

**PREDICTORS OF READMISSION IN HOSPITALIZED ANOREXIA NERVOSA  
PATIENTS**

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# **PREDICTORS OF READMISSION IN HOSPITALIZED ANOREXIA NERVOSA PATIENTS**

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**Objective:** Managed care practices that limit access to and duration of treatment conflict with established standards of care for patients with anorexia nervosa (AN). However, there is little information about how abbreviated lengths of hospitalization relate to the need for rehospitalization, one indicator of unfavorable outcome. This dissertation describes the demographic and clinical features of patients who require multiple psychiatric hospitalizations for treatment of AN and identifies patient characteristics that predict both likelihood of and time to readmission in the current care environment. **Method:** One-hundred-forty-seven patients with a primary diagnosis of AN and hospitalized on a specialized eating disorders psychiatric unit completed self-report questionnaires measuring eating disorders symptoms, mood, and personality functioning at admission and discharge. Medical record reviews yielded demographic, historical, and inpatient course of treatment information. Medical records were later reviewed to determine which of the 147 patients had been readmitted to the same facility within 3 years of their index admission. Multivariate logistic regression analysis was used to evaluate prediction of readmission status. Cox regression survival techniques were used to evaluate prediction of time to readmission. Parallel analyses were conducted on the full sample (n = 147) and on a subsample of patients (n=107) who were not discharged against medical advice (i.e., received an adequate dose of treatment). **Results:** Twenty-seven percent of the full sample and 31% of the subsample were readmitted within 3 years of their discharge. Body

dissatisfaction and mood disorder diagnosis at discharge best predicted the likelihood of both readmission and time to readmission for the group of patients who received an adequate dose of inpatient treatment. **Discussion:** The observed predictors differ from those typically associated with readmission in patients with AN. The findings highlight the centrality of psychopathological aspects of AN and comorbid mood disorder, and they suggest a need to refine inpatient treatment interventions to more specifically target the psychological distress associated with body image disturbances and mood disorder. More broadly, the findings suggest the need to further evaluate the extent to which the managed care treatment environment is affecting treatment outcomes.

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## 1.0 INTRODUCTION

Changes in our health care system have had profound effects on the delivery of mental health care services. Managed care practices have been implemented on a widespread basis across diagnostic groups and treatment settings with the stated intent of improving efficiency and reducing health care costs without loss of effectiveness (Bobbitt, Marques & Trout, 1998). Managed mental health care has significantly influenced access to care, as well as setting and duration of care for the privately and publicly insured. Managed care penetration in mental health has seen explosive growth, and it is estimated that greater than 3 out of 4 individuals are enrolled in some form of a managed mental health plan (Sturm, 1997). Managed mental health care has emerged as the dominant influence in the delivery of services to people with mental illness, having profound effects on patients<sup>1</sup> as well as treatment providers. In particular, treatment services for serious and potentially chronic mental disorders, like some eating disorders, have been the most affected (Weissman, Pettigrew, Sotsky, & Reigier, 2000; Williamson, Thaw & Vernando-Sullivan, 2001; Wiseman, Sunday, Klapper, Harris & Halmi, 2000). Providers too, have been affected. One effect has been that as managed care policies have proliferated, social workers have increasingly become the providers of mental health

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<sup>1</sup> The author recognizes that use of the term “patient” rather than terms such as “consumer” or “client” may be considered inconsistent with Recovery Movement language. The decision for use of the term “patient” was based primarily on the fact that the subjects being described in this study are people who are hospitalized on an inpatient unit and thus the term “patient” seemed the most precise and accurate descriptor.

treatment in the United States, by some estimates surpassing that which is provided by psychologists and psychiatrists (Cohen, 2003). Clinical social workers provide as much as 65% of all psychotherapy and mental health services in the United States (Gibelman & Schervish, 1997). According to an Open Minds analysis cited in the NASW News, under managed care plans, social workers and other licensed professionals provide outpatient mental health care 56 percent of the time, while psychologists and psychiatrist provide care only 33 and 11 percent of the time, respectively (O'Neill, 1999). Moreover, a 1996 survey by the American Association for Marriage and Family Therapy documented the composition of 15 managed mental health care clinician panels and found that social workers dominated. Eight of the managed care organizations reported that social workers comprised 30 percent or more of their panel. Of those eight companies, two reported that their networks were 50 and 70 percent Master's prepared social workers (American Psychiatric Association (APA), 1997).

Studies examining outcome, specifically readmissions, for people with serious and chronic mental illness in the current care environment are emerging in the literature (Wickizer & Lessler, 1998); however, the empirical database is quite limited. Identifying, defining, and measuring potential harm that occurs as a result of the use of managed mental health care techniques on various populations has been identified as an area in need of further examination (Mauery, Vaquerano, Sethi, Jee, & Chimento, 2006). The current study examines one such population, individuals hospitalized with anorexia nervosa, and identifies predictors of readmission, one indicator of long-term outcome for anorexia nervosa patients. Reevaluating outcome and predictors of outcome in the current care environment is critically important because previous knowledge may not generalize to the current environment in which access to and duration of care are limited.

Anorexia nervosa (AN) is a serious mental illness that disproportionately affects young adult and adolescent females. Although once considered to affect primarily upper middle class Caucasian females, it is now recognized as affecting individuals from all cultures and socioeconomic classes (Crago, Shisslak, & Estes, 1996). AN affects about 0.5% of young females (Hoek, 2002) and affects females at a rate 9 times that of males (American Psychiatric Association (APA), 1994). Although AN is not common, its consequences can be devastating to individual sufferers and their families. AN is a difficult disorder to treat and is associated with significant psychiatric and medical comorbidity, high relapse rates, and mortality (Mitchell, Pomeroy & Adson, 1997). AN has the highest known mortality rate of all psychiatric illnesses (Sullivan, 1995), with 5% of patients with AN eventually succumbing to the disorder (Steinhausen, 2002).

Treatment for AN is protracted and expensive. A typical course of treatment for AN is measured in terms of years and is marked by the need for medical and psychiatric intervention, on both an inpatient and outpatient basis (Strober, Freeman & Morrell, 1997). The standards of care for severe AN specify extended hospitalization, prolonged outpatient mental health care and ongoing medical management (APA Practice Guidelines, 2006). These standards of care conflict with the realities of providing treatment in a managed care environment. Managed care policies dictate access to and type of care received, and they affect when, where, for how long, and by whom the patient will be treated. The necessity to negotiate treatment decisions in the context of managed care may delay or curtail intensive (high cost) treatment. For people with AN, the delay or curtailment may be associated with continued weight loss and increased morbidity resulting in more compromised individuals eventually being admitted for inpatient care, but for shorter lengths of stay that are inadequate to achieve symptom remission.

The consensus of expert opinion and research evidence demonstrates that restoration of adequate body weight is an essential first step in the treatment of AN. Due to the ego-syntonic nature of AN and the physiological factors associated with refeeding, inpatient treatment on a specialty care unit is often required to achieve weight gain. The weight gain process is slow and thus necessitates longer lengths of stay than are customary in the current care environment. Premature discharge, i.e., discharge prior to achieving a minimally adequate body weight, is associated with worse short- and long-term outcomes, as detailed in the literature review below. Frequent but shorter admissions that are not sufficient to achieve adequate weight gain or symptom remission may, for some patients with AN, set the stage for multiple hospitalizations and increase the risk for the development of a chronic course of illness.

## **1.1 IMPLICATIONS**

This study's focus, identifying predictors of readmission for patients with AN in the current care environment, has implications for social work policy, practice, and service delivery. Readmissions are costly to patients, their families, and the mental health care system. For patients and their families, there are substantial, and perhaps incalculable, physical, emotional and financial costs associated with numerous hospitalizations for AN. Readmissions also burden already limited treatment resources and add additional expense to the overall system. It is therefore incumbent upon social workers in policy making roles to understand the implications of our current method of service delivery and to advocate for policies that balance the needs of patients with AN with the very real cost and quality concerns that have traditionally plagued our mental health care system.

Moreover, it is critically important that policies influencing mental health care service, delivery, and financing are informed by empirical evidence. Managed care has fundamentally altered the delivery of mental health services to patients with severe mental illness. Difficulties accessing intensive and specialty care as well as abbreviated lengths of stay in intensive levels of care are complaints related to managed care that are often voiced by patients and practitioners, and that may affect outcome. At present little is known about the outcomes of patients with severe mental illness who receive treatment in the current care environment of restricted access and limited duration of inpatient stay. Studies describing the short-term outcome of patients with AN in the current care environment are emerging (Treat, Gaskill, McCabe, Ghinassi, Luczak, & Marcus, 2005; Treat, McCabe, Gaskill, Bardone-Cone, & Marcus, under review). The current study will add to this knowledge base by examining predictors of readmission, one important indicator of the long-term treatment outcomes of severely ill patients with AN. In addition to enhancing our understanding of and informing treatment protocols for patients with AN, the findings also may shed light on concerns related to the outcomes of patients diagnosed with other severe mental illnesses that have been affected by managed care policies that limit access and duration of care. The findings therefore can help to inform and drive public policy related to mental health care delivery and financing for all patients diagnosed with severe mental illnesses.

The study's findings may have important implications for those treating patients with AN, many of whom, as noted, are social workers. The ability to identify predictors of readmission in patients with AN prospectively will inform the design of clinical interventions aimed at reducing readmissions. As providers of mental health treatment, social workers must have at their disposal empirical evidence to inform patient care decisions and recommendations. Effectively treating patients with AN with fewer admissions will diminish the consequent

personal costs associated with a chronic course of AN and reduce overall costs to the mental health care system.

Finally, the study may have implications for mental health services delivery. The effect of practices that limit access and duration of care on the treatment outcomes of people with severe mental illnesses has not been fully examined. The descriptions of patients with AN and their outcomes will inform the development of standards of care that take into account the implications of treating patients with serious mental illnesses in a managed care environment, information that is currently absent in the literature. Thus, the study's findings should help inform the design of more effective systems of care.

## **1.2 PRESENT STUDY**

The overarching aims of this study are to describe the demographic and clinical features of patients who require multiple psychiatric inpatient hospitalizations for the treatment of AN and to identify patient characteristics that predict readmission. In light of the changes in the mental health care delivery system that have occurred over the last 15 years, it is critically important to re-examine both short and long-term outcomes of inpatient treatment for AN, because predictors of readmission based on prior research may not generalize to the current care environment. This study is significant because its sample is drawn from an eating disorders specialty program that treats relatively large numbers of patients with AN who are seriously ill. Samples of this size are difficult to obtain due to the disorder's low prevalence rate and the difficulties associated with recruiting patients who are resistant to efforts to engage them in treatment. Thus, this study

provides an opportunity to examine with sufficient power the characteristics of patients readmitted for treatment of AN who are treated in a managed care environment in which access to intensive treatment and length of stay has been restricted.

Data for this study were collected as part of a clinical pathways project designed to develop a best practice description of inpatient eating disorders treatment (Treat, Gaskill, McCabe, Ghinassi, Luczak & Marcus, 2005). Data were collected from 147 patients with AN who were consecutively admitted to the eating disorders unit of a psychiatric hospital over a 22-month period of time. Demographic information, patient self-report questionnaires and information obtained from review of the medical record are included in the analysis. Patient self-report questionnaires were used to assess eating disorder and depressive symptoms, as well as difficulties in interpersonal functioning, at admission to and discharge from inpatient psychiatric treatment. Information obtained through medical record review includes all weight related information, Axis I diagnoses, and historical information, such as number of prior eating disorders, psychiatric hospitalizations, and duration of illness.

The analysis will consist of a detailed description of both the full sample ( $n=147$ ) and the subsample of patients who were readmitted to the inpatient eating disorders unit within 3 years of discharge ( $n=40$ ). A parallel set of analyses will be conducted on a subsample of patients ( $n=107$ ) who were not discharged against medical advice and thus received an adequate dose of treatment. This subsample of patients is arguably more representative of those who have received an adequate dose of treatment in the current care environment and are thus a better group from which to identify predictors of readmission. Tables will present univariate descriptive statistics for the full sample and the subsample at admission (e.g., means and standard deviations for continuous variables, frequencies and percentages for discrete variables).

Potential predictors that will be examined include age, number of prior eating disorders psychiatric admissions, duration of illness, and percent of ideal body weight at admission to and discharge from inpatient treatment. Additionally, psychiatric symptoms, including eating disorder and depressive symptoms, difficulties in interpersonal functioning, and presence of additional Axis I diagnoses at discharge, will be examined as potential predictors of readmission. Table 2 presents a full list of all examined predictors. Axis I diagnoses at admission will not be examined because the patient's low weight status at admission compromises the validity of assessment of other Axis I diagnoses (i.e., many ostensibly comorbid conditions resolve with weight gain). Similarly, we will not examine GAF scores at admission or discharge because they are notoriously unreliable. Medications at admission also will not be evaluated because of the difficulties in interpretation associated with the widely varying prescribing practices of the numerous physicians who were treating the patients prior to admission. Significant predictors that emerge in preliminary bivariate analyses then will be examined in multivariate logistic-regression and survival analyses. All continuous-variable distributions will be inspected for normality and transformed as necessary prior to inclusion in the multivariate parametric analyses.

The empirical knowledge base from which to draw information about predictors of relapse and readmission in AN is quite limited (Carter, Blackmore, Sutandar-Pinnock , & Woodside, 2004). Further complicating the identification of applicable predictors is the fact that much of the work in this area was conducted prior to the widespread implementation of managed care; therefore, the findings may not translate well to the current care environment. Moreover, much of the work in this area examines predictors of relapse, rather than readmission. Inherent in the definition of AN relapse is the notion that a period of remission from the illness (i.e.,

weight restoration) was achieved. As patients now commonly are discharged from inpatient units prior to full weight restoration, remission may not be attained prior to readmission. Nonetheless, the factors that are associated with relapse are relevant to our understanding of predictors of readmission and are therefore considered here.

Body weight at both admission to and discharge from inpatient treatment has been well established as a predictor of outcome, including relapse and readmission (Baran, Weltzin, & Kaye, 1995; Fichter & Quadflieg, 1999; Heberbrand et al., 1996; Commeford, Licinio, & Halmi, 1997; Heberbrand et al., 1997; Lowe, et al., 2001; Pike, 1998; Steinhausen, Grigoriou-Serbanescu, Boyadjieva, Nuemark, & Metzke, 2008; Treat et al., under review; Zipfel, Lowe, Reas, Deter, & Herzog, 2000). Duration of illness (Deter & Herzog, 1994; Fichter & Quadflieg, 1999; Richard, Bauer, & Kordy, 2005) and delay in treatment initiation (Steinhausen, 1995; Zipfel, Lowe, Reas, Deter, & Herzog, 2000) have also been found to have predictive value. Willer, Thuras, & Crow (2005) found increased length of stay, more rapid rate of weight gain, and having prior hospitalizations increased the likelihood of re-hospitalization. Their somewhat unexpected finding that increased length of stay was associated with re-hospitalization was explained in further analyses demonstrating that increased length of stay was correlated with more prior hospitalizations and lower body mass index at admission. Similarly, previous AN treatment has been identified as a predictor of relapse by Carter, Blackmore, Suandar-Pinnock and Woodside (2004). Purging behavior has also been associated with relapse (Fichter & Quadflieg, 1999; Garner, & Rosen, 1993; Deter & Herzog, 1994; Eckert, Halmi, Marchi, Grove, & Crosby, 1995; Herzog & Schellberg & Deter, 1997). In a smaller number of studies, greater severity of social and psychological problems have been identified as predictors of poor outcome (Carter, Blackmore, Suandar-Pinnock, & Woodside, 2004; Herzog, Schellberg & Deter, 1997;

Lowe, Zipfel, Buchholz, Dupont, Reas,& Herzog, 2001). In sum, the most frequently reported predictors of relapse and readmission among patients with AN are weight, duration of illness, and purging sub-type of AN.

On the basis of this literature, we hypothesize that more previous admissions, longer duration of illness, greater psychiatric symptomatology, and lower percent of ideal body weight at admission and discharge will predict readmission and time to readmission, as these variables represent indicators of greater severity of illness. The previous admissions and duration of illness variables are indicators of whether or not the illness is refractory to treatment. These variables may also be an indication that the duration of previous inpatient treatment was not sufficient to achieve restoration of normal body weight, thus leading to increased risk for multiple hospitalizations. The psychiatric symptomatology variable is a measure of the degree of psychiatric distress. Greater psychiatric symptomatology would be an indicator of more complicated and difficult-to-treat illness and thus is hypothesized to contribute to readmissions. Both clinical opinion and empirical evidence indicate that lower percent of ideal body weight at admission and discharge is associated with more negative short- and long-term treatment outcomes. Thus, it is hypothesized in this study that lower percent of ideal body weight at admission and discharge will predict readmissions. Further explication of the relevance of these variables to the likelihood of readmission is described in the literature review below.

## **2.0 LITERATURE REVIEW**

The theoretical foundation for the current study draws on two separate but related literatures. The managed care literature describes the evolution of a system of care delivery that attempts to integrate the frequently competing demands of improved access to and quality of care and cost containment. The effect of managed care on the treatment of serious mental illness has not been fully examined. This study examines one important aspect of outcome, readmission, for one serious mental illness, AN, in the context of managed care policies that restrict access to and duration of care. This literature review will chronicle the emergence of managed care and describe its impact on the delivery of mental health services to patients with serious mental illness. The review of the AN literature will summarize our current understanding of a psychiatric illness that was first described in the medical literature of the 17th century and today remains poorly understood in terms of etiology and effective treatments. The review will illustrate the incompatibility of the current system of mental health care delivery and the established treatment guidelines for AN. Finally, the review will present the previous research that led to the specific hypotheses about predictors of readmission.

## 2.1 MANAGED CARE

We are currently in an era of unprecedented change in the health care industry, referred to by some as the “managed care era”. It is an era in which the research advances of previous decades have yielded new understandings of and technologies for ameliorating disease and human suffering. It is also an era in which spiraling health care costs, largely related to these technologies, have generated a demand for health care reform, and more specifically cost containment. The existence and availability of these technologies have spurred debate and controversy and have called into question societal values: is health care a basic entitlement for all citizens or is it a privilege for those who can afford to pay? Basic health care is unavailable to large numbers of Americans. Estimates based on data collected from the 2007 National Health Survey Interview indicate that 42.5 million Americans of all ages were uninsured at the time of the interview and 53.2 million had been uninsured for at least part of the year prior to the interview (Cohen & Martinez, 2007). Talbott (2001) reported that at any given time between 30 and 40% of the United States population is without health insurance coverage. Moreover, the United States rates far below other industrialized nations in most public health indices. Comparisons to other industrialized nations reveal a system that ranks poorly in terms of ability to organize, deliver, and finance health care. Although the American system is criticized as being inefficient, unfair, and expensive, it is the high and uncontrolled cost of our system that has motivated reform efforts. Unfortunately, the legislative and policy reform efforts, described below, have done little to address the other valid criticisms and may have exacerbated the inefficiency and inequity problems..

### 2.1.1 Defining Managed Care

In response to the call for reform, private sector and public policy changes, in the form of managed care practices, have been implemented to reduce the financial cost of health care. Sturm (1997) estimated that three out of four individuals are enrolled in some form of managed medical care. Managed care penetration in mental health is estimated to be even higher (Sturm, 1997). Managed care is a complex concept with multiple and varying definitions. Talbott (2001) described managed care as consisting of four inter-related elements. First, managed care is a method of *providing care* that makes use of specified provider groups, networks or carve-outs. Second, it is a *philosophy of care* that emphasizes health maintenance, prevention/limitation of hospitalization and alternatives to hospitalization. Third, managed care is method for *financing care*. Finally, managed care *controls costs* by covering only specific diagnoses, utilizing guidelines for treatment, and by reviewing the proposed and ongoing care to determine medical necessity.

Mechanic (1999) described four basic mechanisms that are central to the concept of managed care. These mechanisms are capitation, incentives and risks, gatekeeping and utilization management. Since these mechanisms are critical to our understanding of how managed care affects treatment delivery, the following definitions are provided.

Capitation is the practice of prepaying a treatment provider a fixed, predetermined amount per person covered, for specified services over a specified period of time. Theoretically, this type of payment promotes the efficient use of resources. In practical terms, however, the likelihood exists for promoting the use of the least expensive treatments (i.e., outpatient care), not necessarily the most appropriate. Under capitation, the use of too many expensive services (i.e., inpatient care) would result in financial losses while the use of less expensive services

would result in higher earnings or cost savings. Conversely, in a fee-for-service system, providers are financially rewarded for providing the most expensive, not necessarily the most effective or appropriate care. Both systems have inducements that may serve to limit a patient's access to appropriate, cost effective treatment.

Incentives and risks in managed mental health care refer to the practice of paying bonuses or withholding earnings to limit referrals to specialists. Incentives and risks typically apply to primary care physicians (PCPs), who, by virtue of their gatekeeping role, are in a position to refer patients to mental health specialists. Essentially, PCPs may have part of their income withheld for exceeding a predetermined threshold of referrals for specialty care or they may receive a bonus for keeping referrals within an expected target. Mental health practitioners typically work under a reduced payment fee-for-service arrangement. Their treatment decisions are then managed through various utilization management techniques further described below.

Gatekeeping is the process of requiring referrals for specialty care. The objective of gatekeeping is to limit access to specialists, hospitals, and expensive procedures. As noted above, gatekeeping is most typically the role of the PCP. In many managed care plans, all referrals for specialty care must go through the PCP. Specialty care that is directly accessed by the patient is not paid for by the plan. Overt gatekeeping by PCPs has been eliminated in some plans, although the objective of limiting access to specialty care remains intact through the use of utilization management techniques such as precertification, which is described below.

