Short-term Outcome of Psychiatric Inpatients with Anorexia Nervosa in the Current Care Environment

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ABSTRACT

Objective: The current study describes the short-term outcome of 61 inpatients with anorexia nervosa (AN), utilizing a standardized protocol that could be completed by most patients within the typical length of stay (LOS) in an academic medical center in our geographic area.

Method: Patients were placed on disorder-specific and medication clinical pathways and completed questionnaires at admission and discharge. Diagnostic, historical, demographic, and treatment-related information was obtained.

Results: Treatment was sufficient to resolve acute medical problems, initiate refeeding, and interrupt compensatory behaviors, but continued intensive treatment will be critical to full recovery. Patients were discharged at an average of 85% of ideal body weight (IBW). Twenty patients were discharged against medical advice (AMA). Clinical and demographic variables poorly predicted AMA status.

Discussion: Attainable inpatient treatment goals in our care environment appear to be $\geq$80% IBW at discharge, resolution of acute medical problems, and interruption of compensatory behaviors. Future research should examine whether shorter LOS increases readmission rates or long-term costs. © 2005 by Wiley Periodicals, Inc.

Keywords: psychiatric inpatients; anorexia nervosa; length of stay; ideal body weight

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Introduction

Anorexia nervosa (AN) is a debilitating illness that affects approximately 0.5% of young females (Hoek, 2002; Wilson & Pike, 2001). Recent reviews of AN outcome studies indicate that only approximately 50% of patients recover completely, whereas 30% show partial recovery and 20% exhibit a chronic course (Pike, 1998; Steinhausen, 2002). Historically, medical stabilization, weight restoration, and the promotion of psychological recovery have been the goals of extended psychiatric hospitalizations, but lengthy inpatient stays no longer are feasible in the current care environment in many regions of the country (Kaye, Enright, & Lesser, 1988; Wiseman, Sunday, Klapper, Harris, & Halmi, 2001). These increasing constraints on the length of inpatient stays for patients with AN both (a) necessitate reevaluation of the goals of inpatient treatment and specification of attainable treatment outcome benchmarks and (b) highlight the importance of construing inpatient hospitalization as only the initial phase of ongoing intensive treatment efforts with this population. Accordingly, the current study provides a detailed account of a standardized and research-informed approach to inpatient treatment of AN patients that can be completed during the usual length of stay (LOS) in our geographic region, as well as a comprehensive description of patients' short-term treatment outcomes. This prospective description and short-term evaluation of the evidence-based and standardized treatment of a sizeable number of AN patients provides a standard of evidence that is found infrequently in this research literature (Wilson, 1999), given the low prevalence rate of AN. Thus, the current study helps to establish a research-informed benchmark that should prove useful in future evaluations of short-term treatment outcome in the current care environment of increasingly abbreviated inpatient stays.

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The research literature and best-practice guidelines converge in proposing six primary goals for inpatient hospitalization of AN patients (American Psychiatric Association [APA], 2000). First, *medical stabilization* is achieved by monitoring and initiating treatment of the medical sequelae of eating disorders (e.g., edema, electrocardiogram [EKG]-related changes, dehydration: Halmi, 2002; Pomeroy & Mitchell, 2002), as well as beginning nutrition rehabilitation. Second, *nutrition rehabilitation* is facilitated by consumption of structured, nutrient-dense meals based on the exchange system of the American Diabetes Association, use of nasogastric tubing when necessary, consultation with dietitians, implementation of individualized behavior plans to reinforce adaptive behavior and eliminate food or fluid restriction, and use of pharmacologic and psychosocial strategies to decrease meal-related anxiety. Third, *interruption of compensatory behaviors* is attained by staff supervision and support at meals, by monitoring inpatient rooms and bathroom usage, and by imposing behavioral consequences for their continued use (e.g., loss of private time in room). Fourth, *psychoeducation about eating disorders and nutrition* is provided in groups, in one-on-one consultations with the dietitian and psychiatrist, and in family sessions. Fifth, *identification and management of the psychological aspects of the illness* are initiated through use of cognitive-behavioral therapeutic techniques in both group and individual contacts. Sixth, *identification and treatment of comorbid conditions* are accomplished by utilizing comprehensive evaluations and providing appropriate pharmacologic and psychosocial strategies.

Attainment of these goals has become increasingly difficult in an inpatient setting, as there has been considerable impetus to decrease LOS (Kaye et al., 1988; Wiseman et al., 2001). AN patients' discharge weights have decreased in parallel with reductions in LOS (Wiseman et al., 2001). For example, Wiseman et al. (2001) reported that the average LOS for eating disorder inpatients in their large medical center setting decreased from 149.5 days ($SD = 109.6$) in 1984 to 23.7 days ($SD = 19.8$) in 1998. The average body mass index (BMI) of AN patients at discharge also decreased significantly over the years, from between 19 and 20 before 1995 to an average of 17.7 in 1998, although the average BMI at admission was unchanged. We have observed comparable declines in LOS and BMI. The average LOS on our inpatient unit in 2000 was 29.31 days ($SD = 19.80$; median = 26), and the average BMI of AN patients at discharge was 17.27 ($SD = 1.36$; median = 17.39).

Clinical researchers have raised concerns about the longer-term consequences of shorter hospital stays and lower-weight discharges, by demonstrating that weight gain occurs more rapidly in an inpatient setting (APA, 2000; Deep-Soboslay, Sebastiani, & Kaye, 2000; Howard, Evans, Quintero-Howard, Bowers, & Anderson, 1999) and that the likelihood of relapse and inpatient readmission increases as percent ideal body weight (IBW) at inpatient discharge decreases (Baran, Weltzin, & Kaye, 1995; Howard et al., 1999; Wiseman et al., 2001). Increasing constraints on the provision of inpatient treatment of eating disorders also necessitate reevaluation of inpatient treatment expectations and outcomes, however, as previous expectations and outcomes may not generalize well to treatments offered in the current care environment in many regions of the country.

