Practical Approach to Refeeding Syndrome

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Objectives

• Present the recognized complication of Refeeding Syndrome in nutrition management
• Identify patients at risk for Refeeding Syndrome
• Discuss the Pathophysiology and Electrolyte Abnormalities
• Discuss the 3-day increment protocol in managing Refeeding Syndrome
If this was your patient, what would be your initial Total Caloric Requirement?

Less than 25% oral intake past 30 days

Weight loss >10% in 3 months

Diabetic and diagnosed to have Lung Cancer 2 months ago
You would:

A. START AT 10-15 CALORIES/ABW
B. START AT 30-35 CALORIES/ABW
C. START AT 40 CALORIES/ABW
What is Refeeding Syndrome?
Refeeding Syndrome

A potentially lethal complication of refeeding in patients who are severely malnourished – ESPEN 2011

• Refers to the metabolic and physiologic shifts of fluid, electrolytes, and minerals (eg, phosphorus, magnesium, and potassium) that occur as a result of aggressive nutrition support or nutritional repletion of a malnourished patient – ASPEN 2012
Who is at risk?
• **Unintentional Weight Loss**

- Loss of >5% of body weight in 1 month
- Loss of >7.5% of body weight in 3 months
- Loss of >10% of body weight in 6 months
- Undernourished children
• Increased Nutrient Losses or Decreased Nutrient Absorption
  - Significant vomiting and/or diarrhea
  - Dysfunction or inflammation of the GIT
  - Chronic pancreatitis
  - Chronic antacid users (binds minerals)
  - Chronic high-dose diuretic users
  - After bariatric surgery
• **Low Nutrient Intake**
  - Starved for >7 days (less than 25% of caloric goals)
  - Prolonged hypocaloric feeding or fasting
  - Chronic swallowing problems and other neurologic disorders
  - Anorexia nervosa
  - Chronic Alcoholism

ESPEN Guidelines 2011
• Low Nutrient Intake
  - Depression in the elderly
  - Patients with cancer
  - Chronic infectious diseases (e.g., AIDS, TB)
  - During convalescence from catabolic illness
  - Postoperative patients
  - Diabetic hyperosmolar states
• Low Nutrient Intake
  - Morbid obesity with profound weight loss
  - Homelessness, social deprivation
  - Idiosyncratic/eccentric diets
  - Hunger strikers

www.livestrong.com

ESPEN Guidelines 2011
Pathophysiology

Hypokalaemia
Hypomagnesaemia
Hypophosphataemia
Thiamine deficiency
Salt and water retention - oedema

Starvation / Malnutrition

Glycogenolysis, gluconeogenesis and protein catabolism

Protein, fat, mineral, electrolyte and vitamin depletion – salt and water intolerance

Refeeding syndrome

↑ Glucose uptake
↑ Utilization of thiamine
↑ Uptake of $K^+$, $Mg^{2+}$ & $PO_4^{2-}$

↑ Protein and glycogen synthesis

Refeeding (switch to anabolism)

Fluid, salt, nutrients (CHO major energy source)

Insulin secretion

www.oncoline.nl
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Severe hypophosphatemia

• Levels <0.3 mmol/L
• Can cause impaired neuromuscular function (paresthesia, seizures, cramps or impaired musculo-skeletal function including weakness and muscular contractility)
• Hypoventilation – respiratory failure
• Rhabdomyolysis

Z Stanga, L Sobotka ESPEN 2011 p 428
Hypophosphatemia

- Thrombocytopenia
- Impaired blood clotting
- Deficiency of leukocyte function
- Confusion and eventually even coma

Z Stanga, L Sobotka ESPEN 2011 p 428
Hypomagnesemia & Hypokalemia

- Mg <0.5 mmol/L
- K <3 mmol/L
  - can lead to arrhythmias and cardiac arrest
  - neuromuscular dysfunction
Other complications

- Sodium retention
- Extracellular fluid expansion
- Thiamine deficiency
What to do Now?
Days 1-3