Utilization management is a broad term that refers to a number of practices: precertification, concurrent review, high cost case management and second opinion programs. Most relevant to this review are the concepts of precertification and concurrent review. Precertification refers to the practice of requiring that the patient and or mental health

practitioner obtain authorization from the managed care company prior to receiving any inpatient or outpatient services. To obtain authorization, a description of the patient's presenting problems is required. The utilization reviewer, typically a nurse or master's prepared clinician, bases the decision to authorize treatment on clinical judgment or an algorithm developed by the managed care company. The soundness of the decision therefore, is based on the quality of the criteria used and the experience and clinical judgment of the reviewer. There is usually opportunity to appeal decisions. Utilization review practices vary widely across managed care companies, and the quality or appropriateness of decisions rendered is highly dependent upon the managed care company.

Concurrent review is the process of requiring clinicians to report, either verbally or in writing, the progress made, remaining symptoms (frequency and severity), short and long term goals, mental status exam, and rationale for continuing treatment in order to obtain continued authorization for treatment. Concurrent review is a mechanism designed to encourage the use of alternative levels of care and thereby reduce length of stay in intensive, high cost levels of care. It is also used to monitor the course of treatment. Concurrent review is labor intensive and costly in terms of clinician time and administrative overhead to mental health providers and managed care companies.

## **2.2 SOCIAL POLICY BACKGROUND**

As illustrated by the previous description of managed care mechanisms, considerable administrative and clinical effort is required to function in a managed care environment. Clearly, the administrative and clinical overhead adds significant expense to the cost of providing and

financing care. This would appear to contradict the goals of managed care, which are to reform the mental health care delivery system by reducing costs and increasing efficiency. However, the issue of health care reform is a complex subject, not easily evaluated and confounded by competing political, social and economic agendas. A brief review of the legislation that set the stage for the emergence of managed care illustrates the interplay of these agendas and the difficulty associated with assessing and measuring reform efforts.

Beginning in the late 1970s and continuing through the 1980s, the federal government passed landmark legislation that greatly changed the financing and delivery of health benefits, including mental health services. The Health Maintenance Organization (HMO) Act of 1973 and the Employee Retirement Income Security Act (ERISA) of 1974 established the groundwork for today's managed care dominated health care scene. The intent of the HMO Act of 1973 was to reduce employer health costs by permitting health care practitioners to organize HMOs to compete with health insurance plans (Oss & Mackie, 1995). It is significant to note that this Act allowed profit-making corporations to enter what had essentially been a non-profit, consumer-driven prepaid group practice arena. This law is credited with changing the direction of the private health care delivery system to one based on what has become known as managed care. ERISA was intended to encourage employers to self-insure health benefits, essentially giving them the ability to create their own employer managed health benefit plan (Sipkoff & Oss, 1995).

Both ERISA and the HMO Act had a significant impact on the mental health field. According to the American Psychiatric Association (APA), "the HMO Act essentially institutionalized a minimum level of mental health benefits by failing to require the same level of comprehensive coverage for psychiatric care as it did for all other physical illnesses and health

care services”(APA, 1997). As federal legislation, ERISA further diminished insurance coverage for mental health services and increased the disparities between physical health and mental health benefits by exempting employer-sponsored health plans from the minimum benefit requirements and mental health parity regulations passed by state legislatures. The APA contends that as more employer-sponsored health plans have limited or eliminated mental health care benefits from their plans, the cost of providing care to the uninsured has been shifted to the public mental health system, where it has steadily increased.

In response to growing concerns regarding access to care, the Mental Health Parity Act was passed in 1996 and implemented in 1998. This act required that annual and lifetime dollar limits for mental health care be eliminated or be equal to other physical illnesses for all United States group health care plans that offer mental health benefits and serve more than 50 employees. The act overrode exclusions in ERISA that had exempted at least one third of the population covered by self-insured employers from state-level parity legislation (Varmus, 1998). This was an important step toward parity in all states, although the act did not address other managed care practices that can affect access to care. For example, day and visit limits, higher co-pays and deductibles, and aggressive utilization review may still be applied to those with mental illness, thus effectively limiting their access to care. Moreover, the act applied only to mental illnesses as defined under individual plans, and plans are not required to provide mental health coverage. Consequently, it is doubtful that parity legislation alone, as currently defined will be sufficient to assure access to mental health services in the presence of managed care.

Managed care has similarly influenced the public sector by penetrating systems that have traditionally been privately administered, such as child welfare, mental retardation, corrections, and residential care (O’Neill, 1999) and Medicare and Medicaid programs. Increasingly, states

are looking to managed care as a means of controlling mental health costs and quality for its Medicaid populations. For example, the Commonwealth of Pennsylvania began shifting its Medicaid populations from fee-for-service plans to capitated, mandatory managed plans for both physical and mental health benefits with the introduction of HealthChoices in February of 1997. Enrollment began with five counties in the southeastern part of the state, which included Philadelphia County and the four surrounding counties. Since that time, major expansions occurred in 1999 and 2002 and have included 20 counties in southwestern and south central Pennsylvania bringing the total enrollment to over 900,000 Medical Assistance consumers. Plans are currently underway to enroll the northwestern part of the state. It is anticipated that by the end of 2007, all Pennsylvania counties will be enrolled in a mandatory managed care plan for mental health services (<http://www.dpw.state.pa.us.behavementalhealth>).

### **2.3 IMPACT OF MANAGED CARE**

Although it is generally recognized that managed care practices result in some reduction of health care spending (Varmus, 1998), the practices raise serious concerns from patients, providers, and policy-makers regarding access to care and quality of care received. Managed care practices such as capitation, incentives and risks, gatekeeping, and utilization management, that are intended to achieve cost savings may not be (e.g., Abelson, 1999; Freudenheim, 1998). Moreover, these practices may in fact be exacting an unacceptable toll on public health and welfare. Evaluations of managed care's effect on delivery of services to persons with serious mental illness in the public sector have been largely negative. The National Alliance for the Mentally Ill (NAMI) has been an active observer of the effects of managed care on mental health

services and in 1997 issued the Managed Care Report Card. The report concluded that the industry “fails on the basic elements of care that people with serious brain disorders need to survive” (Hall, Edgar, & Flynn, 1997). Similarly, Ross (2000) concluded that managed care has failed to deliver on its promise of improving delivery of services to persons with serious mental illness. Specifically, he cited the absence of integration of Medicaid and the public mental health system, a general lack of publicly documented performance measurements that demonstrate accountability, and the absence of meaningful and authentic consumer, family, and enrollee participation in service planning, implementation, and evaluation as flaws that have hindered the adequate provision of services.

Research examining the impact of managed care on access to and quality of mental health services is limited. Weissman et al. (2000) examined the impact of managed care on access to mental health services by comparing pre-managed care data reported in the Epidemiologic Catchment Area study (early 1980s) and the National Comorbidity Survey (early 1990s) which described the use of mental health services by adults in public and private settings with published data from managed care programs reporting cost and access data for the time period 1992-1997. Their findings raise concerns that plans paying lower per-member, per-month costs actively contain costs by restricting access to specialty treatment. The authors concluded that benefit designs that include cost containment strategies such as high co-payments and deductibles, stringent authorization of care practices, and incentives to reduce referrals to specialty treatment effectively limit access to mental health care.

The managed care practice of utilization management has been associated with increased likelihood of psychiatric readmission, thus raising quality of care concerns as well as calling into question claims of cost reduction and containment. Wickizer and Lessler (1998) found that

psychiatric patients for whom length of stay was restricted by utilization management were more likely to be readmitted, and they concluded that utilization management restricted access to inpatient psychiatric care by limiting length of stay.

Practices that limit access to and duration of care have particularly worrisome treatment and outcome implications for serious mental illnesses such as AN. Treatment for low-weight AN has traditionally required extended hospitalization to achieve medical stabilization, weight restoration, and promotion of psychological recovery. Thus, AN is one of the mental illnesses most affected by managed care practices (Williamson, et al., 2000).

Treatment for AN is often protracted and expensive and, as such, is at odds with managed care practices that emphasize restricted access to intensive treatment and limit duration of care. Kaye, Kaplan, & Zucker, (1996) have observed that restricted access to care and limitations on duration of care for patients with AN may be creating what they refer to as a “revolving door effect.” That is, patients do not initially receive adequate treatment to achieve symptom remission. This, in turn, places them at high risk for relapse and ultimately results in more severe illness requiring frequent, albeit short admissions. Vandereyken (2003) concurred with this observation and contended that the economic restraints imposed by managed care drive this revolving door and result in increased costs. These findings and observations are significant given the pressures to restrict access to and duration of intensive levels of care even though such care typically is required to safely restore weight in patients with AN who are low weight, and they call into question the quality and adequacy of care provided in such an environment. Moreover, they clearly challenge the efficacy of limiting access to care as a cost-savings mechanism, as they may be associated with greater financial and human costs.

Concerns about the potential effect of managed care practices on treatment for AN are well documented in the literature (Franko & Erb, 1998; Kaye, Enright, & Lesser, 1988; Kaye, Kaplan, & Zucker, 1996; Silber & Robb, 2002). However, there is limited research demonstrating the impact of managed care on AN treatment outcome. The following review of the literature describing anorexia nervosa and its treatment will illustrate the inherent difficulties associated with treating this disorder in the current care environment.

## **2.4 ANOREXIA NERVOSA**

### **2.4.1 Diagnostic Criteria**

AN is a perplexing and debilitating illness that affects both the mind and body. It remains poorly understood in terms of etiology, and little is known regarding effective treatments. The APA (1994) diagnostic criteria for AN include physical and psychological criteria. AN is physically characterized by low body weight, refusal to gain or maintain normal body weight, and loss of menses in postmenarcheal females. Psychological characteristics of AN include intense fear of weight gain or becoming fat even though underweight, disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight. The APA definition of AN is further specified by two subtypes: restricting type and binge-eating/purging type. These subtypes refer to the presence or absence of binge eating and purge behaviors that are intended to rid the body of calories, i.e., self-induced vomiting, or the misuse of laxatives, diuretics or enemas.

### **2.4.2 Prevalence**

AN affects approximately 0.5% of young females (Hoek, 2002; Wilson & Pike, 2001) from all cultures and socioeconomic classes (Crago, Shisslak, & Estes, 1996). There is some evidence to suggest that the incidence of AN is increasing, however the data are conflicting; some data suggest that the rate is increasing (Eagles, Johnston, Hunter et al., 1995; Lucas, Beard, O'Fallon et al., 1988; Milos, Spindler, Schnyder et al., 2004) while other data suggest a stable rate (Hall & Hay, 1991; Hoek, Bartelds, Bosveld et al., 1995). The peak age of onset is between 15 and 19 years of age (Lucas, Beard, O'Fallon, et al., 1991), although there are reports of prepubertal (Gowers, Crisp, Joughin et al., 1991) and mid- and late-life onset presentations (Beck, Casper, & Andersen, 1996; Inagaki, Horiguchi, Tsubouchi et al., 2002). Although onset of AN typically occurs in late adolescence, the need for treatment extends well into adulthood (Streigel-Moore, Leslie, Petrill, Garvin, & Rosenheck, 2000).

### **2.4.3 Course**

Studies examining the course and outcome of AN document that it is an illness that can be highly refractory to known treatments and often requires long term and intensive intervention. Moreover, AN is characterized by unacceptably high relapse and mortality rates. Pike (1998) in her review of the literature reported relapse rates of 30-50%. Steinhausen's review of AN outcome in the 20<sup>th</sup> century reports that full recovery is achieved in only about 47% of patients. Approximately one-third of patients with AN improve, living with only partial or residual features of the disorder, and 20% remain chronically ill over the long term (Steinhausen, 2002). Death occurs in approximately 5% of patients with AN (Steinhausen, 2002), a rate higher than

that of any other psychiatric illness (Sullivan, 1995). About half of the deaths in patients with AN occur as a result of suicide. The remainder are a result of cardiac abnormalities, organ failure, or other physical complications of AN. Strober, Freeman, & Morrell, (1997) followed adolescents who were hospitalized for AN for a 12-15 year period post hospitalization. They describe a typical course of treatment as being 60-72 months.

#### **2.4.4 Etiology**

The etiology of AN is not known. Available evidence documents that it is multi-determined, resulting from a complex interplay of biological, genetic, psychological, familial, and environmental/cultural factors (APA, 2006). The extent to which any one of these factors influences the development of the disorder is a subject of ongoing inquiry.

Families, and in particular their patterns of interaction, have long been implicated in the onset and maintenance of AN (e.g., Bruch, 1973; Gull, 1874; Minuchin, Rosman, & Baker, 1978; Selvini Paazzoli, 1974). Constructs such as enmeshment, over-protectiveness, rigidity, and lack of conflict resolution have been associated with families of patients with AN and have been theorized to at least maintain, if not cause, AN. Likewise, sociocultural factors, specifically the idealization of thinness as a symbol of beauty, have also been implicated as factors in the development of AN (Anderson-Fye & Becker, 2004). Although these explanations have considerable face validity, there is no empirical evidence to support the claim that families or sociocultural factors cause AN. Cultural influences that idealize thinness are pervasive in Westernized cultures and may contribute to or moderate risk for the development of an eating disorder in vulnerable individuals. However, the influence of culture alone is now recognized as being insufficient to cause AN. Similarly, problematic styles of interaction and communication

may be present in families of patients with AN, and may need to be a focus of therapeutic efforts; however, it is unlikely that the presence of specific styles of family interactions alone is sufficient to cause AN.

Research focused on the role of biological and genetic factors in the development of AN has yielded interesting results that challenge previously held conceptualizations of AN. There is now a growing body of research that has found significantly greater lifetime prevalence of eating disorders, including AN, among relatives of people with eating disorders compared to relatives of controls, suggesting that biology plays a substantial role in the etiology of AN (e.g., Lilenfeld, et al., 1998; Strober, Freeman, Lampert, Diamond, & Kaye, 2000; Strober, Lampert, Morrell, Burroughs, & Jacobs, 1990). These studies controlled for the effect of shared environment and demonstrated that genetic factors account for the expression of AN in families.

Individual biologically based personality factors have also been examined as potential contributors to the development of AN. In a study done by Bulik, Sullivan, Tozzi, Furberg, Lichtenstein, and Pedersen (2006), neuroticism, defined as emotional instability, low self-esteem, and feelings of anxiety, depression, and guilt, emerged as a significant prospective predictor of AN. This finding suggests that early existence of neuroticism may predispose individuals to AN. Findings from Anderluh, Tchanturia, Rabe-Hesketh, and Treasure (2003) suggest that childhood histories of obsessive-compulsive traits, specifically perfectionism, rigidity, and rule-bound behavior, may be associated with increased risk for developing AN. There is also evidence to suggest that high rates of childhood anxiety disorders, specifically generalized anxiety disorder and obsessive compulsive disorder, precede the development of AN (Bulik, Sullivan, Fear & Joyce, 1997).

### **2.4.5 Psychiatric Comorbidity**

Co-occurring psychiatric illness is common among patients with AN seeking treatment at tertiary-level psychiatric treatment centers (APA, 2006). The presence of other psychiatric illnesses adds complexity to diagnosis, treatment, and outcome and thus is included as a variable in our examination of predictors of readmission. Steinhausen (2002) found in his review of 119 studies of close to 5600 patients diagnosed with AN that one-quarter of participants had anxiety disorders and one-quarter had affective disorders. He also found that anxiety disorders and phobias, affective disorders, substance use disorders, obsessive compulsive disorder (OCD), and unspecified personality disorders, including borderline personality disorder, were very common diagnoses at follow-up. Moreover, there was evidence that depression, anxiety disorder, phobias, and personality disorders served as risk factors contributing to less than favorable outcome in patients with AN.

Other studies report similarly high or higher rates of co-occurring psychiatric illness. Two studies have found lifetime co-occurring major depression or dysthymia in 50-75% of patients with AN (Halmi et al., 1991; Herzog, Nussbaum & Marmor, 1996). High rates of OCD and obsessive compulsive symptomatology are also well documented in the literature (Godart, Flament, Perdereau, Jeammet, 2002; Halmi et al., 1991; Kaye, et al., 2004), with OCD frequently predating the onset of AN (Anderluh, et al., 2003; Bulik, et al., 1997). Co-occurring anxiety disorders, particularly social phobias, are common among patients with AN (Herzog et al., 1992; Kaye et al., 2004). Studies report an estimated 12-18% of patients with AN have co-occurring substance abuse. These studies have further established that substance abuse is found primarily in those patients with the binge eating, purging subtype of AN (Bulik, et al., 2004; Halmi et al., 1991; Herzog et al., 1992).

#### **2.4.6 Medical Complications**

Serious medical complications are common in AN (Mitchell, Pomeroy & Adson, 1997). AN has a significant impact on physical health and often results in serious and chronic secondary health problems that are sometimes fatal. Consequently, the physical health of patients with AN requires careful evaluation, ongoing monitoring, and intervention. Many of the medical complications associated with AN are a result of the effects of starvation. Keys, Brozek, Henschel, Mickelsen and Taylor (1950) from the University of Minnesota demonstrated definitively that physical as well as emotional health is affected by starvation. This study contributed significantly to our understanding of AN by demonstrating that symptoms once thought to be primary symptoms of AN were in fact attributable to starvation. Many of the psychological, cognitive, and behavioral changes described in the Keys et al. study as being associated with starvation are commonly seen in AN. Psychological changes associated with starvation and seen in AN include depression, anxiety, irritability, lability, social withdrawal and decreased self-esteem. Cognitive changes precipitated by starvation and commonly seen in AN include decreased concentration, poor judgment and apathy. The changes in behavior typically seen in AN such as food preoccupation, increased interest in cooking and recipes, unusual eating habits, overuse of condiments, spices, and caffeinated beverages are also associated with starvation. Thus, diagnoses of comorbid conditions often are deferred until after refeeding has occurred.

Common physical complications secondary to starvation and frequently seen in AN include cardiovascular abnormalities such as bradycardia and hypotension, electrolyte disturbances, endocrine abnormalities including amenorrhea, hematological irregularities, gastrointestinal problems, bone and metabolism abnormalities, neurological abnormalities, and

skin and hair changes (Mitchell, Pomeroy & Adson, 1997). Behaviors such as binge eating and vomiting, and the use of substances such as diet pills, diuretics, laxatives, and emetics, used to reduce weight, further increase the risk of medical complications.

Most physical, psychological, cognitive, and behavioral effects of starvation normalize with nutrition rehabilitation and weight gain; however, some physical complications may not resolve following restoration of adequate nutrition and weight restoration. Physical complications such as osteoporosis and infertility (Pike & Striegel-Moore, 1997), cerebral atrophy (Kingston, Szmuckler, Andrews, Tress, & Desmond, 1996) and growth retardation (Lantzouni, Frank, Golden, & Shenker, 2002) may not reverse with nutrition and weight restoration.

#### **2.4.7 Treatment**

Experts agree that AN requires intensive medical and psychological treatment (van Furth, 1998); however, there is a remarkably little research to guide decisions regarding AN treatment and treatment setting (e.g., Fairburn, 2005; Strober, 2005). The paucity of AN treatment research is related to the difficulties associated with recruiting sufficient numbers of persons with a disorder that has a low prevalence rate who are often difficult to engage in treatment, and who require long-term treatment. Consequently, few data exist on the long-term efficacy of treatment for patients with AN.

Although there is not compelling evidence to guide our decision-making regarding treatment setting (hospital vs. ambulatory), psychosocial intervention, and medication use, evidence does exist to support the necessity of weight restoration as a necessary and primary component of treatment (APA, 2006) and a significant predictor of outcome (Zipfel, Lowe, Reas,

Deter, & Herzog, 2000). As such, weight at admission and discharge will be examined as a predictor of readmission in the present study. Support for the importance of weight as a predictor of outcome is provided by Baran, Weltzin and Kaye (1995), who found that more than 50% of patients with AN who were discharged from inpatient hospitalization while still underweight reported significantly higher rates of re-hospitalization and endorsed more symptoms than those who achieved normal weight prior to discharge. Similar findings were reported by Commerford, Licinio and Halmi (1997) in their 5-year follow-up study of 31 patients diagnosed with AN and bulimia nervosa. They concluded that those patients who met all discharge criteria, including attainment of target weight at the time of discharge, had a significantly higher percent of ideal body weight and were less likely to have relapsed than those who did not meet the discharge criteria at follow-up. Heberbrand et al., (1996 and 1997) added further support for the significance of weight as a predictor of outcome with their findings that a lower weight at referral for treatment was associated with less frequently attained normal body weight and greater risk of chronic AN and death. Our own research, described at the end of this review, also documents a link between weight at either referral or discharge and short-term outcome (Treat et al., under review). There are no available data to indicate that brief inpatient stays are associated with good long-term outcome (APA, 2006).