The current study describes and evaluates a standardized protocol for inpatient treatment of patients with AN that can be completed during the shortened LOS in our program in an academic medical center. We expect that AN patients will complete the protocol in less than 6 weeks, except when they present with unusually low weight (i.e., less than 65% IBW). The current goals for inpatient treatment are resolution of acute medical problems and attainment of at least 85% IBW, which is the median BMI for a specific age and gender specified by the Centers for Disease Control (2000). Upon discharge, we anticipate that the overwhelming majority of patients, at best, will exhibit only partial recovery from AN. Thus, ongoing intensive treatment will be critical to restore normal weight and encourage psychological recovery.

The current project also examines admission and historical predictors of against discharge against medical advice (AMA) status, as determination of risk factors for premature discontinuation of treatment could facilitate providers' efforts to decrease the notoriously high dropout rates (Kahn & Pike, 2001; Steinhausen, Rauss-Mason, & Seidel, 1991). Empirical studies have demonstrated that dropouts have poorer short-term and long-term outcomes (see Kahn & Pike, 2001, for an overview of this literature). Little research has investigated potential predictors of dropout status, however, and the existing research has demonstrated that our current ability to identify and potentially avert the decisions of dropouts is quite poor (Grave, Bartocci, Todisco, Pantano, & Bosello, 1993; Kahn & Pike, 2001; Vandereycken & Pierloot, 1983). In addition, previous investigations have examined predictors of dropouts from treatments for which the average LOS for completers is considerably greater than in the

current study (i.e., 92.4 days for Grave et al.; 106.6 days for Kahn & Pike; and 327.6 days for Vandereycken & Pierloot). Our study provides the only available information about our ability to predict who is more or less likely to drop out of treatments in an era of shorter inpatient treatment stays, and it also allows us to evaluate the generalization of previously identified predictors of dropout status to shorter-length programs.

Method

Participants

The sample consisted of 61 of the 72 unique patients who were admitted consecutively to the inpatient unit with a primary AN diagnosis between January and December 2000. Eleven patients were not included in the sample because of transfer to another facility ($n = 3$)[1] or because of early discharge with team approval ($n = 8$).[2] The sample comprises 41 patients who completed the treatment protocol (completers)[3] and 20 patients who were discharged AMA (dropouts). Patients were placed on pathways according to diagnosis: 23 on the BAN (AN-purging subtype) pathway (37.7%) and 38 on the RAN (AN-restricting subtype) pathway (62.3%). Approval for the current project was obtained from the Biomedical Review Board of the University of Pittsburgh.

Measures

Self-Report. Patients completed three questionnaires at admission: (a) the Eating Disorders Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994), a 34-item measure that assesses behavioral and psychological symptoms of eating disorders during the last 28 days; (b) the Eating Disorders Inventory-2 (EDI-2; Garner, 1991), a 91-item scale that provides information on dietary restraint, bulimic symptoms, and body dissatisfaction; and (c) the Beck Depression Inventory-2 (BDI-2; Beck, Steer, & Brown, 1996), a 21-item questionnaire designed to assess the severity of depressive symptoms. At discharge, patients again completed the EDI-2 and BDI-2. Patients did not complete the EDE-Q again, because the 28-day time frame specified in the majority of the questions exceeded the LOS for a number of patients.

Diagnostic Information. The nurse manager (JAG) on the unit documented clinical diagnoses that relate to criteria in the 4th ed. of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV: APA, 1994), medical problems, and global functioning at admission and discharge. It was not feasible to complete a standardized structured clinical interview with each patient in our setting, so diagnostic information was based on clinical interviews with and observations of the patient, as well as on medical evaluations, including laboratory and EKG assessments. Patients received diagnoses of AN with purging subtype (AN-P) or restricting subtype (AN-R).[4] AN diagnoses were later cross-checked by verifying that all patients who received an AN diagnosis weighed less than 85% IBW on admission. Axis II diagnoses were deferred for all patients throughout inpatient treatment, unless preexisting information about the patient was available.

Other Clinical Information. Historical and demographic information was obtained from patient charts at admission, including onset and duration of eating problems, frequency of previous psychiatric hospitalizations, height, education, race, marital status, gender, and age. Staff monitored and recorded weight, required calories, and medication usage throughout treatment.

Treatment Protocol

We developed a set of clinical pathways for an 11-bed eating disorders unit for implementation by a multidisciplinary team, which includes psychiatrists, psychologists, nurses, dietitians, social workers, and psychiatric technicians. The treatment program is highly structured, with an emphasis on shaping and reinforcement of appropriate behaviors. However, behavioral consequences are imposed for rule violations if necessary. Patients follow a structured meal plan, and cognitive-behavioral strategies are utilized to maintain a supportive and recovery-oriented milieu. AN patients are placed on the BAN or RAN disorder-specific pathway. Table 1 presents an example of the tasks completed by the dietitian for patients during the orientation phase of the BAN pathway.

Patients on the disorder-specific protocols optimally progress through four treatment phases. The orientation phase provides an introduction to the program and is expected to last 1–2 days. Patients remain in this phase until they are attending groups and have ceased purging behavior and restriction of food and fluids. Food is provided on trays during the pre-self-select phase, which

[1] Two patients were transferred due to medical crises precipitated by their AN illness that necessitated treatment in medical hospitals, whereas the third patient preferred to be treated in a different intensive-care setting.

