

BRIEF REPORTS

ACUTE Center for Eating Disorders

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BACKGROUND: While patients with anorexia nervosa have a high mortality rate, more are living into adulthood. Patients with severe malnutrition secondary to anorexia nervosa often require hospitalization for medical stabilization prior to treatment in eating disorders programs.

METHODS: We developed the ACUTE Center at Denver Health Medical Center to medically stabilize adults with the medical complications of severe malnutrition due to an eating disorder. The first 2 years of patient characteristics and outcomes are reported.

RESULTS: From October 2008 through December 2010, the ACUTE unit had 76 admissions of which 62 were for medical stabilization, comprising 54 patients. Eighty-nine percent of patients were female. The mean age was 27 years old (range 17–65). The mean body mass index on admission was 12.9 kg/m² (standard deviation [SD] 2.0). At admission, patients were hyponatremic, anemic, and

leukopenic, with low bone density, but had normal albumin levels. The mean body mass index on discharge was 13.1 ± 1.9 kg/m². Median length of stay was 16 days (interquartile range [IQR] 9–29 days). Eighteen percent were discharged to home and eighty-two percent were discharged to inpatient psychiatric eating disorder units. Inpatient mortality was zero.

DISCUSSION: Patients with this degree of severe malnutrition due to eating disorders are medically complex and relatively uncommon. Regionalized subspecialty centers of excellence, in which a multidisciplinary team is led by practitioners of hospital medicine who have developed expertise in a rare condition, may improve clinical outcomes, optimize healthcare resources, and provide unique professional and academic opportunities for the clinicians involved. *Journal of Hospital Medicine* 2012;7:340–344. © 2012 Society of Hospital Medicine

Anorexia nervosa occurs in 0.9% of women and 0.3% of men in the United States¹ and is associated with a prolonged course,² extensive medical complications that can affect almost every organ system,^{3,4} and a 5% mean crude mortality rate—9.6 times expected for age-matched women in the United States.^{2,5} Those with anorexia nervosa die as a complication of their illness more frequently than any other mental illness.³ Anorexia nervosa is commonly diagnosed during the adolescent years,² with almost 25% going on to develop chronic anorexia nervosa.^{2,6} Consequently, many patients with severe anorexia nervosa will receive treatment by adult medicine practitioners.

Patients with anorexia nervosa frequently require hospitalization. Published guidelines suggest that those who are 70% or less than ideal body weight, bradycardic, hypotensive, or those with severe electrolyte disturbances warrant admission for medical stabilization.^{7–9} Once admitted, however, there are no

published guidelines for best practices to medically stabilize patients.^{7,10} Although most experts advocate a multidisciplinary approach with weight restoration and medical stability as the goals of hospital admission,^{8,9} controversy exists in the literature about how best to achieve these goals.^{7,10}

It is known, however, that for patients with complicated medical illnesses, such as human immunodeficiency virus (HIV) and sepsis, higher volumes of patient caseloads treated by physicians with disease-specific expertise has been found to lead to improved outcomes in patients.^{11,12} The adult patient with severe anorexia nervosa who requires inpatient medical stabilization may also benefit from a multidisciplinary trained staff familiar with the medical management of anorexia nervosa. Accordingly, we have developed the Acute Comprehensive Urgent Treatment for Eating Disorders (ACUTE) Center.

PROGRAM DESCRIPTION

The ACUTE Center at Denver Health is a 5-bed unit dedicated to the medical stabilization of patients with severe malnutrition due to anorexia nervosa or severe electrolyte disorders due to bulimia nervosa. ACUTE accepts patients 17 years and older with medical complications related to chronic malnutrition and refeeding.

ACUTE uses a multidisciplinary approach to patient care. The physician team is composed of a hospital medicine attending physician, consultative expertise

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The A.C.U.T.E. Medical Center at Denver Health
Acute, Comprehensive, Urgent Treatment for Eating Disorders
 Initial Intake Form