#### **2.4.8 Treatment Setting**

The research findings described above support the importance of weight gain in the treatment of AN, but research addressing the optimal setting for weight restoration is sparse. AN treatment occurs in a variety of settings, ranging from intensive eating disorder specific inpatient units to residential and partial hospitalization programs to outpatient programs of varying intensities. In

general, patients who are very low weight (defined as less than 85% of an individually determined healthy weight) have considerable difficulty gaining weight without the support and structure of a specialized inpatient unit (APA, 2006). Physical parameters to consider in determining treatment setting include weight, rate of weight loss, cardiac function and metabolic status (APA, 2006; LaVia et al., 1997). Additional factors to consider in determining treatment setting include suicidality, motivation to recover, the presence of co-occurring disorders, the ability to control compulsive exercise and purging behavior, environmental stressors, and geographic availability of treatment program (LaVia et al., 1997). Hospitalization is indicated for patients who have failed to benefit from less intensive levels of care or under the following conditions: medical instability, high suicidal intent, body weight less than 85% of ideal or acute, rapid weight loss, poor motivation to recover as indicated by treatment resistance, the need for supervision during and after meals, and severe family conflict or lack of an adequate support system (LaVia et al., 1997).

Although indications for inpatient treatment of patients with AN have been defined, research evidence supporting the long-term efficacy of inpatient treatment for AN is lacking. Pike (1998), in her review of studies of long-term outcome, reported that between 30% and 50% of patients discharged from an inpatient unit to outpatient care relapsed and required readmission to an inpatient unit. Clinical concern related to the inadequacy of inpatient and traditional outpatient care for patients with AN, combined with managed care pressures to reduce use of inpatient care, have led to the development of alternative levels of care. The partial hospital program (PHP) is one such alternative being developed and used for patients with eating disorders.

PHPs for patients with eating disorders provide intensive treatment and typically have treatment objectives similar to those of an inpatient unit. Treatment is usually provided on a 5-7 day per week basis, but PHPs differ from inpatient treatment in that they are not 24-hour per day treatment, and thus require that patients be medically and psychiatrically stable enough for outpatient care.

The structure of PHPs for patients with eating disorders varies widely. There are descriptions of PHPs for eating disorders; however, little is known about how this care is delivered and the effect of this level of care on AN treatment outcome. The few studies describing the utility of PHPs for patients with AN reported in the literature report mixed findings. Some studies suggest that PHP is an effective treatment for achieving weight gain and symptom relief in patients with AN, at least in the short term (Gerlinghoff, Backmund & Franzen, 1998; Piran et al., 1989; Williamson et al., 2001). These studies however, describe a 10-12 week average length of stay in PHP, which may be incompatible with current limitations of public and private insurance. Moreover, the Williamson et al. (2001) report of positive outcome was for a generally healthier group, i.e., patients admitted to PHP at higher weights and not having had inpatient treatment immediately prior to admission to PHP.

Less positive findings are reported by Howard, Evans, Quintero-Howard, Bowers, and Andersen (1999), who studied patients with AN who were discharged from an inpatient unit to PHP to identify prognostic indicators for success in PHP. Their findings suggest that duration of illness greater than 6 years is associated with short-term treatment failure. Moreover, they add support for findings from other studies (i.e., Deter & Herzog, 1994; Heberbrand et al., 1997 and 1996; Richard, Bauer, & Kordy, 2005) that report longer durations of illness as being associated with long-term negative outcome, including chronic AN and death, and thus support the

inclusion of duration of illness as a potential predictor of readmission in the current study. Moreover, they report a combined length of treatment (inpatient and PHP) of approximately 91 days and a significantly slower rate of weight gain in PHP than in inpatient care, suggesting that PHP treatment is neither clinically nor cost effective for the average patient. Also of significance is their conclusion that PHP appears to be most effective for patients discharged from inpatient care at weights of 90% or more of healthy weight.

The implications of these findings are of particular concern in light of the abbreviated length of inpatient stay commonly associated with a managed care environment. The restrictions imposed currently on duration of hospitalization would preclude the optimal length of stay described in the Howard et al. (1999) study and preclude in most cases the attainment of weight gain to 90% of healthy weight.

PHP for patients with AN is a potentially useful alternative to inpatient care; however, its long-term clinical and cost effectiveness have not yet been established (Zipfel et al., 2002). Research is needed to determine for whom and under what conditions PHP would be an effective treatment setting for AN.

Residential treatment is another potential alternative to inpatient care (APA, 2006). Residential care is intended for patients who need longer term care, but who do not have acute medical or psychiatric symptoms necessitating inpatient treatment. Residential treatment is 24-hour, non-hospital based care, and is generally provided by a multidisciplinary team. Eating disorder residential treatment facilities are generally for-profit enterprises that are not covered by private or public insurance. In the only known study of eating disorders residential care in the United States, Frisch, Herzog and Frankel (2006) surveyed 22 facilities and found that this level of care has seen rapid growth in the last decade, with a substantial increase in the number of

residential programs occurring between 2000 and 2004. The programs surveyed varied widely in approach and are described as having an average length of stay of 83 days at an average daily cost of \$956. The daily cost of residential programs reported in this study is similar to that reported for inpatient care. The lack of insurance coverage for residential treatment and their high cost would require patients or families to have substantial financial resources in order to access this level of care. The study also noted that there were no established standards of care for residential treatment and identified the need for standardization and regulation by external licensing bodies. Moreover, they noted the lack of residential treatment outcome research and the crucial need for such research in light of the proliferation, length and expense of such programs (Frisch et al., 2006).

The empirical database for outpatient individual treatments for AN is very limited. Eight controlled trials with a total sample size of about 400 represents the extant empirical literature for psychosocial treatments for AN. There is no evidence to support the efficacy of any particular form of outpatient treatment for patients with AN who are underweight (APA, 2006). There is preliminary support for the use of cognitive behavioral therapy with weight-restored adults (Pike, 2003).

There is some evidence to support the use of family therapy with adolescent patients diagnosed with AN. In a study done at the Maudsley Hospital in London, Russell, Szmuckler, and Eisler (1987) found family therapy to be superior to individual therapy for patients with AN younger than 19 years of age and who had a duration of illness of less than 3 years. Based on this work, Dare and Eisler (1997) developed a specific form of family treatment for adolescents diagnosed with AN called the Maudsley approach. This approach is contrary to the traditional stance in AN family treatment of viewing families as pathological and as causing or maintaining

AN symptoms in the patient. The Maudsley approach specifically avoids any direct or implied suggestion of blame and puts parents, rather than clinicians, in charge of their child's refeeding. Since Russell's et al. (1987) description of this approach, three subsequent controlled trials examining aspects of the Maudsley approach have added support for its use (Dare, Eisler, Russell, Treasure, & Dodge, 2001; Eisler et al., 2000; leGrange, Eisler, Dare, & Russell, 1992). The Maudsley approach has also been published in manual form (Lock, leGrange, Agras, & Dare, 2001).

#### **2.4.9 Psychopharmacology**

There are no known effective psychotropic interventions for patients diagnosed with AN who are underweight. Medication can be used to treat associated symptoms, however in one study of antidepressant medication, fluoxetine, a select serotonin reuptake inhibitor (SSRI), was found to be beneficial for reducing episodes of relapse, improving weight maintenance and decreasing depressive symptoms (Kaye et al., 2001). A subsequent study of the use of fluoxetine with patients who have AN, however, failed to demonstrate any positive effect on relapse or weight maintenance (Walsh et al., 2006).

There is preliminary support for the use of second generation antipsychotic medications to promote weight gain and to treat associated symptoms of AN such as obsessiveness, limited insight, anxiety, and psychotic-like thinking in adults and adolescents; however, evidence is based on case reports, case series and open-label uncontrolled trials (Gaskill, Treat, McCabe, & Marcus, 2001; LaVia, Gray, & Kaye, 2000). Further research utilizing controlled trials is needed to evaluate the efficacy of second-generation antipsychotic medication in the treatment of AN.

#### **2.4.10 Preliminary Studies**

The current study is third in a series of studies by our multidisciplinary team at Western Psychiatric Institute and Clinic to examine the effect of the shortened length of inpatient stay on the short- and long-term outcomes of patients with AN. As part of an academic medical center, our treatment center has access to large numbers of patients with AN who otherwise are difficult, if not impossible, to locate and study in sufficient numbers. Our team of clinical researchers designed and developed the treatment-outcome database which allowed us in two initial studies to describe current AN inpatient treatment practices at our treatment center and to predict short-term outcomes, and which allows me to examine predictors of long-term outcome in my dissertation research.

Our initial study described details of the inpatient treatment that patients with AN received in the current care environment and documented the notably shorter length of inpatient stay (37.95 days); the lower weights at discharge (approximately 85% of ideal body weight); the existence of unresolved, non-acute medical issues at discharge; and the lack of improvement on psychological correlates of eating disorders at discharge (Treat et al., 2005). The patients described in this initial study remained quite ill at discharge and clearly did not meet the criteria established by Pike (1998) to indicate a satisfactory initial response to treatment. Importantly, this study illustrated the disparity between established best practice standards and practice that is attainable in a managed care environment. Moreover, given that patients at discharge showed markedly worse outcomes than observed after much longer inpatient treatment stays, this study highlights the importance of characterizing short- and long-term outcomes of inpatient hospitalization in the current environment, and examining factors associated with better or worse outcome over time.

Our second study documented the short-term outcome of patients with AN who completed this inpatient treatment in approximately 5 weeks and then were discharged directly to and treated in our eating disorders-specific PHP for approximately 3 weeks (Treat et al., under review). At discharge from PHP, 35.2% of patients showed excellent outcomes, whereas 23.9% exhibited poor outcomes. Patients who displayed excellent outcomes at PHP discharge showed higher weights and less AN psychopathology at both admission to and discharge from inpatient care, fewer previous psychiatric hospitalizations, shorter duration of illness, and younger age. At 6-months post discharge from PHP, 52.1% of patients who had continued to receive outpatient treatment in our setting had been referred back to a higher level of care. Those patients who did not require readmission to a higher level of care had been admitted to inpatient at higher weight, had fewer previous hospitalizations, were younger, were viewed by staff as more committed to treatment, endorsed less AN psychopathology at inpatient admission and discharge, and showed greater weight gain during PHP. Two variables, number of previous admissions and weight gain in the first 5 days of PHP, correctly predicted almost 90% of outcome classification 6 months after PHP. These findings provide the initial evidence on predictors of short-term outcome for patients with AN who have received an abbreviated dose of inpatient treatment, and begin to document for whom and under what conditions PHP is a useful step-down treatment after inpatient hospitalization.

#### **2.4.11 Current Study**

The present study examines inpatient readmission as an index of long-term outcome for inpatient treatment of AN that occurs in a managed care climate in which shortened length of stay and lower discharge weight have become the norm. As previously described, the widespread

implementation of managed care practices has redefined the treatment landscape and forced a reconsideration of inpatient treatment objectives. The managed care environment precludes our ability to adhere to the established benchmarks historically achieved during hospitalization: attainment of 90% of ideal body weight, substantial decrease in excessive concern about and overvaluation of weight and shape, resumption of menses, substantial improvement in eating and compensatory behaviors, and resolution of medical problems as indicators of a satisfactory initial response to treatment (Pike, 1998). Consequently, the previously studied benchmarks can no longer be applied to the current care environment. The findings from the current study will provide important information about the outcomes of patients with AN in an era of shortened inpatient treatment stays, information presently absent in the literature.

The current study will further inform our understanding of the longer-term outcomes of patients with AN treated in this era of abbreviated inpatient stays by characterizing one critical aspect of long-term outcome – namely, readmission to inpatient care – and examining predictors of this aspect of long-term outcome. The first two studies focused on short-term outcomes; the first study examined and described patient characteristics at discharge from inpatient treatment and the second study examined patients at discharge from PHP and 6-months after completion of PHP. This study extends the work done in the first two studies by examining patient outcomes over a longer period of time to determine the occurrence of readmission for AN treatment within 3 years following the index admission. Moreover, this study will examine numerous potential predictors of readmission, including age, number of prior eating disorders psychiatric admissions, duration of illness, and percent of ideal body weight at admission to and discharge from inpatient treatment. Psychiatric symptoms such as eating disorder and depressive symptoms, difficulties in interpersonal functioning, and the presence of additional Axis I

diagnoses will also be examined as potential predictors of readmission. Consistent with findings reported in the previously described AN literature, it is hypothesized that more previous admissions, longer duration of illness, greater psychiatric symptomatology, and lower percent of ideal body weight at admission and discharge from inpatient will predict readmission to the inpatient level of care.

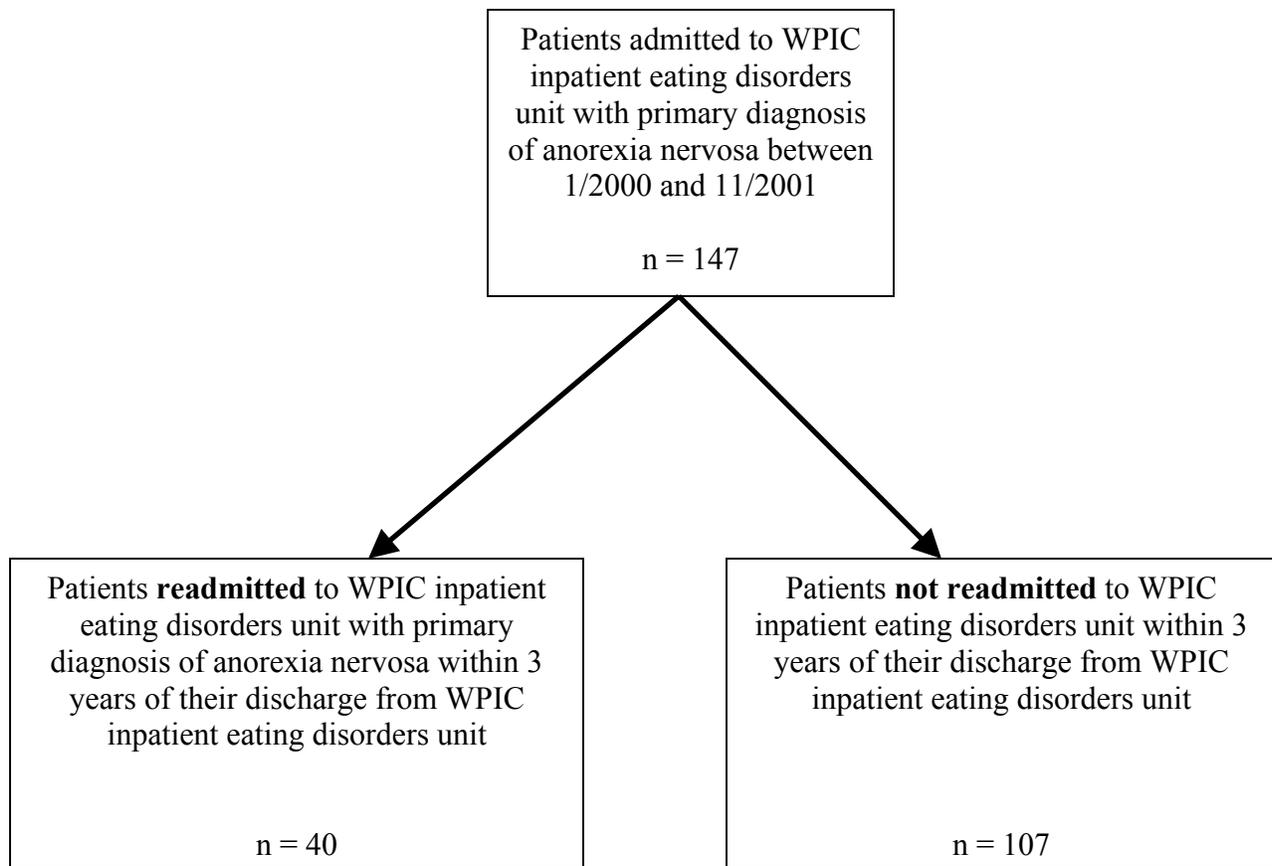
## **3.0 METHODS**

### **3.1 PARTICIPANTS**

The sample for the current study consists of 147 patients diagnosed with AN who were admitted consecutively to the Eating Disorders Unit at UPMC Western Psychiatric Institute and Clinic over a 22-month period of time from January 2000 to November 2001. All patients who were admitted to the eating disorders unit during this time period and who had a primary diagnosis of AN were included in the study. Analyses were conducted on both the full sample ( $n = 147$ ) and the subset of patients who were subsequently readmitted to the WPIC inpatient eating disorders unit within 3 years of their discharge ( $n = 40$ ) (See Figure 1). Analyses were also conducted on a subsample of patients consisting of only those patients who were not discharged from inpatient treatment against medical advice ( $n = 107$ ). That is, they were judged by the treatment team to have received an adequate dose of treatment (See Figure 2). This study examines only those patients who were readmitted to the WPIC eating disorders unit; no information is available regarding whether or not patients were readmitted to other eating disorders treatment facilities.

Data for this study were collected as part of a clinical pathways project designed to develop a best practice description of inpatient eating disorders treatment. The pathways project was a WPIC-wide quality initiative that identified, described, and assessed routine clinical care procedures with the intent of enhancing the quality of clinical care. Thus, patient permission was

not sought as these data were originally obtained in the course of routine clinical care. All self-report questionnaires were included as part of the assessment procedures conducted at the time of index admission and discharge. All remaining data were complete as they were obtained from review of the patient's medical record. Approval for the current project was obtained from the Biomedical Review Board of the University of Pittsburgh, after it was determined that these data would be used for research purposes (i.e. for wider dissemination and publication in the treatment outcome literature).



**Figure 1. Full Sample Schematic**

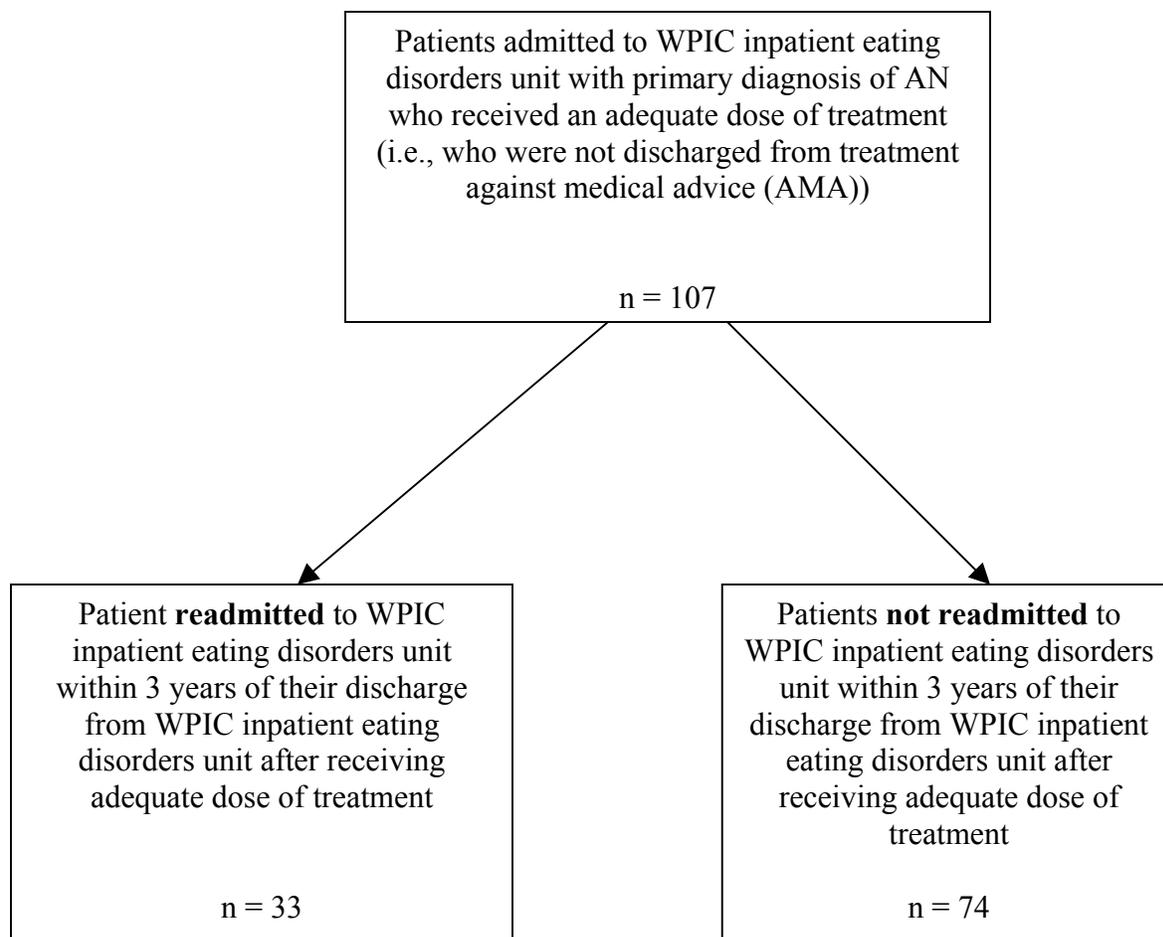


Figure 2. Subsample Schematic

### 3.2 INPATIENT TREATMENT

In earlier work we developed a set of clinical pathways describing the treatment protocol conducted on an 11-bed inpatient eating disorders unit by a multidisciplinary team, which includes psychiatrists, psychologists, nurses, dietitians, social workers, and psychiatric technicians (Treat et al., 2005). The treatment program is highly structured, with an emphasis on

shaping and reinforcement of appropriate behaviors. Weight gain is a primary treatment objective; there are 5 scheduled meals per day. Psychological interventions are delivered primarily in a group therapy format. Groups are intended to provide psychoeducation to patients regarding the various medical, psychological, and interpersonal aspects of eating disorders and to teach the skills designed to enhance the self-management of their disorder. For example, group topics include aspects of cognitive behavior therapy, dialectical behavior therapy skills, meal planning, and medical complications of eating disorders. Patients are expected to participate in all meals and group sessions; failure to do so results in privileges being withheld and may result in other behavioral or medical consequences. Patients follow a structured meal plan, and cognitive behavioral strategies are utilized to maintain a supportive and recovery-oriented milieu. Patients are placed on a disorder-specific pathway based on AN subtype, i.e., AN restricting type or AN purging type.

