrition Support Recommendations:

	Metabolically unstressed or mildly stressed; chronically starved	Moderate to high metabolic stress; acutely starved
Initiation	Limit to 10 kcal/kg or HBE x 0.8 (use whichever is less)	Limit to 20 kcal/kg or HBE x 1.0 (use whichever is less)
Titration	↑ by 5 kcal/kg every 24 to 48 hours until goal feeding rate achieved	↑ by 5 kcal/kg every 24 hours until goal feeding rate achieved
Carbohydrate	Limit to 2 to 3 g/kg for:	
	1 week	1 to 3 days
Protein	15 to 20 % of total calories*	
Fat	30 % of total calories	
Sodium	30 to 60 mmol/day (less than 1500 mg/day) or 1 mmol/kg/day restriction may be needed	
Fluid	1 to 1.5 L/day restriction may be necessary x 1 week	
Vitamin and Mineral Supplements	Multivitamin and mineral supplement (one tablet) daily x 10 days Thiamine 200 mg daily x 10 days (IV is preferable)*	
Energy intake	Do not attempt to promote weight gain until the	
	Second week of refeeding	Stress response has abated

* Higher and more frequent thiamine doses may be needed for chronic alcoholic patients¹³

NOTE: Use actual dry body weight for non-obese patients; use ideal body weight for obese patients⁸

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Additional Considerations:

Protein: Consideration needs to be given to other system functions including Central Nervous System (CNS), renal and liver function. For example, in severe renal dysfunction without dialysis, protein may need to be restricted to 0.8 g/kg.¹⁵

Intravenous Fluids (IVF): Consider nutrient content, volume and infusion rate of solutions (i.e. g/kg/day of carbohydrate, sodium, total volume). Intravenous fluids will likely need to be adjusted once nutrition support is initiated.

Sodium/Fluid: The provision of carbohydrate to malnourished patients leads to a rapid decrease in renal excretion of sodium and fluid causing fluid/sodium retention.^{1,4,9,10} Malnourished patients are at risk of developing congestive heart failure, pulmonary edema and cardiac arrhythmia as a result of a reduced tolerance to IV fluids (IVF).^{1,4,9}

- Consult with the physician regarding fluid status and the need for fluid and/or sodium restriction (consider weights, serum sodium, evidence of edema, cardiac history, and renal function).
- Consider use of an energy dense formula in patients requiring fluid restriction, particularly in patients who are receiving IV medications.
- Recommend daily monitoring of serum sodium, weight, blood pressure, heart rate, jugular venous pressure (JVP), renal function and fluid status, as well as physical assessment of the peripheral tissues and pulmonary system for evidence of edema.¹

Electrolytes: Serum levels of phosphate, magnesium and potassium may be normal in the pre-fed state, especially in patients with renal failure. It is common for serum levels to drop with refeeding, particularly as carbohydrate intake increases. This is due to an increase in the intracellular demand for potassium, phosphate, magnesium and thiamine in the presence of glucose in order to drive anabolic reactions. During repletion (particularly IV), levels may be temporarily elevated for up to 36 to 48 hours post infusion, particularly for magnesium.

- Recommend checking baseline electrolytes before feeding and replacing low potassium, phosphorus, and magnesium prior to feeding and continue throughout the feeding process.^{1,4} It is not necessary to withhold feeding to correct electrolytes.^{9,11}
- Recommend monitoring serum electrolytes, phosphate, magnesium and glucose daily during the first week of refeeding and titrate nutrition support slowly and in consultation with the physician.
- Recommend continued, daily monitoring of serum levels until they are within the normal range, the patient is receiving the goal energy rate, and not requiring further repletion doses of phosphate, potassium and magnesium for several days.
- Repletion dosages must be individualized, especially for patients with compromised renal function. Refer to the [Regional Parenteral Drug Therapy Manual](#) for dosage guidelines and implications of therapy.

Thiamine: Thiamine deficiency is often a manifestation of refeeding syndrome.^{2,7,13} A combination of limited body stores, rapid depletion with inadequate intake and an increase in demand for this micronutrient during glycolysis can potentially create an acute thiamine deficiency.^{2,7,13} Patients with a history of chronic alcoholism are at even higher risk as they may already suffer from chronic thiamine deficiency.¹³ Thiamine deficiency can cause congestive heart failure (wet beri beri) or Wernicke's encephalopathy (dry beri beri), which is characterized by acute confusion, ataxia, ocular abnormalities and/or coma.^{2,10,13}

- Recommend starting thiamine 200mg (IV if possible)^{9,11} before starting nutrition therapy and continue for a total of 10 days in combination with feeding.
- Recommend simultaneous administration of thiamine along with electrolyte replacements for patients at risk for refeeding syndrome.¹³

Glucose: Glucose abnormalities are a common side effect during the initial phase of refeeding. Glucose intake after starvation ceases gluconeogenesis by increasing insulin release and suppressing glucagon.^{1,4} Postprandial hypoglycemia may occur with postprandial insulin surges in anorexic patients with depleted

hepatic glycogen reserves and baseline fasting hypoglycemia.¹⁰ However, excessive glucose administration may lead to hyperglycemia resulting in osmotic diuresis, dehydration, infection risk, lipogenesis that may cause fatty liver, excess CO₂ production and respiratory failure.^{1,4,9}

- Monitor serum random glucose daily as well as additional glucometer checks every 6 hours for the first five days and continue as needed per site specific guidelines. This is especially critical for anorexic patients starting enteral or parenteral nutrition.

Note: This is not a comprehensive list; clinical situations will vary and consultation with the health care team is imperative.

Expected Client/Family Outcomes

Prevention of refeeding syndrome.

Site Specific Practices

Richmond Hospital:

Implement [Magnesium Replacement Protocol](#) and [Phosphate Repletion Protocol](#) for all patients on nutrition support (Enteral Nutrition, TPN). Do not titrate enteral feed rate or TPN slowly unless a slower progression is warranted.

VGH:

- Refeeding Malnutrition Protocol for Patients on Oral Intake ([PPO 978](#))
- Tube Feeding Initiation Orders ([PPO 586](#))
- Parenteral Nutrition Initiation Orders ([PPO 311](#))

Documentation

VCH:

- **Vancouver Acute & Richmond:** [Paper/Electronic Documentation Standards](#)
- **Vancouver Acute & LGH:** Nutrition Assessment form ([VCH.0106](#)) or Nutrition Support Assessment form ([VCH.0104](#)), Nutrition Support Re-Assessment form ([VCH.0105](#)), ongoing patient monitoring (fluid status, weight, lab values, tolerance to EN/PN, patient discussions) to be recorded by dietitian on the Nutrition Report form ([F.&N.Serv.53](#)), or in the Interdisciplinary Progress Notes
- **Richmond:** [Nutrition Care Process Form](#)

PHC:

- Nutrition Support Care plan (Form N.PHC-D1283)
- Acute Care Nutrition Care plan (Form N.PHC-D1281)

Related Documents

VCH: D-00-12-30069: [Parenteral Nutrition, Care and Management \(Adult\) in Acute and Community](#)

- **Vancouver Acute:**
 - [Enteral Feeding Formulary](#)
 - D-200: [Practice Guideline for Dietitians: Enteral Nutrition](#)
 - T-270: [Tube Feeding: Enteral Nutrition, Care and Management](#)
 - T-290: [Tube Feeding: Entriplex Feeding Tube, Insertion of](#)
- **Richmond:** [Enteral Nutrition](#)

PHC: [Interdisciplinary Enteral Feeding Guideline \(IDG1050\)](#)

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