

# Managing Eating Disorders: The Refeeding Syndrome



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## *Eating disorders: An overview*

Anorexia nervosa, bulimia nervosa and eating disorder not-otherwise-specified (EDNOS) are the most common eating disorders. These disorders are about 10 times as common in women than men.

Anorexia nervosa, marked by weight loss and caused by a pathological fear of obesity and weight gain, occurs in about 1% of women and is more common in the early teens.

Bulimia nervosa, a habituation to bingeing food followed by purging or alternate calorie wasting methods, occurs in 3% of women and is more common in the late teens and 20s.

EDNOS, which can have components of anorexia nervosa or bulimia nervosa, is even more common.

## *Role of the GP*

Patients with EDNOS can often be treated on an outpatient basis. The diagnosis of anorexia nervosa should always result in referral because of its medical-psychiatric complexity and its high mortality rate. However, the GP is an essential part of the treatment team in all eating disorder patients due to the broad spectrum of complications and the pivotal importance of psychosocial factors to successful treatment.

## Siena's case

Siena, a gaunt 19-year-old, presents to your office with the complaint of marked fatigue and weakness. She has a 2 year history of:

- weight loss,
- increasing caloric restriction and
- excessive exercise.

### Diagnosis

You diagnose Siena as having anorexia nervosa restrictive subtype. Her electrolytes, creatinine and blood sugar are within normal limits.

You instruct her to increase her caloric intake and you begin the process of admitting her to hospital.

A few days later she presents to the ED with hypokalemia, hypophosphatemia and intermittent somnolence.

### Questions

1. What is the diagnosis?
2. Does Siena need to be hospitalized?
3. What are the complications of refeeding?
4. Can the complications be prevented?
5. How can you prevent hypoglycemia during refeeding?
6. What laboratory tests need to be repeated during refeeding?
7. How do you prevent deficiencies during refeeding?
8. When to refer?

**Read on for the answers to these questions.**

Table 1

**Baseline laboratory testing**

- Complete blood count
- Blood urea nitrogen
- Magnesium
- Creatine phosphokinase
- Alkaline phosphatase
- Ferritin
- Red blood cell folate
- EKG
- Thyroid stimulating hormone
- Aspartate aminotransferase
- Electrolytes
- Creatinine
- Phosphorus
- Calcium
- Albumen
- Vitamin B12
- Urinalysis

*Siena's case*

*1. What is the diagnosis?*

Siena has the refeeding syndrome, which is a set of complications that occur during refeeding. Many prisoners of war lived through prolonged starvation only to die when they began to eat. Table 1 lists the recommended baseline laboratory measurements.

*2. Does Siena need to be hospitalized?*

Refeeding those with severe malnutrition should always be done in hospital. Outpatient refeeding is only safe if it is done very slowly and is supervised by someone who has experience with refeeding, with a very reliable patient who is medically and psychiatrically stable.

*The GP is an essential part of the treatment team in all eating disorder patients.*

*3. What are the complications of refeeding?*

*Deficiencies*

Any deficiency, including scurvy, pellagra and heart failure (due to selenium), can occur in

Table 2

**The glucagon test**

- a) Preparation: IV access available; in the morning after at least 3-4 hours of fasting
- b) Measure blood glucose before then at 10 minutes and 20 minutes after glucagon injection
- c) Inject 1 mg of IV glucagon as a push and flush with 10 cc of normal saline
- d) Interpretation:
  - A normal test: the blood glucose increases from the baseline on either subsequent reading to either:
    - > 6.5 mm/L with a 2 mm/L increase, or
    - > 7mm/L

**Important**

- The IV access line must be flushed with normal saline, not dextrose; the glucagon must be completely dissolved before administering; and the IV access must be completely flushed with saline before and after administration of the glucagon
- Laboratory blood glucose measurement is very accurate at all levels of glucose. Needle prick measurement is not accurate when the blood glucose is < 3 mm/L and, at low levels, may have an error as large as 2 mm/L. Therefore, needle prick glucose measurement should only be used as a screening test for hypoglycemia, not for the glucagon test

anorexia nervosa due to the bizarre foods that are eaten. However, potassium, magnesium and phosphorus are the most common and important deficiencies that occur during refeeding.

## Hypoglycemia

Hypoglycemia (postprandial) occurs in early refeeding if there is no glycogen in the liver. Consequently, hypoglycemia occurs after eating. The patient begins to eat much more than before, as a result more insulin is released, the blood sugar drops, glucagon is released to stop the falling glucose—but the blood sugar does not correct itself because there is no glycogen to breakdown to glucose.

## Arrhythmias

Arrhythmia is the most common medical cause of death in anorexia nervosa. An arrhythmia is more likely to occur if there is a prolongation of the QTc interval (> 440 msec) or mineral deficiencies.

## 4. Can the complications of refeeding be prevented?

The complications of refeeding can be prevented by:

- Correcting deficiencies
- Monitoring and treating deficiencies that occur during refeeding
- Monitoring and treating other complications of refeeding (e.g., hypoglycemia)

Feeding a patient by “low and slow” means also reduces the risk of complications. In this case, the dietitian should assess the patient and begin feeding at 800 kcal to 1,200 kcal q.d. The caloric content should be gradually increased every few days until it is at least 1,800 kcal to

Table 3

### Refeeding for a patient with hypoglycemia

Continuous enteral feeding should be employed until the results of the glucagon test are received.