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. During the second phase of treatment, Pre-Self-Select, patients select their food from a menu which is then provided to them on trays delivered to the inpatient unit. This phase continues until patient weight is >80% IBW, daily calorie consumption is >2000, and there is no secretive exercising or ritualized eating behavior. Length of stay in this phase is anticipated to be 14-28 days. During the third phase of treatment, Self-Select Phase, patients select their food in a hospital cafeteria. This phase of treatment ends when appropriate foods are selected consistently and weight gain is stable at >1 kg per week. This phase is anticipated to last 7-10 days. During the final phase of treatment, Discharge Phase,

patients complete at least one meal session, a daylong therapeutic pass outside of the hospital, and a shopping/cooking outing. This phase is expected to last 5-7 days. Advancement criteria between treatment phases are presented in Table 1.

All patients also are placed on a medication pathway, which details pharmacological strategies for managing symptoms associated with eating disorders, such as anxiety or mood lability.

**Table 1. Criteria for Advancement to Next Inpatient Treatment Phase**

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Advance to Pre-Self-Select Phase

WHEN eating 100%, drinking minimum required fluids, attending groups, participating in family therapy (if applicable), completing treatment 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 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 1 therapeutic pass, meal session, and shopping/cooking outing (if applicable OR IF discharge therapeutically indicated)

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### 3.2.1 Procedures

During the 22-month period from January 2000 to November 2001 patients who were admitted to the eating disorders unit at UPMC Western Psychiatric Institute and Clinic with a primary

diagnosis of AN were asked to complete four self-report questionnaires: the Eating Disorders Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994), the Eating Disorders Inventory-2 (EDI-2; Garner, 1991), the Beck Depression Inventory-2 (BDI-2; Beck, Steer, & Brown, 1996), and the Inventory of Interpersonal Problems (IIP; Horowitz, Rosenberg, Baer, Ureno, & Villaseno, 1988). Descriptions of the questionnaires are provided in the Measures section. Staff explained that the questionnaires were part of a project to monitor and enhance clinical care and would provide detailed information regarding the symptoms with which patients present. Staff provided instructions for questionnaire completion to patients and were also available during the time patients completed the questionnaires to provide assistance if needed. Other than completing the questionnaires, patients participated in treatment as usual; no alterations were made to their treatment plans as a result of their completion of the questionnaires. During the week prior to discharge patients again were asked to complete three of the four questionnaires: the EDI-2, the BDI-2, and the IIP. Additional information regarding the other variables of interest was obtained by reviewing the medical record. Data gathered from the self-report questionnaires and chart reviews were entered into a database developed for this project.

The medical records of all patients were later reviewed to determine if patients had been readmitted to UPMC Western Psychiatric Institute and Clinic within 3 years of their index admission.

### **3.2.2 Measures**

#### **3.2.2.1 Self-Report.**

The four questionnaires completed at admission were: (a) the EDE-Q, a 34-item measure that assesses behavioral and psychological symptoms of eating disorders such as frequency of use of

compensatory behaviors (e.g., binge eating, purging), and preoccupation with weight, shape, eating, and dietary restraint during the last 28 days; (b) the EDI-2, a 91-item scale that provides information on dietary restraint, bulimic symptoms, body dissatisfaction, perfectionism, and ineffectiveness; (c) the BDI-2, a 21-item questionnaire designed to assess the severity of depressive symptoms; and (d) the IIP, a 47-item scale used to assess personality styles. At discharge, patients again were asked to complete the EDI-2, the BDI-2, and the IIP. Patients did not complete the EDE-Q again, because the 28-day time frame specified in the majority of the questions exceeded the length of stay for a substantial number of patients.

### **3.2.2.2 Diagnostic Information.**

The nurse manager of the inpatient unit documented psychiatric diagnoses based on criteria in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV: APA, 1994). 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). Female patients of menarcheal age were not required to exhibit amenorrhea to receive an AN diagnosis on our unit. This stance is consistent with literature suggesting that the amenorrhea criterion is unnecessary (Cachelin & Maher, 1998; Mitchell, Cook-Meyers, & Wonderlich, 2005). AN diagnoses were later cross-checked by verifying that all patients who received an AN diagnosis weighed less than 85% of ideal body weight on admission. Axis II diagnoses were deferred for all patients throughout inpatient treatment unless preexisting information documenting the presence of an Axis II diagnosis was available. Because this information was available for only a subset of patients, it was not included in the analyses. The practice of deferring personality disorder diagnosis during an inpatient hospitalization is consistent with the consensus of clinical

practice and opinion that suggests that patient functioning during an acute psychiatric crisis or at very low body weight is not a valid representation of patient functioning in general and should not be used as a basis for diagnosing personality disorders. However, included in the analysis will be information obtained from the IIP, the self-report measure assessing personality styles and assessed to be a valid measure of maladaptive personality styles associated with interpersonal dysfunction.

### **3.2.2.3 Other Clinical Information.**

Historical and demographic information was obtained from patient medical records at admission and included onset and duration of eating problems, frequency of previous psychiatric hospitalizations, height, education, race, marital status, gender, and age. Nursing staff monitored and recorded in the medical record weight, prescribed calories, and medication usage throughout treatment.

## **3.3 DATA PREPARATION AND ANALYSES**

Data was complete for almost all analyses, except for those based on the self-report questionnaire data, for which approximately 20% of the data were missing. Complete data were available, with the exception of self report questionnaire data, because it was gathered throughout the course of routine clinical care, documented in the medical record, and later obtained via medical record review. To increase power, missing questionnaire data was imputed and out-of-range estimates were replaced with the most extreme appropriate score for that

variable. Little's test was used to evaluate whether the missing data could be treated statistically as missing completely at random.

### **3.3.1 Description of Full Sample at Admission**

The clinical characteristics of the full sample (n=147) on admission to the inpatient unit is presented in the text and in tables. Tables present univariate descriptive statistics for the full sample at admission. Means and standard deviations are presented for continuous variables (e.g., duration of illness, number of previous admissions, body mass index (BMI), percent ideal body weight, and self-report measures); frequencies and percentages are presented for discrete variables (e.g., AN diagnostic sub-type, comorbid diagnoses, and use of medications).

### **3.3.2 Description of Pre-Post Inpatient Treatment Changes for Full Sample**

The next phase of analyses examined changes in the clinical characteristics of the full sample over the course of inpatient treatment. Given the non-normal nature of most distributions, Wilcoxon and McNemar bivariate procedures were used to evaluate whether continuous and discrete variables changed over the course of the index admission. Results are presented in the text and in tables.

### **3.3.3 Description of Readmission Sample**

The next phase of analyses described the clinical characteristics of the readmission sample (n=40) and differences between the readmitted and non-readmitted groups on all variables.

Mann-Whitney and chi-square bivariate procedures were used to examine whether index admission variables differed as a function of readmission status. Differences between the groups on each of the variables are presented in text and table form.

### 3.3.4 Prediction of Readmission

All demographic and clinical variables that were available on index inpatient admission and discharge were evaluated as potential predictors of readmission. Potential predictors that were examined include age, number of prior eating disorders psychiatric admissions, duration of illness, and percent of ideal body weight at admission to and discharge from inpatient treatment. Additionally, psychiatric symptoms including eating disorder and depressive symptoms, difficulties in interpersonal functioning, and presence of additional Axis I diagnoses were examined as potential predictors of readmission (see Table 2).

**Table 2. Examined Predictors of Whether Readmitted or Time to Readmission**

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AN subtype (purging vs restricting)
Duration of Eating Disorder
Number of Previous eating-disorder hospitalizations
Inpatient length of stay
Inpatient weight gain per week (kg)
Medication at inpatient discharge (present or absent)
Mood stabilizers
Selective serotonin reuptake inhibitors (SSRIs)
Second-generation anti-psychotics
Anxiety (either fast- or slow-acting benzodiazepines)
Age
Weight variables (at admission and discharge)
BMI
Percent-ideal BMI
Comorbidity information at inpatient discharge (present or absent)
Mood disorder diagnosis
Anxiety disorder diagnosis

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**Table 2 (cont'd)**

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Inventory of Interpersonal Problems subscale scores (admission and discharge)
Interpersonal Sensitivity
Ambivalence
Need for Social Approval
Lack of Sociability
Personality Disorder Detection
Eating Disorders Inventory subscale scores (admission and discharge)
Drive for Thinness
Bulimia
Body Dissatisfaction
Beck Depression Inventory score (admission and discharge)
Eating Disorders Examined subscale and global scores (admission only)
Restraint
Weight Concern
Shape Concern
Eating Concern
Global

---

Finally, all significant predictors of readmission status in bivariate analyses were included in multivariate logistic-regression and survival analyses. The distributions of all continuous variables were evaluated for normality on the basis of both visual inspection of the histograms and the skewness coefficient. Grossly non-normal distributions were transformed so that the distributions were more appropriate for parametric analyses. A natural-log or square-root transformation was used whenever possible, and variables with distributions that could not be transformed to rough normality were converted into discrete variables. The transformed data were used in the multivariate statistical analyses, but the untransformed data are presented in the text, tables, and figures, for ease of interpretation and comparison with the values presented in other reports.

Logistic regression was used to evaluate the relative and cumulative predictive power of the significant predictors of readmission within three years of inpatient discharge. These analyses evaluated whether the likelihood of readmission varied as a function of various predictors. As noted above, preliminary non-parametric bivariate analyses were used to screen

potential predictors. All significant bivariate predictors that passed a multicollinearity screening (i.e., that do not correlate too strongly with one another) were then included in a multivariate regression model.

Survival analysis was used to evaluate predictors of “survival time,” or the number of days until readmission. In contrast to the logistic-regression analyses, the survival analyses evaluated whether the length of time until readmission varied as a function of different predictors. All participants’ data were included in the analysis, including those who did not experience the target event of interest (i.e., readmission) during the three-year assessment window after inpatient discharge. After screening all potential predictors in preliminary bivariate survival analyses, significant bivariate predictors that passed a multicollinearity evaluation were included in the multivariate survival analysis model. A simultaneous-entry method was again used to select predictors for the final model.

### **3.3.5 Re-analysis of Research Questions for Patients Who Received an Adequate Dose of Treatment**

All analyses described above were conducted on a subsample of patients (n = 107) consisting of those patients who were not discharged against medical advice and thus received an adequate dose of treatment. This subset of patients is arguably more representative of those who have received an adequate dose of treatment in the current care environment and are thus a better group from which to identify predictors of readmission.

## 4.0 RESULTS

### 4.1 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 non-parametric statistical methods, except where noted (i.e., logistic regression and survival analyses). 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 data were imputed using the Expectation-Maximization algorithm procedure provided by SPSS, 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: length of stay, age, weight gain per week, number of previous hospitalizations for an eating disorder, BMI and % IBW at admission and discharge, calories at admission and discharge, reported duration of eating disorder, and AN subtype. Little's test suggested that the missing questionnaire data were missing completely at random,  $\chi^2(835) = 901.722$ ,  $p = .054$ , which justified the use of imputation methods to increase the power of analyses involving the questionnaire data. Across the full sample ( $n = 147$ ), the percentages of missing data were as follows: 18.4% and 24.5% for the EDI-2, at admission and discharge, respectively. 29.9% and 24.5% for the BDI-2 at

admission and discharge, respectively, and 18.4% for the EDE-Q at admission. 20.4% and 21.1% for the IIP at admission and discharge, respectively.

#### 4.1.1 Description of Full Sample

The majority of participants were female (94.6%), Caucasian (98.0%), single (87.8%), and hospitalized voluntarily throughout treatment (95.2%). Average age was 21.15 years (SD = 9.11, Median = 17.57). 41.5% percent reported at least one prior psychiatric hospitalization, and patients reported an average symptom duration of 5.26 years (SD = 6.76, Median = 2.37). Table 3 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, Coppinolle, & Pieters, 1999).

**Table 3. Clinical Characteristics of Full Sample (n=147) on Admission to Inpatient Unit**

Variable	Patients with Characteristic	
	N	%
Diagnosis		
AN-R	89	60.5
AN-P	58	39.5
Comorbid Axis I Psychiatric Diagnosis		
Any Unipolar Mood Disorder <sup>a</sup>	61	41.5
Any Anxiety Disorder <sup>b</sup>	31	21.1
Any Psychotic Disorder	0	0
Medication		
Anxiolytics	22	15.0
SSRIs	57	38.8
Second-Generation Antipsychotics	18	12.2
Mood Stabilizers	5	3.4
	Mean	SD
Duration of eating disorder (years)	5.26	6.76

**Table 3 (Cont'd)**

Body Mass Index <sup>c</sup>	15.08	1.53
Percent-Ideal Body Weight (%IBW) <sup>d</sup>	72.65	7.52
Eating Disorders Inventory-2		
Drive for Thinness	11.11	7.20
Bulimia	1.94	3.31
Body Dissatisfaction	14.16	8.54
Eating Disorders Examination-Q		
Restraint	3.64	1.94
Weight Concern	3.37	1.78
Shape Concern	3.92	1.77
Eating Concern	2.96	1.67
Global Score	3.47	1.68
Beck Depression Inventory-2		
Total Score	24.03	13.13
Inventory of Interpersonal Problems		
Interpersonal Sensitivity	1.69	.88
Ambivalence	1.05	.75
Aggression	.92	.64
Need for Social Approval	2.15	.97
Lack of Sociability	1.62	.90
Personality Disorder Detection	1.22	.63

<sup>a</sup>Major Depressive Disorder with or without psychotic features, Depressive Disorder NOS, Dysthymia

<sup>b</sup>Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, Panic Disorder, Post-Traumatic Stress Disorder, Social Phobia, Specific Phobia, Anxiety Disorder NOS

<sup>c</sup>Weight (kg) / Height<sup>2</sup> (m)

<sup>d</sup>Absolute body mass index divided by the medium body mass index for a given age and sex, as specified on CDC growth charts (CDC,2000)

Note: SSRI = selective serotonin reuptake inhibitors; AN-P = anorexia nervosa-bingeing/purging subtype; AN-R = anorexia nervosa-restricting subtype

Weight is represented in the text and tables in terms of Body Mass Index (BMI) and percent ideal body weight (%IBW). BMI is obtained by dividing weight in kilograms by height in meters squared ( $BMI = \text{Weight}(\text{kg}) / \text{height}^2(\text{m})$ ). %IBW refers to the patient's BMI divided by the median BMI for a specific age and gender, as specified by the Center for Disease Control (CDC, 2000).

#### **4.1.2 Pre-Post Inpatient Treatment Changes for Full Sample (n=147)**

The average length of stay for the entire sample was 31.48 days (SD = 18.34, Median = 28). Patients gained an average of 1.30 kg per week (SD = .78). Patients were 72.65% (SD = 7.52) of ideal BMI at admission and 83.44% (SD = 6.53) of ideal body weight at discharge.

As shown in Table 4, the percentage of patients who received comorbid diagnoses of either mood or anxiety disorders increased significantly from admission 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 re-nutrition, unless pre-existing information about the patient is available.

As shown in Table 4, 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 related to refeeding, from 12.2% to 42.3%. The percentage of patients taking SSRIs also increased significantly from 38.8% to 52.4%. Per the treatment protocol, patients who were admitted at less than 80% IBW were encouraged to discontinue SSRIs, consistent with evidence indicating lack of efficacy for SSRIs at low body weight (e.g., Attia, Haiman, Walsh, & Flater, 1998). After achieving 80% of IBW, SSRIs were prescribed or re-prescribed, as appropriate, given the available evidence at the time suggesting their potential utility in weight maintenance and the management of mood and anxiety symptoms (e.g., Kaye, Nagata, Weltzin, Hsu, Sokol, McConaha, Plotnicov, Weise, & Deep, 2001). Subsequent studies have since demonstrated no effect on weight maintenance (Walsh et al., 2006); however, they substantiate the continued utility of SSRIs for the management of co-existing mood and anxiety symptoms.

Average scores on the BDI-II and the Drive for Thinness and Bulimia subscales of the EDI-2, and Lack of Sociability subscale of the IIP decreased significantly over treatment. The observed decrease in the Body Dissatisfaction subscale score was not significant.

**Table 4. Pre-Post Inpatient Treatment Changes for Full Sample (n = 147)**

Variable	Admission		Discharge	
	Mean	SD	Mean	SD
Body Mass Index <sup>ab</sup>	15.08	1.53	17.32	1.29
Percent-Ideal Body Weight (% IBW) <sup>bc</sup>	72.65	7.52	83.44	6.53
Calories per day <sup>b</sup>	1506.08	417.71	2905.10	541.14
Eating Disorders Inventory-2				
Drive for Thinness <sup>b</sup>	11.11	7.20	8.75	6.66
Bulimia <sup>b</sup>	1.94	3.31	1.13	2.18
Body Dissatisfaction	1416	8.54	13.33	8.10
Beck Depression Inventory-II				
Total Score <sup>b</sup>	24.03	3.13	14.29	10.64
Inventory of Interpersonal Problems				
Interpersonal Sensitivity	1.69	.88	1.65	.86
Ambivalence	1.05	.75	1.13	.83
Need for Social Approval	2.15	.97	2.08	.95
Lack of Sociability <sup>b</sup>	1.62	.90	1.47	.88
Personality Disorder Detection	1.22	.63	1.21	.68
	N	%	N	%
Comorbid Axis I Psychiatric Diagnosis				
Any Unipolar Mood Disorder <sup>dc</sup>	61	41.5	76	51.7
Any Anxiety Disorder <sup>df</sup>	31	21.1	68	46.3
Any Psychotic Disorder	0	0	0	0
Medication				
Anxiolytics	22	15.0	20	13.6
SSRIs <sup>d</sup>	57	38.8	77	52.4
Second-Generation Antipsychotics <sup>d</sup>	18	12.2	62	42.3
Mood Stabilizers	5	3.4	9	6.1

<sup>a</sup>Weight (kg) / Height<sup>2</sup> (m)

<sup>b</sup>Pre-post difference significant at  $p < .05$ , using Wilcoxon Test to compare medians at admission and discharge

<sup>c</sup>Absolute body mass index divided by the median body mass index for a given age and sex, as specified on CDC growth charts (CDC, 2000)

<sup>d</sup>Pre-post difference significant at  $p < .05$ , using McNemar Test to compare dependent proportions

<sup>e</sup>Major Depressive Disorder with or without psychotic features, Depressive Disorder NOS, Dysthymia

<sup>f</sup>Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, Panic Disorder, Post-Traumatic Stress Disorder, Social Phobia, Specific Phobia, Separation Anxiety Disorder, Anxiety Disorder NOS

Note: SSRI = selective serotonin reuptake inhibitors; BMI = Body Mass Index

### **4.1.3 Description of Readmission Sample**

The readmission sample consists of 40 patients, 27.21% of the full sample of 147. Consistent with the full sample, the majority were female (92.50%), single (90%), and Caucasian (97.50%). 50% of the readmitted patients had no prior hospitalizations at the time of the index admission, and 20% had 3 or more prior eating disorders inpatient admissions. The total number of prior readmissions ranged from 0 to 12. The average length of time to readmission was 285 days (SD = 309.93, median = 148.50) and ranged from 2 to 1065 days. The average readmission weight was 73.70% of IBW (SD = 10.18, median = 74.70). 75% were readmitted at a weight of 80% of IBW or below.

### **4.1.4 Prediction of Readmission: Logistic Regression Approach**

All demographic and clinical variables that were available on index inpatient admission and discharge were evaluated as potential predictors of readmission using Mann Whitney and Chi Square procedures. Table 5 presents all significant findings. Readmitted patients scored significantly higher than patients who were not readmitted on the Drive for Thinness and Body Dissatisfaction subscales of the EDI-2 at discharge. Readmitted patients scored significantly higher on all subscales of the EDE-Q at admission. The BDI-II scores for readmitted patients at admission and discharge were also significantly higher. No significant differences emerged on any other variables, including weight, duration of illness, number of prior hospitalizations, presence of co-morbid psychiatric illness, and personality problems.

Next, a logistic-regression model was used to evaluate the predictive power of this pool of significant correlates of readmission status. As seen in Table 5, only scores on self-report

measures emerged as predictors of readmission status in the bivariate analyses. The strong correlations among these scores posed a multicollinearity problem that would increase the standard errors of parameter estimates and jeopardize the statistical significance of the findings. Thus, only a single self-report measure was included in the logistic-regression model. Because Body Dissatisfaction at inpatient discharge emerged as the single strongest predictor in the bivariate analyses reported in the previous paragraph, it was included as the self-report predictor of readmission status in the logistic-regression model. Body Dissatisfaction was roughly normally distributed, so it was unnecessary to transform this variable prior to inclusion in this parametric analysis. The Hosmer and Lemeshow goodness-of-fit test indicated that the model provided an adequate fit to the data,  $\chi^2(8) = 5.847$ ,  $p = .664$ . Body Dissatisfaction accounted for 9.1% of the variability in readmission status,  $\beta = .074$ ,  $p < .05$ . This variable correctly predicted the readmission status of 25 of the 40 readmitted patients (62.5%) and 64 of the 107 (59.8%) of the patients who were not readmitted.