Date:	Time:	Nurse Taking Call:
Name of Caller:	Phone:	<input type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Cell <input type="checkbox"/> Confidential VM?
<input type="checkbox"/> Patient <input type="checkbox"/> Family Member <input type="checkbox"/> Physician <input type="checkbox"/> Referral Source <input type="checkbox"/> Other		
1. Patient Demographics		
Patient's Name:		Patient's Age:
Current Height	Current Weight	Lowest Weight
Patient Contact Information: Home Phone:		Cell Phone:
<input type="checkbox"/> Anorexia – Any Purging?		<input type="checkbox"/> Bulimia Mode of Purging:
How long has the patient had the eating disorder?		
2. Current treatment		
Where is patient currently located? (If Hospital or Treatment Center, give location and duration)		
<input type="checkbox"/> Home	<input type="checkbox"/> Hospital:	_____
<input type="checkbox"/> Treatment Center:	_____	
<input type="checkbox"/> Other, explain:	_____	
How Long in Hospital: _____		
What is the patient's current physical condition: <input type="checkbox"/> Critical <input type="checkbox"/> Fair <input type="checkbox"/> Stable <input type="checkbox"/> Ventilator <input type="checkbox"/> Capable of Transport		
Any Behavioral Problems?		
Description of current symptomology (Labs, Current KCal, Vital Signs, Tubes):		
What is the patient's current refeeding plan?		
Current functional Status:		Any History of Suicide Attempts:
<input type="checkbox"/> Stable <input type="checkbox"/> Anxious <input type="checkbox"/> Depressed <input type="checkbox"/> Suicidal	<input type="checkbox"/> No <input type="checkbox"/> Yes – How Many Attempts: _____	
Current Treating MD:	Phone:	Pager or Cell:
Any other MD we should contact:	Phone:	Pager or Cell:
Current PCP:	Phone:	Pager or Cell:
Current Psychiatrist:	Phone:	Pager or Cell:
Admitting Physician	Phone:	Pager or Cell:
Other Physician:	Phone:	Pager or Cell:
Case Manager:	Phone:	Pager or Cell:
Any Special Dietary Considerations:		
3. Previous Treatment Over the Last Year		
What previous medical treatment has the patient received for this eating disorder?		
What previous psychiatric treatment has the patient received for this eating disorder?		
4. General Comments		
Any other information you feel we need to know to care for this patient?		
Where is patient going when they leave this program?		
5. Referral Information		
How did you hear about our program?		
8. Insurance Information		
Insurance Company:	ID #:	
Customer/Member Services Phone:	Group #:	
Subscriber – Name:	Subscriber DOB:	
Employer:		
Relationship to Patient:		
Patient if not subscriber SSN:	DOB:	
9. Action Taken		
<input type="checkbox"/> Emailed to Dr. Mehler, Dr. Gaudiani, Adrianna Padgett, Kim Carroll, Dr. Weiner (kweiner@eatingrecoverycenter.com), Terese Heaton, Janet Morris, Teresa Kukolja and Rachael Harriman NOTE: Mark e-mail subject (safe mail)		

FIG. 1. The ACUTE Center at Denver Health initial intake form.

by an internal medicine specialist in the management of the medical complications of eating disorders, and a psychiatrist specializing in eating disorders. There is

a dedicated team of nurses, two dietitians, physical therapists, certified nursing assistants, speech therapists, a psychotherapist, and a chaplain.

TABLE 1. Patient Characteristics (N = 62 Admissions)

	Median (Interquartile Range)*	Range
Age, yr	27 (21–35)	17–65
Female [†]	56	90%
Length of hospitalization, days	16 (9–29)	5–70
Calculated BEE	1119 (1067–1184)	906–1491
Measured BEE [‡]	792 (634–1094)	500–1742
DEXA Z-score [‡]	-2.2 ± 1.1	-4.4–0.7
Height, in	65 (61–67)	57–74
Weight on admission, lb	76.1 ± 14.4	50.8–110.0
% Ideal body weight on admission	62.2 ± 10.2	42.4–101.0
% Ideal body weight on discharge	63.2 ± 9.1	42.3– 82.7
BMI on admission	12.9 ± 2.0	8.7–19.7
BMI nadir	12.4 ± 1.9	8.4–15.7
BMI on discharge	13.1 ± 1.9	8.7–17.0

Abbreviations: BEE, basal energy expenditure; BMI, body mass index; DEXA, dual energy x-ray absorptiometry.

*Mean ± standard deviation displayed if normally distributed.

[†] Frequency and percentage shown for categorical variables.

[‡] Measured BEE available for 42 admission and DEXA scans for 38 patients.

ACUTE patients are on continuous telemetry monitoring for the duration of their hospitalization to monitor for arrhythmias as well as signs of covert exercise. As part of the initial intake, a full set of vital signs is obtained, including height and weight. Patients are weighed daily with their back to the scale. There is no discussion of weight fluctuations. Patients may walk at a slow pace around the unit. No exercise is allowed.