[2] These eight patients were discharged due to lack of insurance coverage when medically stable, but before satisfactory completion of the treatment protocol.

[3] Two of the 41 completers were discharged before completion of the self-select and discharge phases of treatment, as the treatment team believed that continued progress could be well maintained in an outpatient setting.

[4] Female patients of menarcheal age are not required to exhibit amenorrhea to receive an AN diagnosis on our unit. Three cyclic patients in the full sample received AN diagnoses because of their extremely low weight. Two were classified as dropouts and one as a completer.

TABLE 1. Task examples from disorder-specific and medication pathways

BAN pathway, orientation phase, dietitian
Complete nutrition assessment
Determine IBW
Recommend initial calories: 35 cal/kg, unless preadmission calories higher
Increase calories by 200–300 every 2–4 days, to a maximum of 70–100 cal/kg, with a goal of 1–2 kg gain per week
Calculate nutritional supplement back-up in case patient restricts or purges
Attend treatment team meetings, make rounds, provide consulation to team, make changes in calorie intake (as appropriate)
Meet individually with patient to discuss calorie intake plans, provide education, and answer questions (as appropriate)
Conduct educational groups on exchange system, nutrition, weights and measures, etc. (weekly)
Provide nutritional counseling and education to family (as appropriate)
Medication pathway, psychiatrist, and psychiatric clinical registered nurse practitioner
Recommend SSRI medication (e.g., fluvoxetine) to target significant depressive symptoms or significant anxiety symptoms, to help with weight restoration, or to help maintain weight gain if ≥80% IBW and nutritionally stable
Recommend tapering SSRI meds if <80% IBW
Recommend atypical antipsychotic medication (e.g., olanzapine, risperidone) to target significant agitation and anxious rumination related to eating disorder, regardless of weight
Recommend lorazepam 30 min before meal(s) to target excessive anxiety symptoms
Recommend tapering lorazepam before discharge

Note: BAN = anorexia nervosa, purging subtype; IBW = ideal body weight; SSRI = selective serotonin reuptake inhibitor.

TABLE 2. Criteria for advancement to next treatment phase

Advance to pre-self-select phase
When eating 100%, drinking minimum required fluids, attending groups, participating in family therapy (if applicable), completing paperwork, and not purging
Advance to self-select phase
When patient continues to meet preceding advancement criteria, obtains 80% of target weight, eats at least 2000 cal per day, and engages in no secretive exercising or extremely inappropriate or ritualized eating behavior (e.g., excessive cutting, excessive chewing or holding food in mouth, excessive mixing)
Advance to discharge phase
When patient continues to meet preceding advancement criteria, eats appropriate exchanges while self-selecting, and continues to gain at least 1 kg per week
Advance to discharge
When patient continues to meet preceding advancement criteria, and successfully completes at least one pass, meal session, and shopping/cooking outing (if applicable or if discharge therapeutically indicated)

lasts until patient weight is greater than or equal to 80% IBW, daily calorie consumption is greater than or equal to 2000, and there is no secretive exercising or ritualized eating behavior. The LOS in this phase is anticipated to be 14–28 days. Patients select their food in a hospital cafeteria during the self-select phase, which ends when appropriate foods are selected consistently and weight gain is stable at greater than or equal to 1 kg per week. This phase is anticipated to last 7–10 days. Patients complete at least one meal session, a day-long pass, and a shopping/cooking outing in the discharge phase, which is expected to last 5–7 days. Table 2 presents the formal criteria for advancement to the next treatment phase on the disorder-specific protocols.

All patients also are placed on a medication pathway, which details pharmacologic strategies for managing symptoms associated with eating disorders, such as anxiety or mood lability. Table 1 presents a subset of the tasks completed by the psychiatrist or the psychiatric-certified registered nurse practitioner. Copies of the disorder-specific and medication pathways may be requested from the last author.

Adherence to Treatment Protocol

Variance forms were used to assess staff adherence to the clinical pathways. Variance forms contained the orders written during each treatment phase and triggers for advancement to the next phase. The nurse manager documented whether each order was completed, not applicable, refused, or a variance, which was a deviation from the order specified by the pathway. Table 3 presents all items included on the variance form for the orientation phase in the disorder-specific pathways.

Variance forms were completed for the first 46 of the 61 patients. The variance data from the first 13 patients were used to revise the pathways, primarily by fine-tuning specification of the conditions under which patients could advance to the next phase of treatment (e.g., specifying that patients would not progress from the orientation phase if they were restricting food or fluids). We cross-validated the final version of the pathways by examining variance and refusal data for the next 33 patients (21 on the RAN pathway, 12 on the BAN pathway).

Overall, variances were noted for less than 1% of all tasks listed on both pathway types, indicating that patient care adhered well to pathway specifications. On the disorder-specific pathways, variances resulted primarily from failure to write or carry out all admission orders and the need to alter prescribed calorie levels (e.g., laboratory tests were not ordered for 2 patients admitted through the emergency room until the day after admission, the observation level of one patient was increased due to concerns that she might be exercising secretively on the unit, and reductions to initial daily calories were indicated clinically). On the medication-specific pathway, only one variance was noted. Twenty-four patient refusals were noted for the medication-specific pathway, however, for three primary reasons: (a) 4 patients refused daily vitamins; (b) 8 patients who were admitted on selective serotonin reuptake inhibitors (SSRIs) declined to taper them when their IBW was less than 80%; and