**Table 5. Index Admission Variables for which Readmitted Patients (n=40) and Patients Who Were Not Readmitted (n=107) Differed Significantly**

Variable	Readmitted		Not Readmitted	
	Mean	SD	Mean	SD
Eating Disorders Inventory – 2				
Drive for Thinness (d/c)	11.13	6.67	7.62	6.43
Body Dissatisfaction (d/c)	16.64	7.24	12.09	8.08
Eating Disorders Examination – Q				
Restraining (adm)	4.17	1.80	3.44	1.96
Weight (adm)	3.86	1.64	3.18	1.80
Shape (adm)	4.41	1.67	3.73	1.78
Eating (adm)	3.40	1.63	2.79	1.66
Global (adm)	3.97	1.60	3.29	1.67
Beck Depression Inventory II				
Admission (sig)	28.17	12.64	22.48	13.03
Discharge (sig)	17.22	9.98	13.19	10.71

#### 4.1.5 Re-analysis of Research Questions for Subsample of Patients Who Received an Adequate Dose of Treatment (n= 107)

The analyses were repeated for a subsample of patients that excluded those who left treatment against medical advice (AMA) – that is, those who clearly did not receive an adequate dose of treatment. The rationale for excluding patients who left treatment prematurely is to provide a more valid description of the outcomes of patients who received an adequate dose of treatment in the current care environment.

The average age of patients in this subsample was 20.57 years (SD = 9.14), and their mean duration of illness was 4.73 years (SD = 6.30). 59.8% of this subsample were diagnosed with restricting subtype of AN, and 40.2% were diagnosed with the purging subtype of AN. The average length of stay for this subsample was 32.45 days (SD = 16.38, Median = 30). See Table 6 for a description of the clinical characteristics of the subsample.

**Table 6. Clinical Characteristics of Subsample of Patients Who Received an Adequate Dose of Treatment (n=107) on Admission to Inpatient Unit**

Variable	Patients with Characteristic	
	N	%
Diagnosis		
AN-R	64	59.8
AN-P	43	40.2
Comorbid Axis I Psychiatric Diagnosis		
Any Unipolar Mood Disorder <sup>a</sup>	45	42.1
Any Anxiety Disorder <sup>b</sup>	21	19.6
Any Psychotic Disorder	0	0
Medication		
Anxiolytics	14	13.1
SSRIs	44	41.1
Second-Generation Antipsychotics	15	14.0
Mood Stabilizers	3	2.8
	Mean	SD
Duration of eating disorder (years)	4.73	6.30
Body Mass Index <sup>c</sup>	15.28	144
Percent-Ideal Body Weight (%IBW) <sup>d</sup>	73.93	6.88

**Table 6 (Cont'd)**

Eating Disorders Inventory – 2		
Drive for Thinness	12.22	7.02
Bulimia	2.00	3.39
Body Dissatisfaction	14.61	8.70
Eating Disorders Examination – Q		
Restraint	3.90	1.85
Weight Concern	3.59	1.76
Shape Concern	4.07	1.78
Eating Concern	3.11	1.65
Global Score	3.67	1.64
Beck Depression Inventory-2		
Total Score	24.89	12.74
Inventory of Interpersonal Problems		
Interpersonal Sensitivity	1.69	.84
Ambivalence	1.07	.76
Aggression	.93	.61
Need for Social Approval	2.21	.94
Lack of Sociability	1.56	.86
Personality Disorder Detection	1.23	.60

<sup>a</sup>Major Depressive Disorder with or without psychotic features, Depressive Disorder NOS, Dysthymia

<sup>b</sup>Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, Panic Disorder, Post-Traumatic Stress Disorder, Social Phobia, Specific Phobia, Anxiety Disorder NOS

<sup>c</sup>Weight (kg) / Height 2 (m)

<sup>d</sup>Absolute body mass index divided by the median body mass index for a given age and sex, as specified on CDC growth charts (CDC, 2000)

Note: SSRI = selective serotonin reuptake inhibitors; AN-P = anorexia nervosa-bingeing/purging subtype; AN-R = anorexia nervosa-restricting subtype

#### **4.1.6 Pre-Post Inpatient Treatment Changes for Subsample Who Received an Adequate Dose of Treatment (n = 107)**

As shown in Table 7, percent ideal body weight increased significantly over the course of treatment from 73.93% (SD = 6.88) to 85.37% (SD = 5.56). Average scores on the Drive for Thinness and Bulimia subscales of the EDI-2 and the BDI II decreased significantly over the course of treatment. There were no significant changes over the course of treatment on the Body Dissatisfaction subscale of the EDI-2 or any of the IIP subscale scores.

**Table 7. Pre-Post Inpatient Treatment Changes for Subsample of Patient Who Received an Adequate Dose of Treatment (n=107)**

Variable	Admission		Discharge	
	Mean	SD	Mean	SD
Body Mass Index <sup>ab</sup>	15.08	1.44	17.65	1.21
Percent-Ideal Body Weight (% IBW) <sup>bc</sup>	73.93	6.88	85.37	5.56
Calories per day <sup>b</sup>	1543.87	448.20	3002.34	405.00
Eating Disorders Inventory-2				
Drive for Thinness <sup>b</sup>	12.22	7.02	9.41	6.67
Bulimia <sup>b</sup>	2.00	3.39	1.07	2.20
Body Dissatisfaction	14.61	8.70	14.04	8.29
Beck Depression Inventory-II				
Total Score <sup>b</sup>	24.89	12.74	14.83	10.50
Inventory of Interpersonal Problems				
Interpersonal Sensitivity	1.69	.84	1.69	.83
Ambivalence	1.07	.76	1.09	.77
Aggression	.93	.61	.87	.74
Need for Social Approval	2.21	.94	2.17	.91
Lack of Sociability	1.56	.86	1.54	.84
Personality Disorder Detection	1.23	.60	1.21	.66
	N	%	N	%
Comorbid Axis I Psychiatric Diagnosis <sup>d</sup>				
Any Unipolar Mood Disorder <sup>de</sup>	45	42.1	57	53.3
Any Anxiety Disorder <sup>df</sup>	21	19.6	51	47.7
Any Psychotic Disorder	0	0	0	0
Medication				
Anxiolytics	14	13.1	14	13.1
SSRIs <sup>d</sup>	44	41.1	63	58.9
Second-Generation Antipsychotics <sup>d</sup>	15	14.0	52	48.6
Mood Stabilizers	3	2.8	6	5.6

<sup>a</sup>Weight (kg) / Height<sup>2</sup> (m)

<sup>b</sup>Pre-post difference significant at  $p < .05$ , using Wilcoxon Test to compare medians at admission and discharge

<sup>c</sup>Absolute body mass index divided by the median body mass index for a given age and sex, as specified on CDC growth charts (CDC, 2000)

<sup>d</sup>Pre-post difference significant at  $p < .05$ , using McNemar Test to compare dependent proportions

<sup>e</sup>Major Depressive Disorder with or without psychotic features, Depressive Disorder NOS, Dysthymia

<sup>f</sup>Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, Panic Disorder, Post-Traumatic Stress Disorder, Social Phobia, Separation Anxiety Disorder, Anxiety Disorder NOS

Note: SSRI = selective serotonin reuptake inhibitors; BMI = Body Mass Index

#### 4.1.7 Prediction of Readmission for Subsample of Patients Who Received an Adequate Dose of Treatment: Logistic Regression Approach

All demographic and clinical variables listed in Table 2 were evaluated as potential predictors of readmission in preliminary bivariate analyses using Mann Whitney and Chi Square procedures.

Table 8 presents all significant findings. Readmitted patients scored significantly higher than not readmitted patients on the Drive for Thinness and Body Dissatisfaction subscales of the EDI-2 at discharge. Readmitted patients also showed higher scores on the Interpersonal Sensitivity, Lack of Sociability, and Personality Disorder Detection subscales of the IIP at discharge. The BDI-II scores for readmitted patients at discharge also were significantly elevated. Readmitted patients also differed significantly from the remaining patients on the presence of co-morbid psychiatric illnesses; readmitted patients displayed a significantly higher frequency of any unipolar mood disorder at discharge. No other significant differences emerged on any other variables, including any of the subscales of the EDE-Q, weight, duration of illness, number of prior psychiatric hospitalizations, and medication usage.

**Table 8. Index Admission Variables for Which Readmitted Patients (n=33) and Patients Who Were Not Readmitted (n=74) Differed Significantly Among Patients who Received an Adequate Dose of Treatment**

Variable	Readmitted		Not Readmitted	
	Mean	SD	Mean	SD
Eating Disorders Inventory – 2				
Drive for Thinness (d/c)	11.13	6.67	7.62	6.43
Body Dissatisfaction (d/c)	16.64	7.24	12.09	8.08
Inventory of Interpersonal Problems				
Interpersonal Sensitivity (d/c)	1.95	.73	1.57	.86
Lack of Sociability (d/c)	1.79	.81	1.43	.83
Personality Disorder Detection (d/c)	1.40	.58	1.13	.67
Beck Depression Inventory II				
Discharge (sig)	18.04	10.00	13.40	10.46
	N	%	N	%
Comorbid Axis I Psychiatric Diagnoses				
Any unipolar mood disorder (d/c)	23	69.7	34	45.9

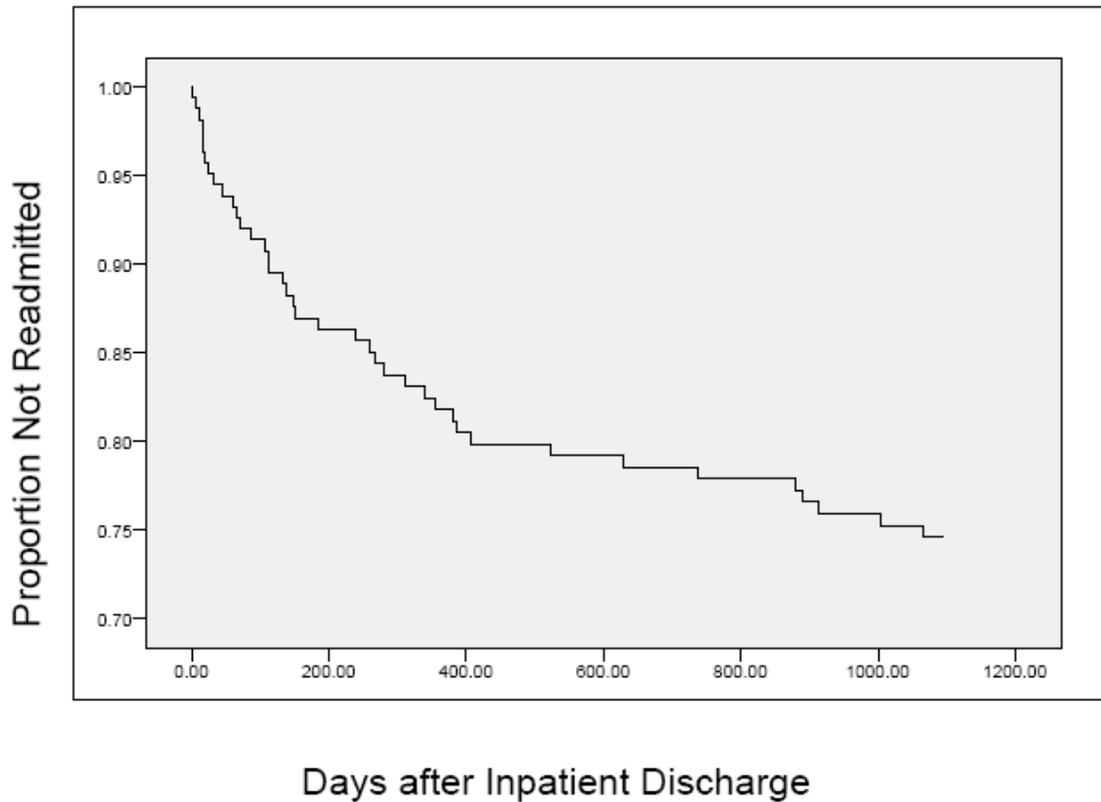
A logistic-regression approach was used to evaluate the predictive power of this pool of significant bivariate correlates of readmission status. Strong correlations among scores on self-report measures again presented a multicollinearity problem and necessitated the inclusion of only a single self-report measure in the logistic-regression model. Body Dissatisfaction at

inpatient discharge emerged as the single strongest predictor in the bivariate analyses of the subsample of patients who received an adequate dose of treatment. Thus, only this self-report index was included in the logistic-regression model. The presence or absence of any unipolar mood disorder at inpatient discharge also was included in the model. Body Dissatisfaction was not transformed prior to conducting the analysis, as its distribution was roughly normal. The Hosmer and Lemeshow goodness-of-fit test indicated that the model provided an adequate fit to the data,  $\chi^2(8) = 8.311$ ,  $p = .404$ , and accounted for 12.0% of the variability in readmission status. Body Dissatisfaction,  $\beta = .056$ ,  $p < .05$ , and Mood Disorder,  $\beta = .854$ ,  $p < .10$ , correctly predicted the readmission status of 20 of the 33 readmitted patients (60.6%) and 44 of the 74 (59.5%) of the not readmitted patients.

#### **4.1.8 Prediction of Readmission: Survival Analysis Approach**

Cox-regression survival techniques were used to evaluate potential predictors of time to readmission (up to three years after inpatient discharge), whereas logistic-regression methods were used to examine prediction of the presence or absence of readmission within three years of inpatient discharge. Please refer to Table 2 for a list of the predictors that were evaluated in preliminary bivariate analyses. Figure 3 depicts the average survival curve for the full sample. The X axis presents the number of days since inpatient discharge, which ranges from 0 to 1095 days. The Y axis presents the probability of “surviving” readmission (i.e., the probability of not being readmitted). Initially, this probability is 1.00 (i.e., no patients have been readmitted on the day of discharge), but it declines to .7279 by the end of 1095 days. In other words, the percentage of patients who are readmitted within three years is 27.21, as noted previously. Note

that most readmissions occur within one year of inpatient discharge. Variability in the time to readmission serves as the dependent variable in all subsequent survival analyses. This variable assumes values from 0 to 1095 for readmitted patients and has a “censored” value (which indicates that the readmission “event” has not yet occurred) for all remaining patients.



**Figure 3. Average Survival Curve for the Full Sample (n = 147)**

MPlus was used to conduct all survival analyses, because this statistical package (but not SPSS) allows maximum-likelihood estimation of parameters with standard errors that are robust to non-normality. Thus, it is unnecessary to transform variables with non-normal distributions prior to analysis. Many of the potential predictor variables in the current data set were not transformable to roughly normal distributions without discretizing them, which eliminates

potentially useful information from analyses. Thus, the use of MPlus to conduct survival analyses allowed the retention of more information about each variable.

For each survival analysis, MPlus provides the unstandardized beta coefficients for the logistic-regression equation, the standard errors for the coefficients, and the estimates divided by their respective standard errors. An estimate divided by its standard error provides a test statistic for the evaluation of the null hypothesis that the population parameter estimate (i.e., the population parameter corresponding to the beta coefficient) is zero. The test statistic is known to adhere to a Z distribution, so values greater than +1.96 or less than -1.96 are significant at  $p = .05$  (two-tailed). Odds ratios, which correspond to exponentiated beta coefficients, also are provided for each significant predictor. Odds ratios indicate the odds of readmission for a 1-unit increase in a predictor. For a dichotomous predictor, the odds ratio is readily interpretable. For example, an odds ratio of 2.248 for any unipolar mood disorder at inpatient discharge indicates that earlier readmission (e.g., readmission 30 days post inpatient discharge rather than 500 days post inpatient discharge) is more than two times as likely for a patient who receives such a diagnosis on discharge. For continuous predictors, it is useful to consider how the odds of readmission change with a greater increase in the value of a predictor. For example, an odds ratio of 1.066 for Body-Dissatisfaction subscale scores on the EDI-2 at inpatient discharge (i.e.,  $1.066 = e^{0.059}$ ) indicates that the odds of being readmitted are 1.066 times greater for a patient who scored one point higher than another patient on the Body-Dissatisfaction subscale of the EDI-2. This likely strikes the reader as a miniscule effect, but Body-Dissatisfaction scores range from 0 to 27 in the current data set, whereas values of the mood-disorder variable are constrained to be either 0 or 1. Note that the odds of readmission for a patient who scored 12 points higher on the Body-Dissatisfaction subscale is 2.030 times greater than it is for the patient scoring 12 points

less (i.e.,  $2.030 = e(12*0.059)$ ). Thus, the odds of earlier readmission are slightly more than two times greater for a patient who scores 12 points higher on the subscale at inpatient discharge.

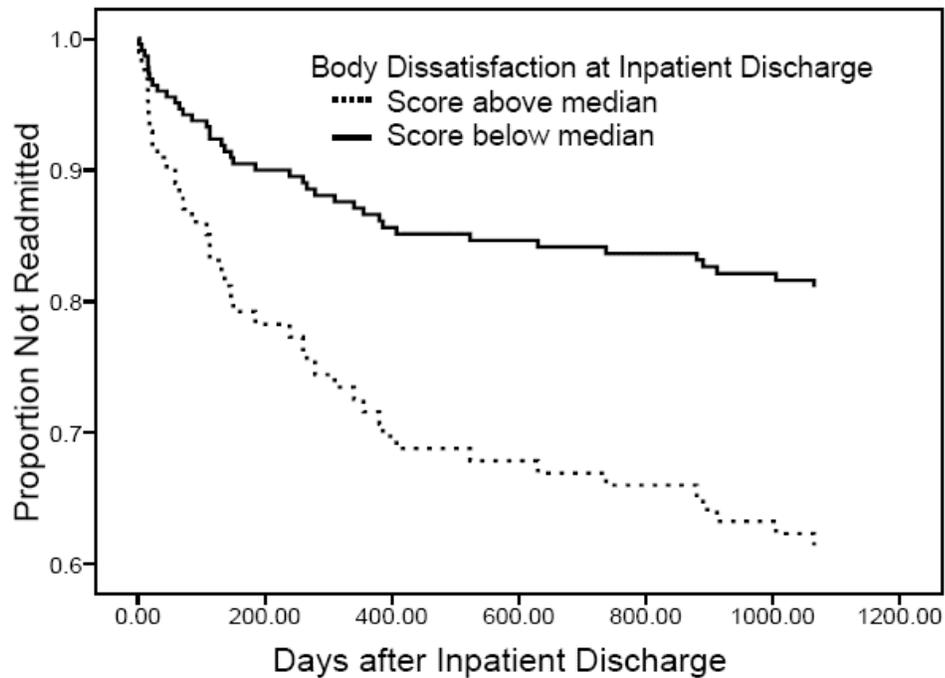
#### Survival Analysis for Full Sample

Table 9 presents all significant findings from preliminary bivariate survival analyses on the full sample ( $n = 147$ ). Patients were significantly more likely to be readmitted earlier if they showed higher scores on the Drive-for-Thinness and Body-Dissatisfaction subscales of the EDI-2 at inpatient discharge. The likelihood of earlier readmission also increased as BDI-II scores increased at both inpatient admission and discharge. Higher scores on most EDE-Q subscales, as well as the global score, predicted earlier readmission. Earlier readmission also became more likely as the number of prior hospitalizations increased. None of the remaining variables listed in Table 2 was associated with an altered likelihood of earlier readmission, including AN subtype, all weight-related variables, the duration of the eating disorder, medications on inpatient discharge, and presence of comorbid Axis-1 psychiatric diagnoses on inpatient discharge.

**Table 9. Significant Survivor-Analytic Findings for Full Sample ( $n = 147$ )**

Variable	Beta Estimate	Standard Error of Estimate	Z-score	Odds Ratio
Number of prior hospitalizations	0.146	0.058	2.507	1.157
Eating Disorders Inventory – 2				
Drive for Thinness (discharge)	0.064	0.022	2.870	1.066
Body Dissatisfaction (discharge)	0.059	0.018	3.219	1.061
Beck Depression Inventory-II				
Total Score (admission)	0.029	0.012	2.443	1.029
Total Score (discharge)	0.026	0.012	2.153	1.026
Eating Disorders Examination – Q				
Restraint (admission)	0.174	0.087	2.004	1.190
Weight Concern (admission)	0.195	0.091	2.153	1.215
Shape Concern (admission)	0.206	0.104	1.990	1.229
Global Score (admission)	0.226	0.106	2.136	1.254

The nine significant bivariate predictors of time-to-readmission were considered for inclusion in a multivariate model. Given the strong collinearity of scores on the self-report measures, only the Body-Dissatisfaction subscale of the EDI-2 at inpatient discharge was included. Number of prior hospitalizations also was included, as it showed only a weak non-parametric correlation with Body-Dissatisfaction scores (.256). Body-Dissatisfaction scores significantly predicted time to readmission ( $B = 0.051$ ,  $s.e. = .020$ ,  $z = 2.540$ , odds ratio = 1.052), whereas number of prior eating-disorder hospitalizations was not a reliable predictor in a multivariate context ( $B = 0.086$ ,  $s.e. = .068$ ,  $z = 1.257$ , odds ratio = 1.090). The Body Dissatisfaction effect can be observed in Figure 4, as the survival rate (i.e., the probability of not being readmitted) drops much more rapidly for patients with Body-Dissatisfaction scores that exceed the median.



