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Safe refeeding management of anorexia nervosa inpatients: an evidence-based protocol

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ABSTRACT

Objective: Anorexia nervosa is associated with several serious medical complications related to malnutrition, severe weight loss, and low levels of micronutrients. The refeeding phase of these high-risk patients bears a further threat to health and potentially fatal complications. The objective of this study was to examine complications due to refeeding of patients with anorexia nervosa, as well as their mortality rate after the implementation of guidelines from the European Society of Clinical Nutrition and Metabolism.

Methods: We analyzed retrospective, observational data of a consecutive, unselected anorexia nervosa cohort during a 5-y period. The sample consisted of 65 inpatients, 14 were admitted more than once within the study period, resulting in 86 analyzed cases.

Results: Minor complications associated with refeeding during the first 10 d (replenishing phase) were recorded in nine cases (10.5%), four with transient pretibial edemas and three with organ dysfunction. In two cases, a severe hypokalemia occurred. During the observational phase of 30 d, 16 minor complications occurred in 14 cases (16.3%). Six infectious and 10 non-infectious complications occurred. None of the patients with anorexia nervosa died within a follow-up period of 3 mo.

Conclusions: Our data demonstrate that the seriousness and rate of complications during the replenishment phase in this high-risk population can be kept to a minimum. The findings indicate that evidence-based refeeding regimens, such as our guidelines are able to reduce complications and prevent mortality. Despite anorexia nervosa, our sample were affected by serious comorbidities, no case met the full diagnostic criteria for refeeding syndrome.

Introduction

In literature on anorexia nervosa (AN), psychosocial therapy often is the focus of attention, whereas treatment options for avoiding refeeding syndrome (RFS) and its complications are described by few [1,2]. AN is a lifelong illness with frequent relapses, and has two distinct subtypes: Restrictive and binge eating or purging [3]. The latter is characterized by self-induced vomiting and misuse of laxatives and diuretics [4]. According to a recent survey of 10 038 adults, the prevalence of AN in Switzerland is 1.2% for women and 0.2% for men [5]. AN is associated with several complications related to malnutrition, energy restriction, and severe weight loss [1,6]. Substance abuse,

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Table 1
Risk factors for refeeding syndrome [17]

One of the following	Two of the following
BMI <16 (kg/m^2)	BMI<18.5 (kg/m^2)
Unintentional weight loss >15% in preceding 3–6 mo	Unintentional weight loss >10% in preceding 3–6 mo
Very little or no nutritional intake for more than 10 d	Very little or no nutritional intake for more than 5 d
Low levels of serum potassium, phosphate or, magnesium before feed	History of alcohol or drug abuse

BMI, body mass intake

as well as the amount of weight loss and the chronicity of the illness, are main risk factors for the development of complications [7,8].

Specific medical complications in AN (e.g., weight <70% of ideal weight, acute medical complications of malnutrition, bradycardia <30 beats/min, unstable vital signs, marked dehydration) require inpatient treatment in a combined internal medicine and psychosomatic unit [9]. In accordance with current guidelines, nutritional rehabilitation is one important aspect of Bern University Hospital's multimodal team approach to successfully treat inpatients with AN [2,10,11]. Behavioral therapy, psychotherapy, and incorporation of the family in the recuperation process are further important parts of the treatment.

Early nutritional replenishment with appropriate macro- and micronutrient intake and following weight gain is key in reducing AN morbidity and mortality [12]. The refeeding (RF) phase, however, poses a high risk for life-threatening and potentially fatal complications [2,11]. RFS is characterized by the occurrence of thiamine deficiency, fluid and electrolyte shifts, and their associated complications during nutritional rehabilitation [13]. It has been demonstrated that AN inpatients with phosphate levels <0.32 mmol/L during the RF phase were at higher risk for severe complications, which can lead to widespread dysfunction of cellular processes affecting almost every physiological system [14]. The most important issue concerning RFS prevention is to expect it, as its onset can be very rapid, sometimes within hours of RF. Common aggravating factors include severe malnutrition and overaggressive nutritional support in the early stages without adequate supplementation of micronutrients. Symptoms are observed generally within 3 d - after starting food intake and normally last no longer than 10 d [2,11,14,15].

Based on our long-term clinical experience, as well as on evidence-based literature, we developed guidelines for the prevention and management of the RFS in patients at risk, in collaboration with an international working group of specialists [2]. The guidelines (Table 2) also were adopted by the European Society of Clinical Nutrition and Metabolism (ESPEN) in 2011 [11].

Table 2
Guidelines for management of refeeding syndrome in adult patients at risk [2,11]

General recommendations

- Be aware of patients at risk
- Provide adequate assessment, interdisciplinary care plans, and follow-up
- Appreciate that risks apply whether patients are fed by oral, enteral, or parenteral route
- Carefully restore circulatory volume: monitor heart rate and fluid balance
- Energy intake should be instituted carefully and gradually increased over 1–10 d
- Empirical supplementation of electrolytes and vitamins should be started before feeding is initiated

Days	Energy (by all routes; daily)	Electrolytes/vitamins/minerals	Fluids/sodium	Monitoring
1–3	10 kcal/kg* and slowly increase to 15 kcal/kg*	Prophylactic electrolyte supplementation (unless prefeeding serum levels are high): • Phosphate 0.5–0.8 mmol/kg daily • Potassium 1–2.2 mmol/kg daily • Magnesium 0.3–0.4 mmol/kg daily Supplement micronutrients: • 200–300 mg thiamine IV 30 min before first eating, and then 200–300 mg IV or PO daily • Vitamins: 200% of RDI • Minerals and trace elements: 100% of RDI (no iron supplementation in week 1)	Restrict daily fluids to 20–30 mL/kg (restrict to sufficient to maintain renal function, to replace deficits or losses, and to avoid weight gain → zero fluid balance) Salt: restrict daily sodium intake <1 mmol/kg (if edema develops, restrict further)	Serum electrolytes (K, Mg, PO4) and glucose: • Day 1: 2×/d • Days 2-3: 1×/d Monitor daily: • Body weight (fluid balance) • Clinical examination† • Biochemistry‡ • Preferably ECG monitoring in severe cases
4–6	15–20 kcal/kg*	Continue electrolyte supplementation to restore normal serum levels: • If phosphate <0.6 mmol/kg daily → give 30–50 mmol phosphate IV over 12 h • If potassium <3.5 mmol/kg daily → give >20–40 mmol KCl IV over 4-8 h • If magnesium <0.5 mmol/kg daily → give 24 mmol MgSO4 IV over 12 h Supplement micronutrients: • Vitamins: 200% of RDI • Minerals and trace elements: 100% of RDI (no iron)	Fluids 25–30 mL/kg daily (maintain zero fluid balance)	Serum electrolytes: • 1×/d Monitor daily: • Body weight (fluid balance) • Clinical examination† • Biochemistry‡
7–10	20–30 kcal/kg*	Electrolyte, mineral, trace element, and vitamin substitutions as above. Iron should be supplemented from day 7 onward.	Fluids 30 mL/kg daily	Body weight: 2×/wk Clinical examination†: 1×/d Biochemistry‡: 1×/wk

ECG, electrocardiogram; IV, intravenous; PO, orally; RDI, dietary reference intake
* Nutrients: carbohydrates 50–60%, fat 30–40%, and protein 15–20%.
† Edema, blood pressure, heart rate, cardiovascular and respiratory systems.
‡ Phosphate, magnesium, potassium, sodium, calcium, glucose, urea, creatinine (thiamine: optional on day 1).