Each patient at the ACUTE Center has an individualized meal plan and are started on an oral caloric intake 200 kcal below their basal energy expenditure (BEE). Indirect calorimetry is performed on the first hospital day. Each patient meets on a daily basis with the registered dietician to choose meals that meet their caloric goals.

All patients have a sitter continuously for their first week, and thereafter sitter time may be reduced to supervision surrounding each meal. Patients who fail to finish their prescribed meal are required to drink a liquid supplement to meet caloric goals. Calories are increased weekly until the patient’s weight shows a clear pattern of weight increase.

Patients are discharged from the ACUTE Center when they have achieved several basic goals: They are consuming greater than 2000 kcal per day, they are consistently gaining 2–3 pounds per week, their laboratory values have stabilized without electrolyte supplementation, and they are strong enough for an inpatient eating disorder program.

METHODS

Patients admitted to the ACUTE Center between October 2008 and December 2010 for medical stabilization and monitored refeeding were included. Patients with a diagnosis of bulimia nervosa were excluded. Demographic data and laboratory results were obtained electronically from our data repository,

TABLE 2. Admission Labs (N = 62)

	Median (Interquartile Range)*	Range
Sodium (135–143 mmol/L)	133 ± 6	117–145
Potassium (3.6–5.1 mmol/L)	3.8 (3.0– 4.0)	1.8–5.5
Carbon dioxide (18–27 mmol/L)	28 (25–31)	18–45
Glucose (60–199 mg/dL)	85 (76–105)	41–166
BUN (6–22 mg/dL)	16 (9–23)	3–44
Creatinine (0.6–1.2 mg/dL)	0.7 (0.6–1.0)	0.3–1.6
Calcium (8.1–10.5 mg/dL)	8.9 ± 0.6	7.6–10.1
Phosphorus (2.7–4.8 mg/dL)	3.2 (2.8–3.7)	2.1–5.7
Magnesium (1.3–2.1 mEq/L)	1.8 ± 0.3	1.2–2.5
AST (10–40 U/L)	38 (23–91)	12–2402
ALT (7–45 U/L)	45 (24–98)	15–2436
Total bilirubin (0.0–1.2 mg/dL)	0.5 (0.3–0.7)	0.1–2.2
Pre-albumin (20–52 mg/dL) [†]	21 ± 7	8–42
Albumin (3.0–5.3 g/dL)	3.7 ± 0.7	1.6–4.8
WBC (4.5–10.0 k/μL)	4.0 (3.2–5.7)	1.1–20.3
Neutrophils (%) (48.0–69.0%) [‡]	55.5 ± 13.1	17.0–82.0
Lymphocytes (%) (21.0–43.0%)	34.9 ± 13.0	10.8–64.0
Platelet count (150–450 k/μL)	266 (193–371)	40–819
Hematocrit (37.0–47.0%)	36.1 ± 5.4	19.1–45.7
MCV (80–100 fL)	91 ± 7	73–105
TSH (0.34–6.00 μIU/mL) [†]	1.52 (0.96–2.84)	0.18–64.1
INR (0.82–1.17) [†]	1.09 (1.00–1.22)	0.81–2.05
1,25 Hydroxy vitamin D (30–80 ng/mL) [†]	41 (30–58)	8–171

NOTE: Reference range shown in parentheses.

Abbreviations: ALT, alanine aminotransferase; AST, aspartate aminotransferase; BUN, blood urea nitrogen; INR, international normalized ratio; MCV, mean corpuscular volume; TSH, thyroid stimulating hormone; WBC, white blood cell.

* Mean ± standard deviation displayed if normally distributed.

[†] Pre-albumin was available on 49 admissions. TSH was available on 50 admissions. INR was available on 59 admissions. 1,25 Hydroxy vitamin D was available on 53 admissions. Neutrophils and lymphocytes were available on 60 admissions.

whereas weight, height, and other clinical characteristics were obtained by manual chart abstraction. The statistical analysis was conducted in SAS Enterprise Guide v4.1 (SAS Institute, Cary, NC).