**Figure 4. Body Dissatisfaction Predictor of Time to Readmission in Survival Analyses for the Full Sample (n = 147)**

#### 4.1.9 Survival Analysis for Subsample Receiving Adequate Dose of Treatment

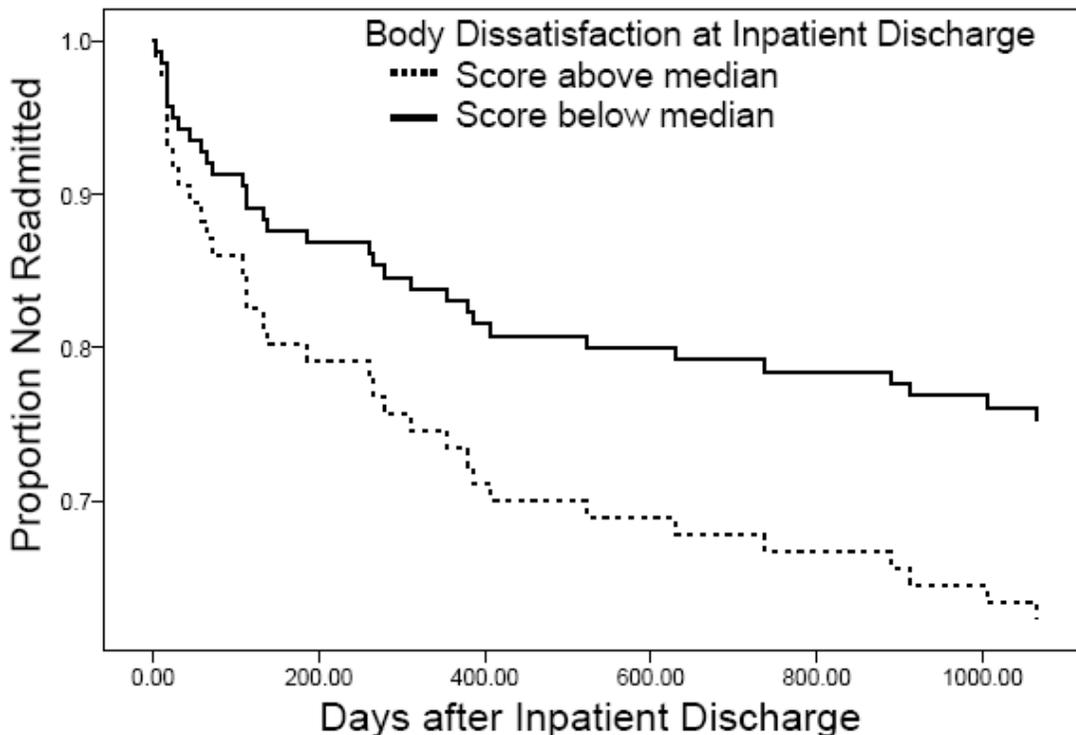
Table 10 presents all significant findings from preliminary bivariate analyses on the subsample who received an adequate dose of treatment (n = 107). Patients were significantly more likely to be readmitted earlier if they showed higher scores on the Drive-for-Thinness and Body-Dissatisfaction subscales of the EDI-2 at inpatient discharge. The likelihood of earlier readmission also increased as BDI-II scores increased at inpatient discharge. Higher scores on two IIP subscales and the personality-disorder detection index of the IIP also predicted earlier readmission. Finally, recipients of mood-disorder diagnoses on inpatient discharge were readmitted sooner. None of the remaining variables listed in Table 2 were associated with an altered likelihood of earlier readmission, including AN subtype, number of prior hospitalizations, all weight-related variables, the duration of the eating disorder, medications on inpatient discharge, and presence of comorbid Axis-1 psychiatric diagnoses on inpatient discharge other than mood disorder.

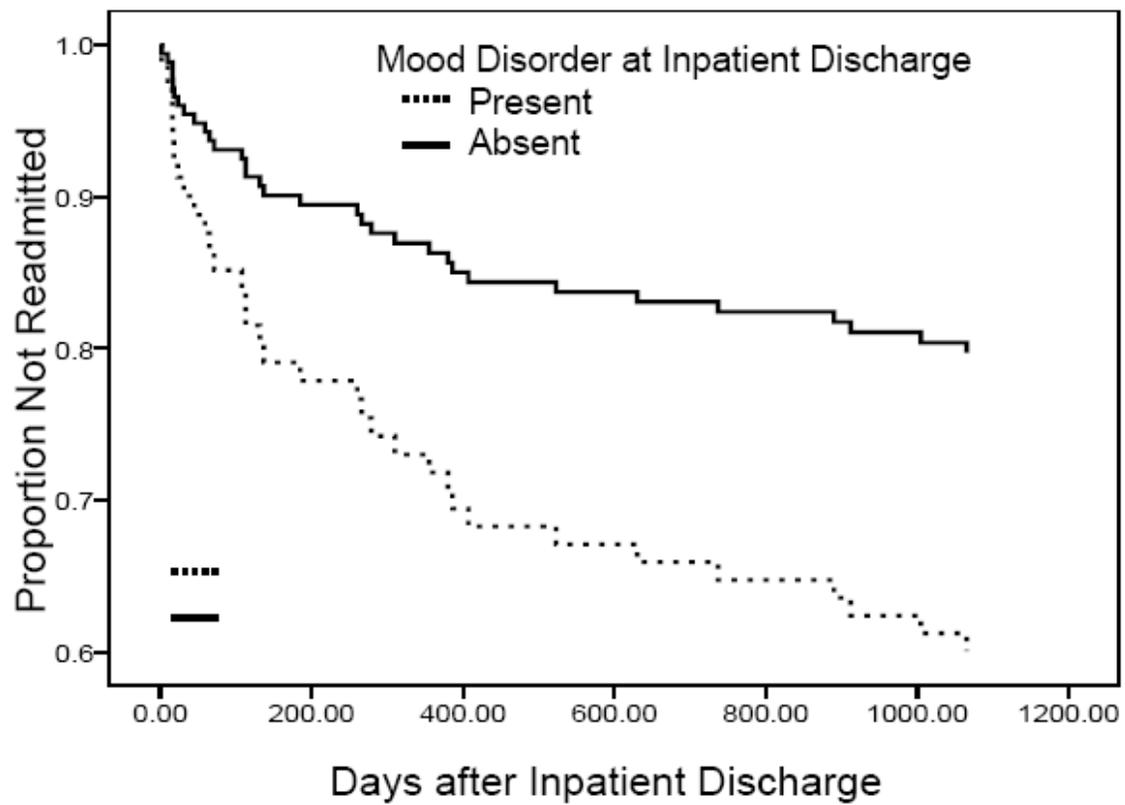
**Table 10. Significant Survivor-Analytic Findings for Subsample that Received Adequate Dose of Treatment (n=107)**

Variable	Beta Estimate	Standard Error of Estimate	Z-score	Odds Ratio
Eating Disorders Inventory – 2				
Drive for Thinness (discharge)	0.061	0.024	2.495	1.063
Body Dissatisfaction (discharge)	0.050	0.019	2.566	1.051
Beck Depression Inventory-II				
Total Score (discharge)	0.029	0.014	2.152	1.029
Inventory of Interpersonal Problems				
Interpersonal Sensitivity (discharge)	0.413	0.178	2.324	1.511
Lack of Sociability (discharge)	0.387	0.189	2.049	1.473
Personality Disorder Detection (discharge)	0.478	0.223	2.137	1.613
Comorbid Axis I Psychiatric Diagnosis				
Any Unipolar Mood Disorder <sup>a</sup> (discharge)	0.810	0.380	2.133	2.248+

<sup>a</sup>Major Depressive Disorder with or without psychotic features, Depressive Disorder NOS, Dysthymia

The seven significant bivariate predictors of time-to-readmission were considered for inclusion in a multivariate model. Given multicollinearity concerns, only Body-Dissatisfaction at inpatient discharge was included from the set of self-report measures in the final model. Mood Disorder Diagnosis on inpatient discharge also was included, as it showed a non-parametric correlation of only .207 with Body-Dissatisfaction scores. In the multivariate model, Body Dissatisfaction significantly predicted time to readmission ( $B = 0.042$ ,  $s.e. = .020$ ,  $z = 2.050$ , odds ratio = 1.043), and Mood Disorder Diagnosis showed a trend-level association with time to readmission ( $B = 0.663$ ,  $s.e. = .397$ ,  $z = 1.671$ , odds ratio = 1.941). Figure 5 and Figure 6 present these effects. Note that the survival rate drops much more rapidly for patients with Body-Dissatisfaction scores that exceed the median and for patients who received a mood-disorder diagnosis on inpatient discharge.





Figures 5 and 6. **Body Dissatisfaction and Mood Disorder Diagnosis Predictors of Time to Readmission in Survival Analyses for the Subsample of Patients Who Received an Adequate Dose of Treatment (n = 107)**

## 5.0 DISCUSSION

Managed mental health care practices are widespread and have fundamentally altered the delivery of mental health services to both the privately and publicly insured. Treatment services for serious and potentially chronic mental illnesses have been the most affected (Weissman, Pettigrew, Sotsky, & Reigier, 2000; Williamson, Thaw & Vernando-Sullivan, 2001; Wiseman, Sunday, Klapper, Harris & Halmi, 2000). Managed care practices that limit access to and duration of care have particularly worrisome treatment and outcome implications for serious mental illnesses such as AN. Research examining the outcome of patients who have serious mental illness and are treated in the current care environment is limited. Given the magnitude of change to the mental health care delivery system, a reevaluation of outcome and predictors of outcome for patients with serious mental illness is critically important. This reevaluation is necessary because previous knowledge, upon which treatment decisions are made, may no longer be applicable to the current care environment.

The present study examined one such group of patients with a serious mental illness, AN patients, and one indicator of long-term outcome, readmission. The overarching aims of this study were to describe the demographic and clinical features of patients who required multiple psychiatric inpatient hospitalizations for the treatment of AN and to identify patient characteristics that predicted readmission. This characterization of AN patients and examination of predictors of readmission not only will inform AN treatment, but also may shed light on factors that predict readmission for other patients who have serious mental illnesses, thus

informing efforts to evaluate and improve mental health treatments and service delivery across the spectrum of serious mental illnesses.

The following discussion briefly summarizes the primary findings from the present study and then places these findings in the context of the relevant managed care and eating disorders literatures. The implications of the study's findings for AN treatment, social work practice and policy development will next be discussed. Finally, the strengths and weaknesses of the current study will be reviewed.

## **5.1 BRIEF SUMMARY OF FINDINGS IN PRESENT STUDY**

The current research examined predictors of inpatient readmission for a sizable sample of patients diagnosed with AN who received inpatient treatment on the Eating Disorders Unit at UPMC Western Psychiatric Institute and Clinic. Analyses were conducted on both the full sample of patients ( $n = 147$ ; see Figure 1) and on a subsample of patients consisting of only those who received an adequate dose of treatment (i.e., they were not discharged from inpatient treatment against medical advice ( $n = 107$ ; see Figure 2)). Non-parametric tests and logistic-regression techniques were used to identify predictors of whether readmission occurred (within a 3 year period after discharge), and survival-analytic techniques were used to identify predictors of the time until readmission (up to 3 years after discharge). We hypothesized that more previous admissions, longer duration of illness, greater psychiatric symptomatology, and lower percent of ideal body weight at index admission and discharge would predict both criterion variables (i.e., whether readmission occurred and whether it occurred sooner, rather than later), as these variables represent indicators of greater severity of illness that historically have been

associated with relapse and readmission. Table 2 lists all variables that were evaluated as potential predictors of whether readmission occurred, as well as time to readmission.

### **5.1.1 Full Sample Findings (n = 147).**

Non-parametric bivariate analyses demonstrated that readmitted patients reported greater depression, dietary restraint, and concern regarding weight, shape, and eating at the time of their index admission, relative to patients who were not readmitted. At inpatient discharge, the readmitted patients continued to report more depression, dietary restraint, and body dissatisfaction than patients who were not readmitted. Interestingly, no other variables predicted readmission status, including weight, duration of illness, number of prior hospitalizations, presence of co-morbid psychiatric illness, and personality problems. In a multivariate logistic-regression analysis, body dissatisfaction alone emerged as a significant predictor of readmission, accounting for 9.1% of the variability in readmission status. Body dissatisfaction correctly predicted readmission status for 25 of 40 readmitted patients (62.5%), and 64 of the 107 patients (59.8) who were not readmitted.

Survival-analytic bivariate analyses found patients were readmitted earlier if they reported greater dietary restraint and concern regarding weight and shape at their index admission, as compared to patients who were readmitted later. Earlier readmission also was associated with patient reports at inpatient discharge of greater drive for thinness and body dissatisfaction. Additionally, patients who reported greater depression at both admission and discharge were also more likely to be readmitted earlier. Finally, as the number of previous admissions increased, earlier admission became more likely. In a multivariate survival-analytic

model, only body dissatisfaction at inpatient discharge significantly predicted time to readmission (see Figure 4). Across both sets of analyses, therefore, body dissatisfaction at inpatient discharge emerged as the strongest predictor of readmission status.

### **5.1.2 Subsample Findings (n = 107).**

Parallel analyses were conducted on a subsample of patients who completed inpatient treatment (i.e., they were not discharged against medical advice). Thus, these patients were judged by the treatment team to have received an adequate dose of treatment. This subsample of patients more closely represents the population of interest, that is, patients receiving adequate inpatient AN treatment in the current care environment. As such, the findings from the subsample will be given greater emphasis in the subsequent discussion.

Non-parametric bivariate analyses showed that, at inpatient discharge, readmitted patients reported greater drive for thinness and body dissatisfaction than patients who were not readmitted. Moreover, readmitted patients reported more personality difficulties and depression, and they were more frequently diagnosed with unipolar depression. We found no other significant group differences on any other variables, including concerns related to weight and shape, duration of illness, number of prior hospitalizations, and weight. In the multivariate logistic regression analysis, body dissatisfaction emerged as a significant predictor of readmission status, with mood disorder as a trend-level predictor. Together, these two variables accounted for 12% of the variability in readmission status. This model correctly predicted the readmission status of 20 of the 33 readmitted patients (60.6%) and 44 of the 74 (59.5%) of the patients who were not readmitted.

Bivariate survival analyses found that patients were significantly more likely to be readmitted earlier if they reported greater drive for thinness, body dissatisfaction, and personality difficulties upon discharge from the index admission. The likelihood of earlier readmission also increased as patient-reported depression at discharge increased. Also, those patients who received a mood disorder diagnosis at discharge were more likely to be readmitted sooner. In the multivariate model, body dissatisfaction at inpatient discharge significantly predicted time to readmission, and mood disorder diagnosis showed a trend-level association with time to readmission (see Figure 5). Overall, the findings from the multivariate logistic regression analysis and survival analysis of this subsample are consistent; self-reported psychological features of AN, specifically body dissatisfaction, and mood disorder significantly predicted readmission status, the latter at a trend level in the survival analyses.

### **5.1.3 Placing Findings in the Context of Managed Care and AN literatures**

The pattern of predictors found in the present study represents a departure from the typical pattern of predictors associated with readmission in AN. The existing empirical data base established body weight at both admission to and discharge from inpatient treatment as predictors of relapse and readmission (Baran, Weltzin & Kaye, 1995; Heberbrand et al., 1996; Commeford, Licinio, & Halmi, 1997; Fichter & Quadflieg, 1999; Heberbrand et al., 1997; Lowe, et al., 2001; Pike, 1998; Steinhausen, Grigoroui-Serbanescu, Boyadjieva, Nuemarker, Metzke, 2008; Zipfel, Lowe, Reas, Deter, & Herzog, 2000; Treat et al., under review). Evidence also exists documenting duration of illness (Deter & Herzog, 1994; Fichter & Quadflieg, 1999; Richard, Bauer, & Kordy, 2005) and delay in treatment initiation (Steinhausen, 1995; Zipfel, Lowe, Reas, Deter, & Herzog, 2000) as predictors of relapse and readmission. Willer, Thuras,

and Crow, (2005) have documented that increased length of stay, more rapid rate of weight gain, and prior hospitalizations were significant correlates of re-hospitalization; however after further analysis, increased length of stay was found to be correlated with more prior hospitalizations and lower body mass index at admission. An association between purging behavior and AN relapse has also been well established (Fichter & Quadflieg, 1999; Garner, & Rosen, 1993; Deter & Herzog, 1994; Eckert, Halmi, Marchi, Grove, & Crosby, 1995; Herzog & Schellberg & Deter, 1997). To a lesser extent, existing evidence also identifies greater severity of comorbid psychological problems as a predictor of poor outcome (Carter, Blackmore, Suander-Pinnock, & Woodside, 2004; Herzog & Schellberg & Deter, 1997; Lowe, et al., 2001).

These previously identified predictors of readmission, when examined in the context of the current care environment in this study, were not found to predict readmission, excepting comorbidity, which sometimes has emerged as predictive of outcome. In our analyses, we see the emergence in the bivariate analyses of the psychopathological aspects of AN, personality difficulties, and both self-reported and diagnosed mood disorder as significant predictors of readmission status. The multivariate logistic-regression and survival analyses identified body dissatisfaction and mood disorder as the most potent predictors of this subset of variables. This finding is typically not seen in the literature describing predictors of AN outcome, which as noted above, more commonly cites weight, presence of purging behavior, and duration of illness as predictors of readmission. However, there are a few studies that document the presence of mood disorder and body image dissatisfaction as predictors of readmission (Eckert, Halmi, Marchi, Grove, & Crosby, 1995; Hjern, Lindberg, & Lindblad, 2006; Keel, Dorer, Franko, Jackson & Herzog, 2005; Lowe et al., 2001), and we speculate that as more studies are

conducted on samples from managed care treatment environments, further support for these two predictors will emerge.

This observed diminished effect of variables previously associated with readmission and the emergence of variables representing psychological distress as predictors of readmission may be understood in light of the changes in the care environment, specifically the shortened lengths of stay. Our previous study (Treat et. al., 2005), which described the course of inpatient treatment of AN in the current care environment, documented that self-reported body dissatisfaction did not improve over the course of inpatient hospitalization and that significant improvement in other aspects of AN psychopathology was of a lesser magnitude than reported in studies evaluating longer durations of inpatient treatment (Bowers & Ansher, 2000; Channon & DeSilva, 1985; Grave, Bartocci, Todisco, Pantano, & Bosello, 1993; Pike, 2000; Probst, Vandereycken, Coppenolle, & Pieters, 1999; Steinhausen, 1985). Findings from the current study bolster the importance of our previous findings by identifying the persistence of psychological distress associated with AN as being predictive of readmission.

The continued difficulties with body dissatisfaction and mood may be related to the shortened lengths of stay characteristic of a managed care environment. Readmission is clearly a negative outcome for patients, but it also may be an unintended outcome of managed care practices that limit duration of care for hospitalized AN patients (Kaye, Kaplan & Zucker, 1996; Williamson, et al., 2000). Although hospital lengths of stays in this care environment are sufficient to initiate weight recovery, we speculate that they are not sufficient to promote psychological adjustment to and acceptance of weight gain and the associated changes in body shape and appearance. Given the psychological features of AN (i.e., denial of the seriousness of weight loss, resistance to weight gain, fear of gaining weight and being fat, and body image

disturbance), it is not surprising that the approximate one month average length of stay described in the current study would be insufficient to produce substantial change in attitude toward weight gain or body size. Patients have neither accepted the need for weight gain nor habituated to the changes in their body shape resulting from the weight gained while hospitalized. They remain more depressed at discharge than patients who are not readmitted, and they may still be suffering the effects of cognitive impairment and diminished ability to regulate emotion. Thus, at discharge, patients are in a heightened state of psychological distress secondary to their weight gain and, because of the abbreviated length of stay, are equipped with few of the psychological resources necessary to tolerate their distress and continue the process of treatment and recovery. The emphasis on weight attainment as the criterion for discharge, a by-product of the managed care environment, in the absence of equal attention to psychological readiness for discharge, may indeed be contributing to readmission. This new pattern of predictors, which highlights the centrality of psychopathological aspects of AN and depressed mood to readmission, suggests a need to reconsider previously established readiness for discharge benchmarks and refine treatment interventions to more specifically target the psychological distress associated with body image disturbances and mood disorder.

#### **5.1.4 AN Treatment Implications**

The findings from this study have important treatment implications. First, unlike predictors previously identified in the literature, prospective knowledge of the predictors identified in the study current can be used to refine existing treatment strategies. The previous predictors described course of illness features for which there were no possible interventions, e.g., duration of illness, number of prior hospitalizations, and presence of comorbid psychiatric illness. These

variables identified those at risk for readmission, but they offered no direction for intervention. The other commonly identified previous predictors of readmission, weight at admission and discharge, were also beyond intervention because admission and discharge weight was strongly influenced by managed care policies and largely not at the discretion of treatment team decision making. Due to the demographic or care environment driven nature of the previous predictors, there were no possible interventions that could be applied during the course of a treatment episode to alter patient status on the variables that were predicting readmission. Conversely, the currently identified predictors describe patient characteristics for which specific treatment interventions can be applied. Prospective knowledge that body dissatisfaction and mood disorder symptoms are implicated in readmissions in the current care environment can be used to refine and augment treatment interventions that specifically and aggressively target these symptoms at the inpatient level of care. This knowledge could also focus treatment interventions at the partial hospital program level of care (the level of care most commonly recommended following inpatient treatment) to extend treatment work initiated at the inpatient level of care or in an effort to prevent hospitalization.