TABLE 3. Orders included on variance form for orientation phase

Order labs on admission unless obtained within 24 hr of admission: CBC, diff, Na, K, Cl, CO_2, Gl, BUN, Cr, AST, ALT, GGTP, Alk Phos, Ca, Mg, Phos, green top tube for FFA, EKG
Order additional labs as indicated
Order egg crate
Order calories on admission: 35 cal/kg, unless preadmission cal higher
Order constant observation (CO) 1 hr after meals and snacks, in bathroom at all times
Order observation (OBS) as indicated
Order input (I) (1,000–3,000 cc) and input monitoring
Order output (O) monitoring until O stabilized (I = O within 250 cc for 3 days in a row) or if clinically indicated
Order vitals assessment: orthostatic BID until stable (no orthostatic signs for 3 days in a row) then daily until stable (no orthostatic signs for 3 days in a row) and >70% IBW then every Saturday
Order monthly outing if IBW >75% and medically cleared
Order nutritional supplement backup for use if patient restricts or purges
Order wheelchair and naps one to two times per day if IBW <68% and vitals unstable
If laxative abuser, order Metamucil (Procter & Gamble, Cincinnati, OH) and Colace (Purdue Pharma L.P., Stamford, CT) daily
If laxative abuser and no BM for 7 days, order magnesium citrate and Dulcolax (Boehringer Ingelheim, Ingelheim, Germany) supplement one time
If not laxative abuser and no BM for 7 days, order Metamucil (Procter & Gamble, Cincinnati, OH) and Colace (Purdue Pharma L.P., Stamford, CT) daily
If already receiving Metamucil and/or Colace daily, continue
Order calories after admission: increase calories by 200–300 every 2–4 days, to a maximum of 70–100 cal/kg, with a goal of 1–2 kg gain per week
When eating 100%, drinking minimum required fluids, attending groups, participating in family therapy (if applicable), paperwork completed, and not purging, advance to pre-self-select phase

Note: CBC = complete blood count; diff = differential; BUN = blood urea nitrogen; Cr = creatinine; AST = aspartate aminotransferase; ALT = alanine aminotransferase; GGTP = g-Glutamyl Transpeptidase; ALK Phos = alkaline phosphatase; FFA = free fatty acid; EKG = electrocardiogram; BID = twice a day; IBW = ideal body weight; BM = bowel movement.

(c) 4 patients refused recommendations to begin second-generation antipsychotic agents for agitation or extreme anxiety associated with refeeding.

Results

Data Preparation and Analyses

The distributions of the majority of the variables were markedly skewed and could not be transformed to normality without discretizing the variables. Thus, all reported analyses employ nonparametric statistical methods, except where noted. Means and standard deviations are presented in the text and tables to maximize comparability with other reports. All reported p values are based on two-tailed tests. Data were complete for all analyses, except for those based on the self-report questionnaire data. Missing questionnaire data were imputed using the expectation-maximization algorithm procedure provided in Statistical Package of Social Science (Chicago, IL), and out-of-range estimates were replaced with the most extreme score possible for that variable. The following variables were used to impute the missing values: LOS, age, weight gain per week, number of previous hospitalizations for an eating disorder, BMI, percent IBW at admission and discharge, calories at admission and discharge, global assessment of functioning (GAF) scores at admission and discharge, and reported duration of eating disorder. Little's test suggested that the missing questionnaire data were missing completely at random, $\chi^2_{(194)} = 197{,}958$, $p = .41$, which justified the use of imputation methods to increase the power of analyses involving the questionnaire data. Across both completers and dropouts ($n = 61$), the percentages of missing data at admission were as follows for each questionnaire: 8.2% for the EDI-2, 8.2% for the BDI-2, and 6.6% for the EDE-Q. Questionnaire data are reported only for completers at discharge, and the percentage of imputed data was 12.2% for the EDI-2 and 17.1% for the BDI-2.

Demographic and Clinical Characteristics

The majority of participants were female (98.4%), Caucasian (96.7%), single (91.7%), and hospitalized voluntarily throughout treatment (95.1%). The average age of the patients was 19.85 years ($SD = 7.59$). In the current study, 45.9% reported at least one prior psychiatric hospitalization, and patients reported an average symptom duration of 4.94 years ($SD = 6.94$). Table 4 presents additional clinical information for the full sample on admission. Average scores on the EDI-2, EDE-Q, and BDI-2 were similar to those for comparable samples of inpatients with eating disorders (e.g., Howard et al., 1999; Pike, 2000; Probst, Vandereycken, Van Coppenolle, & Pieters, 1999).

Completer Analyses

The average LOS for the 41 completers was 37.95 days ($SD = 17.70$, median = 37.00). The average duration of each of the four treatment phases fell within or close to the expected ranges: 3.71, 18.95, 8.28, and 7.13 days for the orientation, pre-self-select, self-select, and discharge phases, respectively. GAF scores improved statistically and clinically from an average of 31.59 ($SD = 3.05$) at admission to an average of 48.29 ($SD = 2.40$) at discharge.

AN-R and AN-P patients gained an average of 1.18 and 1.26 kg per week, respectively, (SDs = 0.40 and 0.54). Table 5 presents the BMIs and per-

TABLE 4. Clinical characteristics of full sample (*N* = 61) on admission to inpatient unit