• ENERGY: (by all routes) 10 kcal/kg/d and slowly increase to 15 kcal/kg/d

• Electrolytes: Measure basal, 4-6 hours later and daily during feeding

ESPEN Guidelines 2011
Electrolyte Correction

• Empirical Treatment of Hypokalemia  (Langley et al ASPEN 2012)

<table>
<thead>
<tr>
<th>Serum Potassium Concentration (mEq/L)</th>
<th>IV Potassium Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-3.4</td>
<td>20-40 mEq</td>
</tr>
<tr>
<td>2.5-2.9</td>
<td>40-80</td>
</tr>
<tr>
<td>&lt;2.5</td>
<td>80-120</td>
</tr>
</tbody>
</table>

*Consider renal function; potassium supplements are best administered orally in a moderate dosage over a period of days to weeks

ASPEN Core Curriculum, 2012
Electrolyte Correction

**Empirical Treatment of Hypomagnesemia**  
*(Langley et al ASPEN 2012)*

<table>
<thead>
<tr>
<th>Serum Mg Concentration (mEq/L)</th>
<th>IV Mg Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild to Mod 1.0-1.5</td>
<td>8-32 mEq(1-4g) MgSO4 up to 1meq/kg</td>
</tr>
<tr>
<td>Severe &lt;1.0</td>
<td>32-64 mEq (4-8g) MgSO4 up to 1.5 mEq/kg</td>
</tr>
</tbody>
</table>

*Consider renal function; 50% of the initial empirical dose. Maximum rate of infusion: 8 mEq (1g) MgSO4 per hour, up to 100 mEq (12g) Mg SO4 over 12 hours if asymptomatic and up to 32 mEq (4g) Mg SO4 over 4-5 minutes in severe symptomatic hypomagnesemia*

*ASPEN Core Curriculum, 2012*
Electrolyte Correction

- **Empirical Treatment of Hypophosphatemia** *(Langley et al ASPEN 2012)*

<table>
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<tr>
<th>Serum Phosphorus</th>
<th>IV Phosphorus Dose (mmol/kg)</th>
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<tr>
<td>Mild: 2.3-2.7</td>
<td>0.08- 0.16</td>
</tr>
<tr>
<td>Mod: 1.5-2.2</td>
<td>0.16- 0.32</td>
</tr>
<tr>
<td>Severe: &lt;1.5</td>
<td>0.32- 0.64</td>
</tr>
</tbody>
</table>

* For those with impaired renal function, 50% of the initial empirical dose, Max infusion rate 7mmol phosphorus per hour. Potassium phosphate is preferred over sodium phosphate when the serum K is <4.0 mEq/L

*ASPEN Core Curriculum, 2012*
Days 1-3

- Fluids: usually 20-30ml/kg/d
- Sodium: Restrict especially if edema develops
- Iron SHOULD NOT be supplemented in the 1st week
- Vitamins 200% RDI
- Thiamine 200-300mg IV at least 30mins before feeding and then 200-300mg IV or orally daily till day 3

ESPEN Guidelines 2011
Days 4 - 6

- ENERGY: 10-20 kcal/kg/d
- Electrolytes- If refeeding syndrome is already established, aim to restore to normal levels
- Fluids: depending on hydration, weight change, and losses

ESPEN Guidelines 2011
Days 7-10

- Energy: 20-30kcal/kg/d
- Electrolytes and Minerals and Vitamins as above
- Iron supplement may be supplemented from Day 7 onwards
- Fluids: To maintain zero balance (approx. 30ml/kg/d)
- Monitor body weight and biochemistry 2x weekly

ESPEN Guidelines 2011
What would your INITIAL caloric requirement be?

A. START AT 10-15 CALORIES/ABW
B. START AT 30-35 CALORIES/ABW
C. START AT 40 CALORIES/ABW
What would your INITIAL caloric requirement be?

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AT RISK FOR REFEEING SYNDROME

Baseline Electrolytes

Initiate Nutrition Slowly

Refeeding Syndrome established

Monitor Fluid Status

Day 1-3 Protocol

Day 4-6 Protocol

Day 7-10 Protocol
Thank you!