Currently applied treatment strategies, such as cognitive behavioral treatment (CBT; e.g., Pike, 2003), dialectical behavior therapy (DBT; e.g., McCabe, LaVia, & Marcus, 2004, Telch & Agras, 2001, Telch, Agras & Linehan, 2000), and the use of movement/exercise could readily be adapted to more specifically address body dissatisfaction and mood symptoms, while simultaneously maintaining a focus on weight gain, as primary treatment targets at the intensive levels of care (inpatient and PHP). The utility of concepts central to CBT, such as the identification of distorted thoughts, examination of evidence to support or refute beliefs, and thought restructuring techniques could be more specifically applied to thoughts and beliefs

associated with body dissatisfaction and mood symptoms at the inpatient and PHP levels of care. Currently, this work is typically done at the outpatient level of care when patients are closer to normal body weight and are therefore less cognitively impaired, better able to regulate emotion, and more responsive to psychopharmacologic interventions. However, knowledge that the presence of body dissatisfaction and mood disorder symptoms predicts both that readmission is more likely to occur and that it will occur sooner, suggests the need to intervene earlier in the treatment episode.

Interventions addressing body dissatisfaction and mood symptoms will need to be refined in order to be applied to patients who are at low body weight. Careful consideration will need to be given to issues related to addressing body dissatisfaction in patients who remain at low body weight. Because patients will remain underweight at the time of discharge from inpatient treatment, many of the traditional methods for addressing body image distortion and dissatisfaction are not applicable in low weight patients due to the cognitive impairments associated with low body weight (e.g., increased distortion, increased obsessiveness, impaired emotion regulation). Moreover, interventions will need to take into account the fact that although patients are distressed by and dissatisfied with their current body weight, they are significantly under-weight and in need of continued weight gain. Thus, because they have not yet achieved a normal body weight, increasing satisfaction with their current body may be an unhelpful and unrealistic goal, especially during the course of an inpatient stay. Providing psychoeducation to patients and families highlighting the significance of body dissatisfaction and mood disorder symptoms, vis a vis readmission, may be a reasonable first step and may provide sufficient incentive to generate willingness to address these issues. Increasing acceptance of the need to gain weight and the associated body changes, work that could be initiated during an inpatient

stay and continued as patients step down to PHP treatment, may be a more rational and attainable goal.

Efforts to treat mood symptoms and body dissatisfaction through increasing acceptance could be addressed by combining aspects of DBT with a graduated and supervised exercise program. Specific elements of DBT that would be useful are the DBT philosophical and treatment stance that simultaneously emphasizes acceptance and change and the use of the DBT Skills of core mindfulness and distress tolerance (Linehan, 1993), as detailed below.

The DBT emphasis on dialectics, specifically the need for therapists to balance pulling for change with acceptance of the difficulty of changing, is useful in addressing the treatment ambivalence so characteristic of patients with AN. Patient with AN frequently resist and resent treatment interventions, which may be experienced as intrusive, controlling and generally aversive. DBT therapists are trained to use emotional, behavioral, and cognitive validation strategies that are designed to acknowledge that symptom behaviors serve a meaningful function and represent a legitimate effort to deal with life circumstances (acceptance). However, DBT emphasizes the dialectic, which is that, although understandable, symptom behaviors also are associated with significant morbidity and mortality, and thus there is a need for behavior change.

Core Mindfulness skills are central to DBT and are based on psychological and behavioral versions of meditation practices from Eastern spiritual training, mostly Zen Buddhism. “Taking hold of one’s mind” by implementing strategies designed to develop a lifestyle of participation with awareness is the primary objective. Also central to mindfulness is the concept of three primary states of mind: reasonable mind, emotion mind and wise mind. These states of mind provide a framework for decision making. Reasonable mind is rational and emphasizes the use of logic and factual information to evaluate and plan. Reasonable mind is

devoid of emotion. For example, the process of designing and building a bridge involves a series of reasonable mind decisions. Emotion mind is when emotions override logical thought and control thinking. Running into a burning building to save a loved one is an example of an emotion mind decision. Practitioners of mindfulness recognize the necessity and usefulness of reasonable mind and emotion mind in particular situations, but strive to balance these two states of mind to achieve wise mind. Wise mind is the integration of reasonable and emotion mind but, goes beyond a mere synthesis of the two to create a state of intuitive knowing.

Mindfulness practice or “participation with awareness” is incompatible with the use of eating disorder behaviors to numb or avoid negative affect. One cannot be simultaneously mindful and engage in behaviors that effectively work to decrease awareness of affect. Mindfulness resembles exposure therapy in that it involves increasing awareness of the mood states that patients with AN typically seek to avoid. Patient with AN frequently are afraid or ashamed of their own thoughts and emotions. Consequently, mindfulness is a critical skill because it emphasizes nonjudgmental acceptance of all moods and encourages observation and labeling of emotions. Mindfulness is also useful for increasing awareness of and labeling of somatic cues (e.g., feelings of fullness, gastric distress) that contribute to body dissatisfaction in patients with AN and may serve as triggers for aberrant behaviors. The “states of mind” conceptualization (i.e., emotion mind, reasonable mind, and wise mind) is also useful for targeting ambivalence in eating disorder patients because it promotes active and aware decision making. Finally, it provides a framework for evaluating decisions and is useful for teaching the difference between thoughts and emotions and the inherent value of each.

Distress tolerance skills are crisis survival strategies. They are for use in situations that cannot be immediately changed. Skills taught in this module are distraction, self-soothing,

strategies for improving the moment, and analysis of the pros and cons of tolerating the distressing situation. Since eating disorder behaviors such as restricting intake, binge eating, and purge behaviors enable patients with AN to avoid or tolerate uncomfortable, negative or overwhelming affect, distress tolerance skills are critical to help patients with AN tolerate negative emotions.

There are situations specific to patients with AN for which distress tolerance skills are useful. Treatment, especially inpatient treatment, is often experienced by patients with AN as aversive. Weight gain in patients with AN is emotionally distressing and often physically uncomfortable. Moreover, treatment is often foisted upon unwilling, if not involuntary patients, thus intensifying the perception of treatment as intrusive and unwarranted. The distress tolerance skills offer strategies for short term use that enable patients to tolerate the distress caused by treatment in general and body dissatisfaction more specifically, until other adaptive strategies suitable for long term use can be integrated into daily life.

A multi-pronged approach combining the above described therapeutic stance and skills with a graduated and supervised exercise program has not to our knowledge been described in the literature. Given the psychological, motivational, and physiological difficulties associated with weight gain in patients with AN, considerable care must be taken so that the introduction of physical activity does not interfere with weight gain. The few studies examining the incorporation of exercise in the treatment of AN (Beumont, Arthur, Russell, & Touyz, 1994; Thien, Thomas, Markin & Birmingham, 2000; Vandereycken, Probst & Meermann, 1988) reported an increase in general and body satisfaction and an acceptable rate of continued weight gain. The incorporation of exercise in the treatment of AN remains controversial and most treatment programs strongly caution against any form of energy expenditure. However, because

efforts to prohibit exercise are rarely effective outside of the structure and near constant supervision of an inpatient unit and patients are compelled to exercise in response to distress associated with body dissatisfaction, there is rationale for prescribing an exercise plan that would address body dissatisfaction and mood symptoms, while not interfering with weight gain. The exercise prescription would be individualized based on patient weight and other health related and psychological factors. Moreover, the prescription would specify duration, intensity, and type of activity, and occur under supervision, ideally in a treatment setting.

### **5.1.5 Social Work Implications**

The treatment implications discussed in the AN Treatment Implications section above are highly relevant to social workers. As previously noted, social workers are providing the majority of the mental health treatments delivered in this country (O'Neill, 1999, APA, 1997, Cohen, 2003) and as such are in a position to be treating and referring individuals with serious mental illnesses such as AN. They, therefore, need to base their treatment decisions and interventions on the most up-to-date and best evidence available. Knowledge of outcome predictors will inform the design of treatment interventions to better target specific aspects of illness or environment to enhance recovery efforts and improve outcome. With such knowledge, clinicians working with patients who have AN would be better able to focus their clinical efforts on symptoms most likely to contribute to poor outcomes. Information from studies such as this can be applied to the ongoing refinement of diagnoses specific standards of care for use across treatment settings.

Beyond the practice implications, however, social workers who function in advocacy and policy making roles have a responsibility to be monitoring our current system of mental health care delivery to ensure that all patients, especially those with serious and chronic mental illnesses

are receiving adequate services. We have not yet achieved a system of mental health care delivery that balances the needs of patients who have serious mental illnesses with the undisputed cost and quality concerns that were inherent in our pre-managed care mental health care system. The implementation of certain managed care practices has resulted in some improved access for certain patients, specifically for those patients diagnosed with mild to moderate mental illness, who are typically treated in outpatient settings (Mauery, Vaquerano, Sethi, Jee, & Chimento, 2006). However, it is the care needs of patients who may require longer length of stays in the most intensive (and expensive) levels of care, like some patients with AN and other serious mental illnesses, that conflict most notably with the managed care driven treatment environment and are the most at risk for poor outcomes in our current system of care delivery. Findings such as those reported in this study, that specify predictors of poor outcome, could inform the design of more effective and efficient systems of care that take into account more precisely the special needs of vulnerable patient populations.

This study, therefore, is consistent with the values and objectives of the social work profession, as outlined in the National Association of Social Workers' Code of Ethics. The Preamble to the Code of Ethics states "Fundamental to social work is attention to the environmental forces that create, contribute to, and address problems in living" (<http://www.socialworkers.org/pubs/code/code.asp>). The mental health treatment environment has undergone fundamental change over the course of the last 15 years as a result of the widespread implementation of managed care practices. Consequently, the manner in which treatment for AN and other serious mental illnesses is provided has been substantially affected. Concern regarding the effect of these changes on the outcomes of patients with AN (e.g., Weissman, Pettigrew, Sotsky, & Reigier, 2000; Williamson, Thaw, & Vernando-Sullivan, 2001;

Wiseman, Sunday, Klapper, Harris, & Halmi, 2000), and other serious mental illnesses (e.g., Huskamp, 1998; Wickizer & Lessler, 1998) has been reported in the literature, however research in this area is limited. Further evaluation is needed to determine the extent to which the managed care treatment environment is affecting treatment outcomes. Further evaluation is also needed to determine if modifications to current managed care practices that limit access to and duration of care are necessary for specific populations. A recent report issued by the U.S. Department of Health and Human Services reviewing the managed mental health care literature from 1990 - 2005 concluded that “The paucity of such studies in the literature continues to restrict our ability to report on, or predict, which patients in which managed care settings may be harmed by benefit design limits or utilization techniques aimed at containing costs and improving appropriate use of the full spectrum of mental health and support services” (Mauery, Vaquerano, Sethi, Jee, & Chimento, 2006, p. 24).

The social work profession’s commitment to challenge social injustice, also as stated in the NASW Code of Ethics, is further support for the relevance of this study to the social work profession. This principle states that “social workers pursue social change, particularly with and on behalf of vulnerable and oppressed individuals and groups of people.....Social workers strive to ensure access to needed information, services, and resources; ...” (<http://www.socialworkers.org/pubs/code/code.asp>). Individuals who require intensive and expensive mental health services may be vulnerable to negative outcomes in a managed care treatment environment that too strongly emphasizes cost containment, perhaps at the expense of providing necessary services. Findings from studies such as this, that examine outcome in the current care environment, can bolster advocacy efforts on behalf of individual patients and groups of patients diagnosed with serious mental illness to ensure access to needed services and

resources. Findings could also be used at a systems level to inform broader policy reform efforts.

The effects of efforts to reduce costs by limiting access to and duration of care must be carefully monitored and evaluated by social workers and others in policy making and research roles to ensure that cost reduction efforts are in fact reducing costs and not inadvertently adding cost (Wickizer & Lessler, 1998) or merely shifting costs to individuals, families, and public sector health insurance plans. Little is known about non-health care costs such as out-of-pocket expenses to patients and families, lost productivity, and care burden associated with AN (Simon, Schmidt & Pilling, 2005), although the consensus of professional opinion is that these costs are high. Effectively and efficiently treating AN and other serious mental illnesses with fewer, but longer admissions may diminish personal costs such as suffering, lost income due to diminished functioning, and actual out-of-pocket expenses associated with a chronic course of AN. Moreover, they may reduce the overall costs to the mental health system that are generated by readmissions and other indicators of poor outcome.

#### **5.1.6 Strengths and Limitations of the Current Study**

In general, this study was limited by lack of information in several areas. First, it would have been useful and interesting to know whether patients discharged from our treatment facility were readmitted elsewhere. In this study, we had knowledge of only those patients who were readmitted to our program. Knowledge of readmissions to other facilities presumably would have increased the validity of our conclusions. Second, we did not have detailed information about what happened to patients who were treated outside of our treatment program between hospital admissions. For example, we could not determine if patients participated in the

recommended post-inpatient treatment, the quality of their participation in ambulatory treatment, or if the ambulatory treatment was appropriate. This information would be critical not only when assessing individual patient outcomes, but also useful in the evaluation of existing systems of care and barriers to accessing care. Third, we had no information regarding the presence or quality of family and social support, factors that could influence relapse and readmission. Future research examining the extent to which family and social support affect readmission rates or the timing of readmission would be an important contribution to the AN treatment outcome database. Fourth, we were unable to assess concepts related to patient motivation, such as commitment to treatment, engagement in treatment, and readiness for change. Such information could potentially focus and inform future treatment modifications and should be obtained in future research in this area. Fifth, although changes to the treatment environment were an impetus to this research, we had no pre-managed care comparison group, other than from the literature. Another short-coming related to the treatment environment was that we had no patient-specific insurance information. Future research examining information related to managed care pressure to discharge and refusals or delays in obtaining authorization for inpatient treatment will perhaps highlight more vividly pre- post-managed care differences and the influence of managed care on outcome. Finally, although considerable attention was given to confirming the AN and comorbid diagnoses, we were unable to assess them using the gold-standard strategy of structured clinical interviews, leaving open the possibility that Axis I comorbid psychiatric diagnoses were not accurately diagnosed or detected.

In spite of the significant limitations cited above, this work also exhibits significant strengths. Most importantly, this study's findings are based on a large sample of diagnosed, full-syndrome AN patients, a rarity in the treatment-outcome literature for this low-prevalence

condition. Moreover, the study was conducted in the current care environment, about which very little information is available. Moreover, because the data reported in this study were obtained as a part of routine clinical care, rather than a research study, the resulting sample may approximate more closely the population of persons with severe AN, thereby enhancing the generalizability of the findings. Another strength of this study is that we comprehensively assessed numerous predictors. The array of self-report, demographic, clinical, and treatment-related predictors assessed in this study is more extensive than typically is seen in studies in this area. Moreover, researchers rarely have evaluated whether self-reported AN psychopathology and depression predict negative outcomes for persons with AN who receive inpatient treatment, as doing so necessitates creating and sustaining an infrastructure to obtain this information. Another strength of the study is that we examined two criterion variables, both whether readmission occurred and time to readmission. Predictors of these two outcome indices were strikingly similar, suggesting the robustness of the findings. Finally, the study documents predictors of outcome over a 3 year period of time, which builds upon our prior work (Treat et al., under review) by extending the period of time during which outcome is assessed from several months after inpatient discharge to 3 years post discharge.

## **5.2 CONCLUSIONS**

This study documented that the two strongest predictors of inpatient readmission for patients with AN in the current care environment are self-reported body dissatisfaction and clinician-diagnosed mood disorder at inpatient discharge. These two variables together accounted for 12% of the variability in readmission status. Although much research remains to

be done to explain the unaccounted for variance, this moderate-magnitude effect nonetheless warrants clinical attention and efforts to modify existing treatment strategies to target body dissatisfaction and mood disorder more precisely.

Notably, the two primary predictors identified in this study differed from those most frequently identified in prior work, highlighting the importance of re-examining predictors of relapse and readmission after inpatient hospitalization in the current care environment of increasingly abbreviated inpatient stays. Moreover, body dissatisfaction and mood disorder are far more amenable to intervention than previously identified predictors. Although the previously discussed suggestions for augmenting existing treatment strategies will need to be carefully evaluated to determine their incremental utility, they represent a novel and potentially fruitful starting point for addressing the vexing problem of readmission in patients with AN.

The present findings suggest the importance of further consideration of the extent to which the current care environment may exert a negative influence on treatment outcomes for patient populations diagnosed with serious mental illnesses. As social workers, it is incumbent upon us to address the clinical, advocacy, policy development, and research issues resulting from the implementation of managed care practices to ensure that all patients with serious mental illnesses have access to effective and efficient mental health services.

## REFERENCES

- Abelson, R. (1999). For managed care, free-market shock. *New York Times (The Week in Review, 148)* January 3, S4 4.
- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders, (DSM-IV)* (4th ed.). Washington DC: Author.
- American Psychiatric Association (1997). *Public mental health A changing system in an era of managed care*. Washington DC: Author.
- American Psychiatric Association (2006). *Practice guidelines for the treatment of patients with eating disorders* (Third ed.).
- Anderluh, M.B, Tchanturia, K. Rabe-Hesketh, S. Treasure, J., (2003). Childhood obsessive-compulsive personality traits in adult women with eating disorders: defining a broader eating disorders phenotype. *American Journal of Psychiatry, 160*, 242-247.
- Anderson-Fye, E.P., & Becker, A.E., (2004). Sociocultural aspects of eating disorders. In J.K. Thompson (Ed.), *Handbook of eating disorders and obesity* (pp. 565-589). Hoboken, New Jersey: John Wiley & Sons.
- Attia, E., Haiman, C., Walsh, B.T., & Flater, S.R. (1998). Does fluoxetine augment the inpatient treatment of anorexia nervosa? *American Journal of Psychiatry, 155*, 548-551.
- Baran, S.A. Weltzin, T.E., & Kaye, W.H., (1995). Low discharge weight and outcome in anorexia nervosa. *American Journal of Psychology, 152*, 1070-1072.
- Beumont, P.J.V., Arthur, B., Russell, J.D., & Touyz, S.W., (1994). Excessive physical activity in dieting disorder patients: Proposal for a supervised program. *International Journal of Eating Disorders, 15*, 21-36.
- Beck, D., Casper, R., Andersen, A., (1996). Truly late onset of eating disorders: a study of 11 cases averaging 60 years of age at presentation. *International Journal of Eating Disorders, 20*, 389-395.
- Beck, A.T., Steer, R.A., & Brown, G.K., (1996). *Manual for Beck Depression Inventory-II*. San Antonio, TX: Psychological Corp.

- Bobbitt, B.L., Marques, C.C., & Trout, D.L. (1998). Managed behavioral healthcare: Current status, recent trends, and the role of psychology. *Clinical Psychology: Science and Practice*, 5, 115-133.
- Bowers, W.A., Ansher, L.S., (2000). Cognitions in anorexia nervosa: Changes at discharge from a cognitive therapy milieu inpatient treatment program. *Journal of Cognitive Psychotherapy: An International Quarterly*, 14, 393-401.
- Bulik, C.M., Sullivan, P.F., Tozzi, F., Furberg, H., Lichtenstein, P., Pedersen, N.L., (2006). Prevalence, heritability, and prospective risk factors in anorexia nervosa. *Archives of General Psychiatry*, 63, 305-312.
- Bulik, C.M., Sullivan, P.F., Fear, J.L., Joyce, P.R., (1997). Eating disorders and antecedent anxiety disorders: a controlled study. *Acta Psychiatrica Scandinavica*, 96, 101-107.
- Bruch, H., (1973). *Eating disorders: Obesity, anorexia nervosa and the person within*. New York: Basic Books.
- Cachelin, F.M., & Maher, B.A., (1998). Is amenorrhea a critical criterion for anorexia nervosa? *Journal of Psychosomatic Research*, 44, 435-440.
- Centers for Disease Control (2000). 2000 CDC growth charts: United States [On-line]. Available: <http://www.cdc.gov/growthcharts/>
- Carter, J.C., Blackmore, E., Sutandar-Pinnock, K., & Woodside, D.B., (2004). *Psychological Medicine*, 34, 671-679.
- Channon S., DeSilva, W.P., (1985). Psychological correlates of weight gain in patients with anorexia nervosa. *Journal Psychiatric Research*, 19 267-271.
- Crago, M., Shisslak, C., & Estes, L. (1996). Eating disturbances among American minority groups: A review. *International Journal of Eating Disorders*, 19, 239-248.
- Cohen, J.A., (2003). Managed care and the evolving role of the clinical social worker in mental health. *Social Work*, 48(1), 34-43.
- Cohen, R.A., & Martinez, M.E., (2007). Health insurance coverage: Early release of estimates from the national health interview survey, January – June 2007. National Center for Health Statistics. [On-line]. Available: <http://www.cdc.gov/nchs/nhis.htm>. December 2007.
- Commerford, M.C., Licinio, J., and Halmi, K.A., (1997). Guidelines for discharging eating disorder inpatients. *Eating Disorders*, 5, 69-74.
- Dare, C., & Eisler, I., (1997). Family therapy for anorexia nervosa. In D.M. Garner & P. Garfinkel (Eds.), *Handbook of treatment for eating disorders* (pp. 307-324). New York: Guilford Press.