	Patients with Characteristics	
Variable	*N*	%
Diagnosis		
AN-R	38	62.3
AN-P	23	37.7
Comorbid Axis I psychiatric diagnosis		
No mood or anxiety disorder	20	32.8
Only unipolar mood disorder[a]	29	47.5
Only anxiety disorder[b]	3	4.9
Both mood and anxiety disorder[ab]	9	14.8
Axis III problems		
EKG changes[c]	46	75.4
Electrolyte imbalances[d]	13	21.3
Kidney function problems[e]	16	26.2
Liver function problems[f]	17	27.9
Phosphorus/magnesium problems[g]	13	21.3
Neutropenia	14	23.0
Medication		
Anxiolytics	11	18.0
SSRIs	32	52.5
Second-generation antipsychotics	9	14.8
Mood stabilizers	1	1.6
Duration of eating disorder (years)[h]	*M*	*SD*
AN-R	2.76	3.73
AN-P	8.98	9.20
BMI[i]		
AN-R	14.60	1.49
AN-P	15.27	1.53
Percent ideal body weight[j]		
AN-R	71.85	7.97
AN-P	71.62	7.52
Eating Disorders Inventory-2		
Drive for Thinness	11.76	6.75
Bulimia	1.55	3.06
Body Dissatisfaction	14.35	8.09
Eating Disorder Examination-Q		
Restraint	3.71	1.80
Weight Concern	3.36	1.60
Shape Concern	4.09	1.46
Eating Concern	3.07	1.47
Global score	3.56	1.43
Beck Depression Inventory-2		
Total score	24.11	12.63

Note: SSRI = selective serotonin reuptake inhibitors; AN-P = anorexia nervosa-binging/purging subtype; AN-R = anorexia nervosa-restricting subtype; BMI = body mass index; EKG = electrocardiogram. Numbers in parentheses in footnotes are patient frequencies (of a potential total of 61).

[a]Major depressive disorder with or without psychotic features, depressive disorder not otherwise specified (NOS), dysthymia.

[b]Obsessive-compulsive disorder, generalized anxiety disorder, panic disorder, posttraumatic stress disorder, social phobia, specific phobia, anxiety disorder NOS.

[c]Bradycardia (33), premature atrial complexes (3), T-wave abnormality (3), ST abnormality (3), prolonged QT (1), arrhythmia (7), biatrial enlargement (1), premature super ventricular compexes (1), rightward axis (5), atrial enlargement or abnormality (2), incomplete bundle branch block (1), occasional premature ventricular complexes (1).

[d]Hypochlorinia (1), hypokalemia (4), hypoglycemia (7), hyponatremia (4).

[e]Dehydration (14), elevated blood urea nitrogen (2), edema/ascites (2).

[f]Elevated liver function (16), Gilbert's disease (1), hyperbilirubinemia (1).

[g]Hypophosphatemia (12), hyperphosphatemia (1).

[h]Diagnostic group difference significant at $p < .05$, using Mann-Whitney test to compare medians of two groups.

[i]Weight (kg)/height^2 (m).

[j]Absolute BMI divided by the median BMI for a given age and sex, as specified on CDC growth charts (CDC, 2000).

cent IBW for both patient groups. Patients were approximately 73% of ideal BMI at admission and approximately 85% of ideal BMI at discharge.

As shown in Table 5, the percentage of patients who received comorbid diagnoses of either mood or anxiety disorders increased from 70.7% at admission to 85.4% at discharge. The increase in the number of Axis I diagnoses reflects unit policy to defer additional diagnoses until after patient stabilization and the initiation of renutrition, unless preexisting information about the patient is available.

Table 5 also documents improvements in medical conditions over the course of treatment. Most notable are the significant reductions in the frequency of EKG changes, from 75.6% to 26.8%, and abnormal liver functions, from 34.1% to 9.8%. No patients reported resumption of menses during the inpatient stay. No patients were discharged with acute life-threatening illnesses. All remaining Axis III problems at discharge were discussed with the patient's primary care physician for continued follow-up.

As shown in Table 5, the percentages of patients who were admitted on four classes of medication were nearly identical at admission and discharge, except for a substantial and significant increase in the proportion of patients taking second-generation antipsychotic agents for the management of agitation and anxiety about refeeding, from 14.6% to 56.1%. The similarity of the percentages for SSRIs and anxiolytics at admission and discharge masked changes in these percentages during treatment, however, which were consistent with pathway specifications. Thirty-nine percent of patients were prescribed anxiolytics at some point during treatment to ameliorate meal-related anxiety. In addition, 21.74% of the completers (5 of 23) who were admitted on SSRIs were tapered off of them, as their percent IBW was below 80.0%, consistent with evidence indicating lack of efficacy for SSRIs at low body weight (e.g., Attia, Haiman, Walsh, & Flater, 1998). After reaching 80% IBW, however, many of these patients were represcribed SSRIs, given the available evidence suggesting their potential utility in weight maintenance and the management of mood and anxiety symptoms (e.g., Kaye et al., 2001).

Average scores on the BDI-2 and on the Drive for Thinness subscale of the EDI-2 decreased significantly over treatment. The observed decrease in the EDI-2 Bulimia subscale score was not significant, even when only AN-P patients were included in the analysis. The observed increase in the Body Dissatisfaction subscale score was not significant when the analysis collapsed across AN subtype,

TABLE 5. Pre-post treatment changes for completers ($n = 41$)