Hypoglycemia is diagnosed/defined by:

- Serum glucose < 2.5 mm/L
- Serum glucose < 2.5 mm/L associated with symptoms of hypoglycemia (e.g., confusion, lightheadedness, decreased coordination)
- Glucagon test failure

There is a risk of hypoglycemia during refeeding. Continuous enteral feeding must be used to prevent hypoglycemia, until the patient can protect themselves against it as evidenced by a normal glucagon test.

Tube feeding is more reliable and successful at preventing hypoglycemia than regular diet or IV feeding. The rate of feeding will vary depending on:

- the rate required to prevent hypoglycemia,
- the ability of the patient to eat and
- the number of calories required for weight gain.

If tube feeding is interrupted in a patient being treated for hypoglycemia, start IV infusion of 10% dextrose in water at 100 cc/hour. The rate should be titrated to prevent hypoglycemia.

*The refeeding syndrome is the set of complications that occur during refeeding.*



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Table 4

**Which laboratory measurements should be repeated?**

- Repeat EKG: weekly or daily if QTc > 440 msec until < 440 msec
- Magnesium, phosphorus, potassium for 5-7 days q.d. and then every Monday, Wednesday and Friday for 21 days (or until the patient stops gaining weight)
- Blood glucose:
  - Before breakfast and 2 hours after breakfast, lunch and dinner for 72 hours
  - When symptoms/signs are suggestive or hypoglycemia develops
  - Once diagnosed with hypoglycemia and until the glucagon test is passed, blood glucose should continue to be measured by chemstrip 2 hours after all meals

2,200 kcal q.d. or more as required for weight gain of 1 kg a week (approximately 1% body fat gain a week or by history of previous caloric requirements for refeeding).

*5. How can you prevent hypoglycemia during refeeding?*

Use the glucagon test (Table 2) to predict who is likely to become hypoglycemic.

Certain modifications to refeeding can help prevent the recurrence of hypoglycemia (Table 3).

*6. What laboratory tests need to be repeated during refeeding?*

Serum levels of magnesium, potassium and phosphorus are almost always normal before refeeding, but often become low during refeeding (Table 4). Of these three, a deficiency of phosphorus is the most dangerous as it usually presents with acute pulmonary edema due to dilated cardiomyopathy. The level of

phosphorus that causes clinical symptoms is less than half the lower limit of normal or lower, but the fall in phosphorus is often acute and rapid.

*7. How do you prevent deficiencies during refeeding?*

Give supplements during refeeding even if there are no abnormal laboratory measurements.

*8. When to refer?*

Get a phone consultation from a referral eating disorder clinic. The information they provide may be sufficient to allow you to safely supervise uncomplicated early refeeding. Expertise in medicine, psychiatry and nutrition is optimal.

*Arrhythmia is the most common medical cause of death in anorexia nervosa.*

A dietitian with training in eating disorders can supervise the type and amount of nutrition. A referral for a consultation with a dietitian at the nearest eating disorder clinic to your hospital can help.

Internal medicine consultation may be helpful depending on your expertise and theirs.

A psychiatric consultation should always be sought if available. The psychiatrist can provide supportive therapy to the patient and guidance for the treating team. However, psychotherapy and family therapy are usually unhelpful during refeeding.

### Take-home message

- Refeeding can cause life-threatening complications, even in an apparently stable anorexic patient with normal laboratory measurements
- Hypoglycemia frequently occurs 1 to 2 hours after meals near the beginning of refeeding
- Keep measuring serum potassium, magnesium and phosphorus because they often remain normal until days to 3 weeks after the beginning of refeeding
- A QTc > 440 msec is associated with an increased risk of death due to arrhythmia in anorexia nervosa. If the QTc is prolonged:
  - Correct deficiencies
  - Stop medications that can prolong the QT
  - Repeat the EKG until the QTc is normalized

*Psychotherapy and family therapy are usually unhelpful during refeeding.*


### *Standard supplements recommended by dietitians*

Standard nutritional supplements during refeeding include:

- **Magnesium:** if there is a deficiency of magnesium, then provide 20 mm of magnesium sulfate in 250 cc of normal saline over three to four hours q.d. for five to seven days
- **Potassium:** 20 mm t.i.d. during refeeding
- **Phosphate:** if the serum phosphate is normal during refeeding, give 500 mg of

phosphate t.i.d. as a tablet or liquid. If the phosphate is decreasing but normal during refeeding then stepwise increase in oral phosphate (e.g., to 1,000 mg q.i.d.) with serum phosphate measurement at least daily

- **Multivitamins:** two a day
- **Thiamine:** 100 mg p.o. q.d. for 10 days  
If glucose is given at the beginning of refeeding then an additional 100 mg of thiamine must be given parenterally to avoid Wernicke Encephalopathy
- **Zinc:** 14 mg of elemental zinc q.d. for two months

If there is renal insufficiency, the dose of magnesium, phosphorus and potassium must be reduced. Remember, creatinine in anorexia nervosa should be low (usually 20 mm/L to 40 mm/L) because of the low muscle mass. Thus, a creatinine of 70 mm/L usually indicates mild renal failure. 

### Resources

1. Birmingham CL, Beumont PJV: *Medical Management of Eating Disorders: A Practical Handbook for Health Care Professionals*. Cambridge University Press, New York, 2004.
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3. American Psychiatric Association: *Treatment of Patients with Eating Disorders*. Third Edition. American Psychiatric Association. *Am J Psychiatry* 2006; 163(7 Suppl):4-54.
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5. Beumont P, Hay P, Beumont D, et al: Australian and New Zealand Clinical Practice Guidelines for the Treatment of Anorexia Nervosa. *Aust N Z J Psychiatry* 2004; 38(9):659-70.