- Dare, C., Eisler, I., Russell, G., Treasure, J., & Dodge, E., (2001). Psychological therapies for adults with anorexia nervosa: Randomized controlled trial of outpatient treatments. *British Journal of Psychiatry*, 178, 216-221.
- Deter, H.C., & Herzog, W., (1994). Anorexia nervosa in a long-term perspective: results of the Heidelberg-Mannheim study. *Psychosomatic Medicine*, 56, 20-27.
- Eagles, J., Johnston, M., Hunter, D., Lobban, M., & Millar, H., (1995). Increasing incidence of anorexia nervosa in the female population of northeast Scotland. *American Journal of Psychiatry*, 152, 1266-1271.
- Eckert, E.D., Hami, K.A., Marchi, P., Grove, W., Crosby, R., (1995). Ten year follow-up of anorexia nervosa: Clinical course and outcome. *Psychological Medicine*, 25(1), 143-156.
- Eisler, I., Dare, C., Hodes, M., Russell, G., Dodge, E., Le, G.D., (2000). Family therapy for adolescent anorexia nervosa: the results of a controlled comparison of two family interventions. *Journal of Child Psychology and Psychiatry* 41, 727-736.
- Fairburn, C.G., & Beglin S.J., (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363-370.
- Fariburn, C.G., (2005). Evidence-based treatment of anorexia nervosa. *International Journal of Eating Disorders*, 37, S26-S30.
- Fichter, M.M. & Quadflieg, N., (1999). Six-year course and outcome of anorexia nervosa. *International Journal of Eating Disorders*, 26, 359-385.
- Franko, D.L., & Erb, J. (1998). Managed care or mangled care? Treating eating disorders in the current health care climate. *Psychotherapy*, 35(1), 43-53.
- Freudenheim, M. (1998). Working Americans facing steep increases in health costs next year. *New York Times*, November 27, A1.
- Frisch, M.J., Herzog, D.B., & Franko, D.L., (2006). Residential treatment for eating disorders. *International Journal of Eating Disorders*, 39(5), 434-442.
- Garner, D.M., (1991). *Eating disorder inventory-2: Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Garner, D.M., Garner, M.V., & Rosen L.W., (1993). Anorexia nervosa “restrictors” who purge: Implications for subtyping anorexia nervosa. *International Journal of Eating Disorders*, 13, 171-185.
- Gaskill J.A., Treat, T.A., McCabe, E.B., Marcus M.D., (2001). Does Olanzapine affect the rate of weight gain among patients with eating disorders? *Eating Disorder Review*;12, 1-2.
- Gerlinghoff, M., Backmund, H., & Franzen, U., (1998). Evaluation of day treatment programme for eating disorders. *European Eating Disorders Review*, 6(2), 96-106.

- Gibelman, M. & Schervish, P.H., (1996). *Who we are: A second look*. Washington, DC: NASW Press.
- Godart, N.T., Flament, M.F., Perdereau, F., Jeammet, p., (2002). Comorbidity between eating disorders and anxiety disorders: a review. *International Journal of Eating Disorders*, 32, 253-270.
- Gowers, S.G., Crisp A.H. , Joughin, N., Bhat, A., (1991). Premenarcheal anorexia nervosa. *Journal of Child Psychology and Psychiatry*, 32, 515-524.
- Grave, R.D., Bartocci, C., Todisco, P., Pantano, M., Bosello, O., (1993). Inpatient treatment for anorexia nervosa: A lenient approach. *European Eating Disorders Review*, 1, 166-176.
- Gull, W.W., (1874). AN (apepsia hysterica, anorexia hysterica). *Transactions of the Clinical Society of London*, 7, 22-28.
- Hall, A. & Hay, P. (1991). Eating disorder patient referrals from a population region 1977-1986. *Psychological Medicine*, 21, 697-701.
- Hall, L.L., Edgar, E.R., & Flynn, L.M., (1997). *Stand and deliver: Action call to a failing industry*. Arlington VA, National Alliance for the Mentally Ill.
- Halmi, K.A., Eckert, E., Marchi, P., Sampugnaro, V., Apple, R., Cohen, J., (1991). Comorbidity of psychiatric diagnoses in anorexia nervosa. *Archives of General Psychiatry*, 48, 712-718.
- Heberbrand J., Himmelmann, G.W., Herzog, W. Herpertz-Danniman, B.M., Steinhausen, H.C., Amstein, M., Seidel, R., Deter, H.C., Remschmidt, H. Schager, H., (1997). Prediction of low body weight at long-term follow-up in acute anorexia nervosa by low body weight at referral. *American Journal of Psychiatry*, 154, 566-569.
- Heberbrand J., Himmelmann, G.W., Wewetzer, C., Gutenbrunner, C., Hesecker, H., Schafer, H., & Remschmidt, H., (1996). Body weight in acute anorexia and at follow-up assessed with percentiles for the body mass index: implications of a low body weight at referral. *International Journal of Eating Disorders*, 19, 347-357.
- Hjern, A., Lindberg, L., & Lindblad, F., (2006). Outcome and prognostic factors for adolescent female in-patients with anorexia nervosa: 9-14 year follow-up. *British Journal of Psychiatry*, 189, 428-432.
- Herzog, D.B., Keller, M.B., Sacks, N.R., Yeh, C.J., Lavori, P.W., (1992). Psychiatric comorbidity in treatment-seeking anorexics and bulimics. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31, 810-818.
- Herzog, D.B., Nussbaum, K.M., Marmor, A.K., (1996). Comorbidity and outcome in eating disorders. *Psychiatric Clinics of North America*, 19, 843-859

- Herzog, W., Schellberg, D., & Deter, H.C., (1997). First recovery in anorexia nervosa patients in the long-term course: A discrete-time survival analysis. *Journal of Consulting and Clinical Psychology*, 65 (1), 169-177.
- Hoek, H.W., (2002). Epidemiology, etiology, and course of eating disorders. In K.D. Brownell & C.G. Fairburn (Eds.), *Eating disorders and obesity: A comprehensive handbook* (pp. 199-244). New York: Guilford Press.
- Hoek, H.W., Bartelds, A., Bosveld, J., van der Graaf, Y., Limpens, V., Maiwald, M., & Spaaij, C., (1995). Impact of urbanization on detection rates of eating disorders. *American Journal of Psychiatry*, 152, 1272-1278.
- Horowitz, L.M., Rosenberg, S.E., Baer, B.A., Ureno, G., & Villaseno, V.S., (1988). Inventory of Interpersonal Problems: Psychometric properties and clinical applications. *Journal of Consulting and Clinical Psychology*, 56, 885-892.
- Howard, W.T., Evans, K.K., Quintero-Howard, C.V., Bowers, W.A., and Andersen, A.E., (1999). Predictors of success or failure of transition to day hospital treatment for inpatients with anorexia nervosa. *American Journal of Psychiatry*, 156, 1697-1702.
- Huskamp, H.A., (1998). How a managed behavioral health care care-out plan affected spending for episodes of treatment. *Psychiatric Services* 49(12), 1559-1562.
- Inagaki, T., Horiguchi, J., Tsubouchi, K., Miyaoka, T., & Uegaki, J., (2002). Late onset anorexia nervosa: two case reports. *International Journal of Psychiatry in Medicine*, 32, 91-95.
- Kaye, W.H., Enright, A.B., Lesser, S. (1988). Characteristics of eating disorder programs and common problems with third-party providers. *International Journal of Eating Disorders*, 7(4), 573-579.
- Kaye, W.H., Kaplan, A.S. & Zucker, M.L. (1996). Treating eating disorder patients in a managed care environment. *Contemporary American issues and a Canadian response. Psychiatric Clinics of North America*, 19(4), 793-810.
- Kaye, W.H., Nagata, T., Weltzin, T.E., Hsu, L.K., Sokol, M.S., McConaha, C., Plotnicov, K.H., Weise, J., Deep, D., (2001). Double blind placebo-controlled administration of fluoxetine in restricting- and purging-type anorexia nervosa. *Biological Psychiatry*, 49, 644-652.
- Kaye, W.H., Bulik, CM., Thornton, L., Barbarich, N., Masters, K., (2004). Comorbidity of anxiety disorders with anorexia and bulimia nervosa. *American Journal of Psychiatry*, 161, 2215-2221.
- Keel, P.K., Dorer, D.J., Franko, D.L., Jackson, S.C., Herzog, D.B., (2005). Postremission predictors of relapse in women with eating disorders. *American Journal of Psychiatry*, 162, 2263-2268.
- Keys, A., Brozek, J., Henschel, A., Mickelsen, O., & Taylor, H.L., (1950). *The biology of human starvation* (2 vols). Minneapolis: University of Minnesota Press.

- Kingston, K., Szmuckler, G., Andrews, D., Tress, B., Desmond, P., (1996). Neuropsychological and structural brain changes in anorexia nervosa before and after refeeding. *Psychological Medicine*, 26, 15-28.
- Lantzouni, E., Frank, G.R., Golden, N.H., Shenker, R.I., (2002). Reversibility of growth stunting in early onset anorexia nervosa: a prospective study. *Journal of Adolescent Health*, 31, 162-165.
- LaVia, M.C., Gray, N., Kaye, W.H., (2000). Case reports of Olanzapine treatment of anorexia nervosa. *International Journal of Eating Disorders*, 27, 363-366.
- LaVia, M.C., Kaye, W.H., Andersen, A., Bowers, W., Brandt, H.A., Brewerton, T.D., Costin, C., Hill, L., Lilenfeld, L., McGilley, B., Powers, P.S., Pryor, T., Yager, J., Zucker, M.L., (1998). Anorexia nervosa: criteria for levels of care. Paper presented at the annual meeting of the Eating Disorders Research Society, Cambridge, Mass, November 5-7.
- LeGrange, D., Eisler, I., Dare, C., & Russell, G., (1992). Evaluation of family treatments in adolescent anorexia nervosa. *International Journal of Eating Disorders*, 12, 347-357.
- Lilenfeld, L., Kaye W., Greeno, C., Merikangas, K., Plotnicov, K., Pollice, C., et. al., (1998). A controlled family study of restricting anorexia and bulimia nervosa: Comorbidity in probands and disorders in first-degree relatives. *Archives of General Psychiatry*, 55, 603-610.
- Linehan, MM (1993). *Cognitive behavioral treatment of borderline personality disorder*. New York: Guilford Press.
- Lock, J., (2002). Treating adolescents with eating disorders in the family context: Empirical and theoretical considerations. *Child and Adolescent Clinics of North America*, 11, 331-342.
- Lock, J., le Grange, D., Agras, W.S., & Dare, C., (2001). *Treatment manual for anorexia nervosa*. New York: Guilford Press.
- Lowe, B., Zipfel, S., Buchholz, C., Dupont, Y., Reas, D.L., & Herzod, W., (2001). Long-term outcome of anorexia nervosa in a prospective 21-year follow-up study. *Psychological Medicine*, 31, 881-890.
- Lucas, A.R., Beard, C.M., O'Fallon, W.M., & Kurland, L.T., (1988). Anorexia nervosa in Rochester, Minnesota: a 45 year study. *Mayo Clinic Proceedings*, 63, 433-442.
- Lucas, A.R., Beard, C.M., O'Fallon, W.M., & Kurland, L.T., (1991). 50-year trends in the incidence of anorexia nervosa in Rochester Minn.: a population-based study. *American Journal of Psychiatry*, 148, 917-922.

- Maurery, D.R., Vaquerano, L., Sethi, R., Jee, J., Chimento, L. (2006). Managed mental health care: Findings from the literature, 1990-2005 (DHHS Pub. No. SMA-06-4178). Rockville, MD: Center for Mental Health Services, Substance Abuse and Mental Health Services Administration.
- McCabe, E.B., LaVia, M.C., & Marcus, M.D. (2004). Dialectical Behavior Therapy for Eating Disorders. In J. Kevin Thompson (Ed.), *Handbook of Eating Disorders and Obesity*.
- Mechanic, D. (1999). *Mental health and social policy. The emergence of managed care*. Boston: Allyn and Bacon.
- Milos, G., Spindler, A., Schnyder, U., Martz, J., Hoek, H.W., & Willi, J., (2004). Incidence of severe anorexia nervosa in Switzerland: 40 years of development. *International Journal of Eating Disorders*, 35, 250-258. Erratum, 36, 118-119.
- Minuchin, S., Rosman B.L., & Baker, L., (1978). *Psychosomatic families: anorexia nervosa families in context*. Cambridge, MA: Harvard University Press.
- Mitchell, J.E., Cook-Meyers, T., & Wonderlich, S.A., (2005). Diagnostic criteria for anorexia nervosa: Looking ahead to DSM-V. *International Journal of Eating Disorders*, 37S, S95-S97.
- Mitchell, J.E., Pomeroy, C., & Adson, D.D., (1997). Managing medical complications. In D.M. Garner & P. E. Garfinkel (Eds.), *Handbook of treatment for eating disorders* (pp. 383-393). New York: Guilford Press.
- NASW Code of Ethics: [On-line}. Available: <http://www.socialworkers.org/pubs/code/code.asp>
- O'Neill, J., (1999). Psychosocial care often left with crumbs. *NASW News*, 44 (4), 3.
- Oss, M.E., & Mackie, J.J., (1995) Behavioral health finance: How did we get here? *Open Minds*, 9(7), 4-5.
- Pike, K.M., (1998). Long-term course of anorexia nervosa: Response, relapse, remission and recovery. *Clinical Psychology Review*, 18(4), 447-475.
- Pike, K.M., (2000). How do we keep patients well: Issues of relapse prevention. Paper presented at the International Conference on Eating Disorders 2000. New York, NY.
- Pike, K.M., Walsh, B.T., Vitousek, K., Wilson, G.T., Bauer, J., (2003). Cognitive behavior therapy in the post-hospital treatment of anorexia nervosa. *American Journal of Psychiatry*, 160(11), 2046-2049.
- Pike, K.M., & Striegel-Moore, R.H., (1997). Disordered eating and eating disorders. In S.J. Gallant, G.P. Keita, & R. Royak-Schaler (Eds.), *Health care for women* (pp 97-114). Washington DC: American Psychological Association.

- Piran, N., Langdon, L., Kaplan, A., & Garfinkel, P.E., (1989). Evaluation of a day hospital program for eating disorders. *International Journal of Eating Disorders*, 8(5), 523-532.
- Probst, M., Vandereycken, W., Van Coppenolle, H., & Pieters, G. (1999). Body experience in eating disorders before and after treatment: A follow-up study. *European Psychiatry*, 14, 333-340.
- Richard, M., Bauer, S., Kordy, H., & COST Action B6, (2005). Relapse in Anorexia and Bulimia Nervosa – A 2.5 year follow-up study. *European Eating Disorders Review*, 13, 180-190.
- Ross, E.C. (2000). Will managed care ever deliver on its promises? Managed care, public policy, and consumers of mental health services. *Administration and Policy in Mental Health*, 28(1), 7-22.
- Safer, D.L., Telch, C.F. & Agras, W.S., (2001). Dialectical behavior therapy for bulimia nervosa. *American Journal of Psychiatry*, 4, 632-634.
- Selvini Palazzoli, M., (1974). *Self-starvation: from the intrapsychic to the transpersonal approach*. London: Chaucer.
- Silber, T.J. & Robb, A.S., (2002). Eating disorders and health insurance. Understanding and overcoming obstacles to treatment. *Child Adolescent Psychiatric Clinics of North America*, 11, 419-428.
- Simon, J., Schmidt, U., & Pilling, S., (2005). The health service use and cost of eating disorders. *Psychological Medicine*, 35, 1543-1551.
- Sipkoff, M., & Oss, M.E., (1995) How to avoid strategic planning pitfalls. *Open Minds*, 8.11, pp?
- Steinhausen, H.C., (1985). Evaluation of inpatient treatment of adolescent anorexic patients. *Journal of Psychiatric Research*, 19, 371-375.
- Steinhausen, H.C., (1995). The course and outcome of anorexia nervosa. In K.D. Brownell, & C.G. Fairburn (Eds.), *Eating disorders and obesity: a comprehensive handbook* (pp 234-237). New York: Guilford Press.
- Steinhausen, H.C., (2002). The outcome of anorexia nervosa in the 20th century. *American Journal of Psychiatry*, 159, 1284-1293.
- Steinhausen, H.C., Grigoriu-Serbanescu, M., Boyadjieva, S., Neumarker, K., Metzke, C.W., (2008). Course and predictors of rehospitalization in anorexia nervosa in a multisite study. *International Journal of Eating Disorders*, 41,(1), 29-36.
- Striegel-Moore, R.H., Leslie, D., Petril, S.A., Garvin, V., & Rosenheck, R.A., (2000). One-year use and cost of inpatient and outpatient services among female and male patients with an

- eating disorder: Evidence from a national database of health insurance claims. *International Journal of Eating Disorders*, 27, 381-389.
- Strober, M., (2005). The future of treatment research in anorexia nervosa. *International Journal of Eating Disorders*, 37, S90-S94.
- Strober, M., Freeman, R., & Morrell, W., (1997). The long-term course of severe anorexia nervosa in adolescents: Survival analysis of recovery, relapse and outcome predictors over 12-15years in a prospective study. *International Journal of Eating Disorders*, 22, 339-360.
- Strober, M., Freeman, R., Lampert, C., Diamond, J., & Kaye, W., (2000). Controlled family study of anorexia nervosa and bulimia nervosa: Evidence of shared liability and transmission of partial syndromes. *American Journal of Psychiatry*, 157(3), 393-401.
- Strober, M., Lampert, C., Morrell, W., Burroughs, J., & Jacobs, C., (1990). A controlled family study of anorexia nervosa: Evidence of familial aggregation and lack of shared transmission with affective disorders. *International Journal of Eating Disorders*, 9(3), 239-253.
- Sturm R., (1997). How expensive is unlimited mental health coverage under managed care? *Journal of the American Medical Association*, 278, (18) 1533-1537.
- Sullivan, P.F., (1995). Mortality in anorexia nervosa. *American Journal of Psychiatry*, 152, 1073-1074.
- Talbott, J.A., (2001). The economics of mental health care in the USA and the potential for managed care to expand into Europe. *Current Opinion in Psychiatry*, 14, 279-285.
- Telch, C.F., Agras, W.S. & Linehan, M.M. (2000). Group dialectical behavior therapy for binge eating disorder a preliminary uncontrolled trial. *Behavior Therapy* 2000; 31, 569-582.
- Thein, V., Thomas, A., Markin, D., & Birmingham, C.L., (2000). Pilot study of a graded exercise program for the treatment of anorexia nervosa. *International Journal of Eating Disorders*, 28, 101-106.
- Treat, T.A., Gaskill, J.A., McCabe, E.B., Ghinassi, F.A., Luczak, A.D., & Marcus, M.D., (2005). Short-term outcome of psychiatric inpatients with anorexia nervosa in the current care environment. *International Journal of Eating Disorders*, 38, 123-133.
- Treat, T.A., McCabe, E.B., Gaskill, J.A., Bardone-Cone, A., & Marcus, M.D., Treatment of anorexia nervosa in a specialty care continuum. Manuscript in preparation.
- Vandereycken, W., (2003). The place of inpatient care in the treatment of anorexia nervosa: Questions to be answered. *International Journal of Eating Disorders*, 34, 409-422.
- Vandereycken, W., Probst, M., & Meermann, R., (1988). An experimental video-confrontation procedure as a therapeutic technique and a research tool in the treatment of eating

- disorders. In K.M. Pirke, W. Vandereycken, & D. Ploog (Eds.), *The psychobiology of bulimia nervosa* (pp. 172-178). Berlin: Springer.
- van Furth, E.F., (1998). The treatment of anorexia nervosa. In H.W. Hoek, J.L. Treasure, & M.A. Katzman, (Eds.), *Neurobiology in the treatment of eating disorders* (pp. 315-330). New York: Wiley.
- Varmus, H.E., (1998). Parity in financing mental health services: managed care effects on cost, access, and quality. Washington DC, National Advisory Mental Health Council.
- Walsh, B.T., Kaplan, A.S., Attia, E., Olmsted, M., Parides, M., Carter, J.C., Pike, K.M., Devlin, M.J., Woodside, B., Roberto, C.A., Rockert, W., (2006). Fluoxetine after weight restoration in anorexia nervosa: a randomized controlled trial. *Journal of the American Medical Association*, 295, (22), 2605-2612.
- Weissman, E., Pettigrew, K., Sotsky, S., Regier, D.A., (2000). The cost of access to mental health services in managed care. *Psychiatric Services*, 51, (5), 664-666.
- WHO Global Database on Body Mass Index. World Health Organization. [On-line]. Available: [http://www.who.int/bmi/index.jsp?introPage=intr\\_5.html](http://www.who.int/bmi/index.jsp?introPage=intr_5.html). December 2007.
- Wickizer, T.M. & Lessler, D., (1998). Do treatment restrictions imposed by utilization management increase the likelihood of readmission for psychiatric patients? *Medical Care*, 36, (6), 844-850.
- Willer, M.G., Thuras, P., Crow, S.J., (2005). Implications of the changing use of hospitalization to treat anorexia nervosa. *American Journal of Psychiatry*, 162, 2374-2376.
- Williamson, D.A., Thaw, J.M., & Vernando-Sullivan, P.J., (2001). Cost effectiveness analysis of a hospital-based cognitive-behavioral treatment program for eating disorders. *Behavior Therapy*, 32, 459-477.
- Wilson, G.T. & Pike, K.M., (2001). Eating disorders. In D.H. Barlow (Ed.) *Clinical handbook of psychological disorders: A step-by-step treatment manual* (3rd ed., pp. 332-375). New York: Guilford Press.
- Wiseman, C.V., Sunday, S.R., Klapper, F., Harris, W.A., & Halmi, K.A., (2001). Changing patterns of hospitalization in eating disorders patients. *International Journal of Eating Disorders*, 30, 69-74.
- Zipfel, S., Lowe, B., Reas, D., Deter, H., & Herzog, W., (2000). Long-term prognosis in anorexia nervosa: lessons from a 21-year follow-up study. *Lancet*, 355, 721-722.
- Zipfel, S., Reas, D.L., Thornton, C., Olmsted, M.P., Williamson, D.A., Gerlinghof, M., Herzog, W., & Beumont, P.J., (2002). Day hospitalization programs for eating disorders: A systematic review of the literature. *International Journal of Eating Disorders*, 31, 105-117.