	Admission		Discharge	
Variable	*M*	*SD*	*M*	*SD*
BMI[a]				
AN-R[b]	14.65	1.51	17.38	1.03
AN-P[b]	15.52	1.28	17.88	.64
Percent ideal body weight[c]				
AN-R[b]	72.74	7.94	86.15	4.05
AN-P[b]	73.09	6.57	84.18	4.27
Calories per day				
AN-R[b]	1,437.5	287.13	3,100.00	409.13
AN-P[b]	1,595.5	523.71	3,100.00	257.39
Eating Disorders Inventory-2				
Drive for Thinness[b]	13.16	6.51	10.95	6.27
Bulimia	1.64	3.35	1.47	3.14
Body Dissatisfaction	14.58	8.33	16.26	6.94
Beck Depression Inventory-2				
Total score[b]	24.85	10.98	17.21	9.95
	N	%	*N*	%
Comorbid Axis I psychiatric diagnosis				
No mood or anxiety disorder[d]	12	29.3	6	14.6
Only unipolar mood disorder[de]	22	53.7	15	36.6
Only anxiety disorder[df]	2	4.9	7	17.1
Both mood and anxiety disorder[efg]	5	12.2	13	31.7
Axis III problems				
EKG changes[hg]	31	75.6	11	26.8
Electrolyte imbalances[ig]	9	22.0	0	0.0
Kidney function problems[jg]	12	29.3	2	4.9
Liver function problems[kg]	14	34.1	4	9.8
Phosphorus/magnesium problems[ld]	8	19.5	2	4.9
Neutropenia[g]	11	26.8	5	12.2
Medication				
Anxiolytics	7	17.1	7	17.1
SSRIs	23	56.1	26	63.4
Second generation antipsychotics[g]	6	14.6	23	56.1
Mood stabilizers	0	0.0	2	4.9

Note: SSRI = selective serotonin reuptake inhibitors; AN-P = anorexia nervosa-binging/purging subtype; AN-R = anorexia nervosa-restricting subtype; BMI = body mass index; EKG = electrocardiogram. Numbers in parentheses in footnotes are patient frequencies at admission and discharge (out of a potential total of 41)

[a]Weight (kg)/height^2 (m).

[b]Pre-post difference significant at $p < .05$, using Wilcoxon test to compare medians at admission and discharge.

[c]Absolute BMI divided by the median BMI for a given age and sex, as specified on CDC growth charts (CDC, 2000).

[d]Pre-post difference trend at $p < .10$, using McNemar test to compare two dependent proportions.

[e]Major depressive disorder with or without psychotic features, depressive disorder not otherwise specified (NOS), dysthymia.

[f]Obsessive-compulsive disorder, generalized anxiety disorder, panic disorder, posttraumatic stress disorder, social phobia, specific phobia, anxiety disorder NOS.

[g]Pre-post difference significant at $p < .05$, using McNemar test to compare two dependent proportions.

[h]Bradycardia (24/3), premature atrial complexes (3/1), T-wave abnormality (2/0), ST abnormality (2/1), prolonged QT (0/1), arrhythmia (3/3), premature super ventricular complexes (1/0), rightward axis (5/2), atrial enlargement or abnormality (1/1), occasional premature ventricular complexes (1/0).

[i]Hypochlorinia (1/0), hypokalemia (2/0), hypoglycemia (5/0), hyponatremia (3/0).

[j]Dehydration (10/0), elevated blood urea nitrogen (2/2), edema/ascites (1/0).

[k]Elevated liver function (13/2), Gilbert's disease (1/1), hyperbilirubinemia (1/1).

[l]Hypophosphatemia (7/1), hyperphosphatemia (1/1).

but a significant increase in the Body Dissatisfaction subscale score was observed for patients diagnosed with AN-R, $z = -1.965$, $p < .05$.

Prediction of Completer Status

Twenty patients (32.8%) received an AMA discharge and were classified as dropouts. Of these, 14 (70.0%) were diagnosed with AN-R and 6 (30.0%) with AN-P. Two of the patients (10.0%) were admitted involuntarily. Only 5 dropouts (25.0%) progressed beyond the pre-self-select phase of treatment, and only 1 dropout (5.0%) completed the self-select phase of treatment.

All clinical and demographic variables that were available on admission were evaluated as potential predictors of treatment outcome. Table 6 presents all significant and trend-level findings. Dropouts showed a lower initial calorie intake and a lower GAF score. Dropouts also reported a longer duration of eating disorder symptoms. On the self-report questionnaires, dropouts showed lower scores on the Drive for Thinness subscale of the EDI-2. No significant differences emerged on any other variables, including medication usage, psychiatric comorbidity rates, or presence of medical problems.

Logistic regression was used to evaluate the relative and cumulative predictive power of these four variables. Calories and symptom duration showed a significant positive skew and were log transformed before conducting this parametric analysis. The Hosmer and Lemeshow goodness-of-fit test indicated that the model provided an adequate fit to the data, $\chi^2_{(8)} = 8.024$, $p = .431$, and accounted for 37.3% of the variability in completer status. The EDI-2 score on the Drive for Thinness subscale, eating disorder duration, and GAF score at admission all accounted for significant variability in completer status, $\beta = -.152, -.275, 1.446$, $p < .01, .05, .05$, respectively. This collection of variables correctly predicted the completer status of 38 of the 41 completers (92.7%) and the completer status of 9 of the 20 patients who received an AMA discharge (45.0%).

Discussion

The overarching goal of the current investigation was to characterize the short-term outcome of a sizeable number of inpatients with AN who were treated according to a standardized and evidence-informed inpatient protocol that could be completed by most patients within LOS constraints in our geo-

TABLE 6. Differences between completers ($n = 41$) and dropouts ($n = 20$) on all admission variables

	Completer		Dropout	
Variable	*M*	*SD*	*M*	*SD*
Duration of eating disorder (years)[b]	3.61	5.00	7.81	9.46
Admission calories (daily)[a]	1,503.02	404.14	1,375.00	319.33
Global assessment of functioning[b]	31.59	3.05	29.63	3.13
Eating Disorders Inventory-2 Drive for Thinness[b]	13.15	6.51	8.91	6.49

[a]Diagnostic group difference trend at $p < .10$, using Mann-Whitney test to compare medians of two groups.
[b]Diagnostic group difference significant at $p < .05$, using Mann-Whitney test to compare medians of two groups.

graphic region. As expected, the observed duration of treatment was consistent with the typical length of inpatient stay for treatment of AN patients in our geographic area. Most patients who completed the treatment were discharged within 6 weeks of admission ($M = 37.95$, $SD = 17.70$). In addition, use of the clinical pathways approach to treatment development increased the standardization and efficiency of treatment provision. The resulting disorder-specific and medication pathways could be disseminated readily and potentially could serve as a contract for treatment services with benefit providers in our region (Lock, 1999). Finally, the treatment protocols were consistent with the research literature on treatment of AN, as well as current practice guidelines (APA, 2000).