RESULTS

In its first 27 months, the ACUTE Center had 76 total admissions, comprising 59 patients. Of the 76 admissions, the 62 admissions for medical stabilization and monitored refeeding of 54 patients with anorexia nervosa were included. Forty-eight of the 54 (89%) included patients were female. Six patients were hospitalized twice, and 1 patient 3 times. There were 3 transfers to the intensive care unit, and no inpatient mortality. Of the 62 admissions, 11 (18%) discharges were to home, and 51 (82%) were to inpatient psychiatric eating disorder units.

The mean age at admission was 27 years (range 17–65 years). The mean percent of ideal body weight (IBW) on admission was 62.2% ± 10.2%. The mean body mass index (BMI) was 12.9 ± 2.0 kg/m² on admission, and 13.1 ± 1.9 kg/m² upon discharge. The median length of stay was 16 days (interquartile range [IQR] 9–29 days). Median calculated BEE (1119 [1067–1184 IQR]) was higher than measured BEE by indirect calorimetry (792 [634–1094]), (Table 1).

The majority of admission laboratory values, including serum albumin, blood urea nitrogen (BUN),

creatinine, potassium, magnesium, and phosphate levels, were within normal limits. Fifty-six percent were hyponatremic at admission, with a mean serum sodium level of 133 ± 6 mmol/L (Table 2).

DISCUSSION

Hospital Medicine is currently the fastest growing area of specialization in medicine.¹³ Palliative care, inpatient geriatrics, short stay units, and bedside procedures have evolved into hospitalist-led services.^{14–18} The management of the medical complications of severe eating disorders is another potential niche for hospitalists.

The ACUTE Center at Denver Health represents a center in which highly specialized, multidisciplinary care is provided for a rare and extremely ill population of patients. Prior to entering the ACUTE Center, the patients described in our program had each experienced prolonged and unsuccessful stays for medical stabilization in acute care hospitals across the country, after being denied treatment in eating disorder programs due to medical instability.

Patients transferred to ACUTE often received medical care reflecting a lack of specific expertise, training, and exposure. The most common management discrepancy we noted was over-aggressive provision of intravenous fluids. Consequently, we often diurese 10–20 pounds of edema weight, gained during a prior medical hospitalization, before beginning the process of weight restoration. This edema weight artificially increases admission weight and results in less than expected weight gain from admission to discharge.

Even without substantial weight gain, medical stabilization is evidenced by consistent caloric oral intake, and fluid and electrolyte stabilization after initial refeeding. Accordingly, patients who have been treated at the ACUTE Center often become eligible for admission to eating disorder programs at body weights below the typical 70% of ideal body weight that most programs use as a threshold for admission.

From a clinical research perspective, centers such as ACUTE allow for opportunities to better understand and investigate the nuances of patient care in the setting of severe malnutrition. From our cohort of patients to date, we have noted unique issues in albumin levels,¹⁹ coagulopathy,²⁰ and liver function,²¹ among others. As an example, the cohort of patients with anorexia nervosa described here had profoundly low body weight, but relatively normal admission labs. Even the serum albumin, a parameter often used to reflect “nutrition” in an adult internal medicine setting, is usually normal, reflecting, in an otherwise generally healthy young population, the absence of a malignant, inflammatory, or infectious etiology of weight loss.¹⁹

Hospitalists also advocate for their patients by helping to maximize the benefits of their health care coverage. Many health care plans place limits on inpatient

psychiatric care benefits. Patients who are severely malnourished from their eating disorder may waste valuable psychiatric care benefits undergoing medical stabilization in psychiatric units while physically unable to undergo psychotherapy. This has become increasingly important as health insurance plans continue to decrease coverage for residential care of patients with anorexia.²²

In contrast, the medical benefits of most health plans are more robust. Accordingly, from the patient perspective, medical stabilization in an acute medical unit before admission to a psychiatry unit maximizes their ability to participate in the intensive psychiatric therapy which is still needed after medical stabilization. A recent study from a residential eating disorder program confirmed that a higher discharge BMI was the single best predictor of full recovery from anorexia nervosa.²³

In the future, we believe that a continuing concentration of care and experience may also lend itself to the development of protocols and management guidelines which may benefit patients beyond our own unit. Severely malnourished patients with anorexia nervosa, or bulimic patients with complicated electrolyte disorders, are likely to benefit both medically and financially from “centers of excellence.” Inpatient or residential psychiatric eating disorder programs may act in synergy with medical eating disorders units, like ACUTE, to most efficiently care for the severely malnourished patient. Hospitalists, with the proper training and experience, are uniquely positioned to develop such centers of excellence.

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