An Updated Benchmark for Treatment Outcomes

Treatment focused primarily on medical stabilization, the initiation of nutrition rehabilitation, and cessation of compensatory behaviors. As expected, patients gained 1–2 kg per week and were discharged at approximately 85% IBW. Medical conditions improved markedly, and staff supervision prevented compensatory behaviors. In addition, depressive symptoms and Drive for Thinness scores decreased significantly. The percentage of patients who were taking second-generation antipsychotic agents for agitation and anxiety related to refeeding also increased substantially over the course of treatment, from 14.6% to 56.1%.

Nevertheless, constraints on the duration of inpatient treatment and the severity of patient illnesses in most cases precluded resolution of some medical conditions, completion of nutrition rehabilitation, extensive psychological intervention, substantial psychological recovery, and treatment of comorbid psychiatric conditions. No patients were discharged with acute life-threatening conditions, but more than one-fourth of the patients who completed treatment were discharged with improved but continued EKG changes, 9.8% with liver function problems, and 12.2% with neutropenia. In addition, the clinical relevance of the reduction in Drive for Thinness scores is questionable, and patient scores on the Bulimia and Body Dissatisfaction subscales did not decrease significantly. Moreover, Body Dissatisfaction scores increased significantly for AN-R patients between admission and discharge, which may be related to limited opportunity for habituation to anxiety surrounding significant weight gain.

The lack of significant and sizeable improvement on the psychological correlates of eating disorders is particularly striking, as previous studies have reported substantial improvement in the psychological aspects of AN during inpatient hospitalization (Bowers & Ansher, 2000; Channon & DeSilva, 1985; Grave et al., 1993; Pike, 2000; Probst et al., 1999; Steinhausen, 1985). As the inpatient treatment provided in the current study was fully consistent with best-practice guidelines, the disparity in outcomes presumably is secondary to the marked decrease in the duration of inpatient treatment. Either the average length of inpatient stay or the average BMI at admission was substantially greater in each of these studies than in the current study, such that the average BMI at discharge in these studies was greater than in our study. Thus, the absence of meaningful psychological improvements in the current study may be attributable to a shorter LOS or to the patients' lower discharge weight. In other words, as several clinical researchers have suggested previously, more complete physical recovery may be a necessary precursor to marked psychological improvement (e.g., Fennig, Fennig, & Roe, 2002).

Overall, therefore, it appears that inpatient treatment was sufficient to promote patients' partial recovery by stabilizing them medically and initiating refeeding. Nonetheless, continued intensive care—preferably in a day-hospital setting—clearly will be critical to the full recovery of these patients. Most importantly, at inpatient discharge, the AN patients in the current study still needed to gain an average of 15% of their IBWs. This will be difficult and may not be cost-efficient (Kaye, Kaplan, & Zucker, 1996), even in a day-hospital setting, as weight gain typically proceeds much more slowly in outpatient settings (APA, 2000; Deep-Soboslay et al., 2000; Howard et al., 1999). Moreover, two studies have shown that lower weight at inpatient discharge is associated with worse short-term and long-term outcomes (Baran et al., 1995; Howard et al., 1999).

Most recently, Howard et al. (1999) reported on the short-term outcomes of 59 AN patients who were discharged from an inpatient eating disorders treatment to a comprehensive day-hospital program. The authors showed that the best predictor of day-hospital failure was an IBW 90% or less than normal: 41.9% of the patients who were discharged from the inpatient unit with an IBW less than 90% failed the day-hospital program, whereas only 3.6% of those with an IBW greater than 90% failed the day-hospital program. In keeping with national trends (Wiseman et al., 2001), approximately one-half (52.5%) of the Howard et al. sample was discharged at less than 90% IBW. Continuing this trend, 90.2% ($n = 37$) of the completers diagnosed with AN in the current study were discharged at less than 90% IBW, due to the shorter LOS ($M = 38.0$ days for the current sample, $M = 48.7$ days for the Howard et al. sample) and to the lower BMIs at admission ($M = 15.0$ for AN patients in the current sample, $M = 16.0$ for the Howard et al. sample).[5] If Howard et al. 's percentages generalized to the current sample, then we would expect 37.8% of the AN patients in the current sample to fail day-hospital treatment. We currently are tracking day-hospital outcomes for AN inpatients who are discharged to our partial-hospitalization program.

Prediction of AMA Discharge

Twenty patients (32.8%) did not complete the inpatient treatment protocol and were discharged AMA. This dropout rate is substantial but not inconsistent with other reported rates for inpatient treatment of AN. For example, in a recent AN treatment study, Kahn and Pike (2001) reported a dropout rate of 33.3% and suggested that the marked treatment resistance of many patients with AN frequently results in much higher dropout rates than are observed for inpatient treatment of most other psychiatric populations. The substantial dropout rates in both studies also may reflect, in part, the highly structured and symptom-focused nature of both treatment programs. Grave et al. (1993) reported a lower dropout rate of 20.5% from their lenient inpatient treatment program. Treatment completers in the Grave et al. study gained only approximately 0.76 kg per week, however, and dropouts showed nonsignificant weight gains. In contrast, treatment completers and dropouts in the current study gained 1.21 and 0.78 kg per week (*SD*s = 0.46, 0.78), respectively. Currently, the manifold differences among treatment programs, treatment contexts, and patient populations constrain our ability to draw confident conclusions about the basis for variable dropout rates across studies. This important question clearly warrants further investigation, however, as the answer might facilitate the development and dissemination of treatment protocols that maximize both efficient symptom reduction and patient acceptability of treatment.

Given the poor prognosis of patients who have dropped out of longer-length inpatient treatment programs (Kahn & Pike, 2001), identification of risk factors for treatment dropout in an era of shorter-term inpatient treatment is critical to providers' efforts to decrease the high dropout rate. In a comprehensive evaluation of all potential admission predictors, only four variables emerged as significant or trend-level predictors of completer status: a longer-standing eating disorder, a lower Drive for Thinness score, lower daily calories ordered at admission, and a lower GAF score. The last two predictors can be construed as indirect indicators of severity of illness and percent IBW at admission, but it is important to note that more direct indicators of these concepts, such as the presence of serious medical problems, BMI, or percent IBW, did not differ at significant or trend levels between the two groups. Results of logistic regression analysis based on these four predictor variables correctly classified almost all of the completers but correctly identified fewer than one-half of the dropouts. This finding suggests that (a) patients who report longstanding histories of AN, present with lower GAF scores, and show lower Drive for Thinness scores appear to be at greater risk of dropping out of treatment; (b) the likelihood of dropping out of treatment is unrelated to the severity of the patient's illness, the number of previous hospitalizations, the presence of comorbid Axis I psychiatric diagnoses, the presence of medical problems, or AN subtype; and (c) our current ability to identify and potentially avert AMA decisions is poor.

Evaluations of predictors of dropout status from longer-length inpatient programs also have sug-

[5] The comparison between the percent IBW data from the current sample and the Howard et al. sample is less than ideal, as Howard et al. 's (1999) ideal BMIs were drawn from different charts than the ideal BMIs used in the current study. A parallel evaluation based on absolute BMIs leads to similar conclusions, however, even though it also is flawed, as percentiles for the same BMI vary for persons below the age of 20 (Hebebrand, Wehmeier, & Remschmidt, 2000). In the Howard et al. sample, 38.9% of the patients were discharged with a BMI less than or equal to 19.0, and 43.5% of these patients failed day-hospital treatment. In contrast, only 11.1% of the patients whose BMI at discharge exceeded 19.0 failed day-hospital treatment. In the current sample, 95.1% ($n = 39$) of the completers were discharged with a BMI less than or equal to 19.0. If Howard et al. 's trend held, then we would anticipate that 41.4% of the current sample would fail day-hospital treatment.

gested that dropout status is largely unpredictable (Grave et al., 1993; Kahn & Pike, 2001). AN subtype emerged as a significant predictor of dropout status in both previous reports of potential predictors, and illness severity emerged as a significant predictor in one of the two studies (Grave et al., 1993). Overall, therefore, it appears that our ability to predict dropout status is minimal, regardless of the length of the inpatient treatment program, and that predictors of dropout may vary as a function of the length of the treatment program.

Further empirical evaluation of inpatient attrition is necessary and should examine other potential predictors that we were unable to assess in the current study, such as the patient's personality characteristics (Wonderlich, 2002). Moreover, we need to consider the possibility that the likelihood of dropping out of treatment is relatively constant for the majority of patients at admission in the current care environment. If so, it may be profitable in future investigations to examine the magnitude and direction of change during treatment on some of the variables examined in the current study as potential predictors of dropout status.

Conclusions

Given the likely irreversibility of downward national trends in the duration of inpatient treatment for AN (Kaye et al., 1988; Wiseman et al., 2001), it is critically important for clinical researchers and care providers in affected geographic regions to (a) re-examine the goals of inpatient treatment; and (b) re-establish treatment outcome benchmarks. The current study provides the first available characterization of the short-term outcomes of inpatients with AN who were treated according to a standardized and evidence-based protocol in the current care environment of markedly abbreviated inpatient stays in our geographic region, in which AN patients are discharged at approximately 85% IBW. Not surprisingly, the overwhelming majority of the completers would not meet Pike's (1998) specified criteria for a satisfactory initial treatment response, which historically has been obtained during inpatient hospitalization: greater than 90% IBW at discharge, a substantial decrease in excessive concern about and overvaluation of weight and shape, the resumption of menses, substantial improvement in eating and compensatory behaviors, and resolution of medical problems. In contrast, the overwhelming majority of completers in the current sample would meet the following alternative inpatient treatment-response criteria, which are more attainable during the limited treatment stays in our geographic region: greater than 80% IBW at discharge, interruption of compensatory behaviors, and resolution of acute medical crises.

In this era of shortened inpatient treatment stays, continued intensive care clearly will be critical to the discharged inpatient's full recovery. Posthospitalization providers of ongoing intensive care for these patients will be confronted with more psychologically vulnerable and medically compromised patients of lower weight than they would have been even a decade ago. Thus, clinical researchers and care providers also should reevaluate the goals and short-term outcomes of step-down, partial-hospitalization programs in regions of the country in which the duration of inpatient treatment for AN has declined sharply, as earlier strategies and findings may not generalize well to the treatment of discharged inpatients in these altered care environments. More generally, it is critically important for clinical researchers to continue to work closely with care providers to evaluate the short-term and long-term effects of discharging inpatients at ever lower weights. In particular, this ostensibly less expensive route may prove to be less cost-effective by increasing the rapidity or frequency of readmissions, lengthening the time to recovery, or enhancing the likelihood of struggling with a chronic eating disorder.

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