The Cost-Effectiveness of Anorexia Nervosa Treatment

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Abstract: **Objective:** *Anorexia nervosa (AN) is an expensive-to-treat illness with a high mortality rate. Some health care systems have limited the amount of treatment provided for AN despite the lack of clearly documented efficacy for these limited-intensity approaches. One method that can inform decisions about AN treatment is cost-effectiveness analysis.* **Method:** *Cost-modeling analysis was used to estimate the incremental cost-effectiveness of AN treatment. Modeling was chosen given the lack of primary data on costs and outcomes in AN treatment. Data for age of onset, life expectancy, and disease-associated mortality were taken from the literature. The costs of treatment used in the analysis were those in use at the University of Minnesota.* **Results:** *Assuming an approach consisting of inpatient weight restoration, followed by treatment of gradually diminishing intensity (partial hospitalization, then outpatient psychotherapy plus medication management), incremental cost-effectiveness ratios were calculated and compared with a limited intensity, ''usual care'' model. These assumptions yielded a cost per year of life saved of $30,180.* **Discussion:** *Relative to many other medical interventions, the comprehensive treatment of AN appears to be quite cost-effective in terms of cost per year of life saved. Such data may have an impact on payer decisions and underscore the serious nature of AN. © 2004 by Wiley Periodicals, Inc.* Int J Eat Disord 35: 155–160, 2004.

Key words: *cost-effectiveness analysis; anorexia nervosa treatment; hospitalization; medication management*

INTRODUCTION

Anorexia nervosa (AN) is an important public health problem. This illness affects 0.5%–1% of young adult women and has a high mortality rate. In fact, due to a variety of medical causes and suicide, the mortality rate for this illness is among the highest of any psychiatric

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illness (Harris & Barraclough, 1994, 1998). AN is broadly viewed as difficult and expensive to treat. This view, in part, has led to a tendency for third-party payers to limit the care provided for this illness, particularly in the United States. As a result, there is evidence that length of stay and the amount of weight restoration achieved during length of stay are diminishing (Wiseman, Sunday, Klapper, Harris, & Halmi, 2001). Further, it appears that such shortened lengths of stay are associated with a diminished likelihood of successful treatment (Baran, Weltzin, & Kaye, 1995; Commerford, Licinio, & Halmi, 1997). On a broader level, the utilization of treatment resources by individuals with eating disorders is less than one might predict based on the population prevalence of these illnesses and, at least for AN, falls well short of any published guidelines or broadly accepted treatment practices (Striegel-Moore, Leslie, Petrill, Garvin, & Rosenheck, 2000).

Cost-effectiveness analysis can be useful in making a variety of decisions about health care policy. In particular, this type of analysis might help in understanding AN in several ways. First, these analyses can test the prevailing belief that, relative to other illnesses, treating AN is expensive. Second, cost-effectiveness analyses can aid in making rational selections from a variety of effective treatments (although choosing from a wide variety of proven treatments is not currently possible for AN). Finally, certain aspects of these analyses can help to underscore the importance of illnesses such as AN, even when fundamental treatment decisions are not involved.

Very limited work has examined cost-effectiveness analysis in eating disorders. One example is a study of cost-effectiveness analysis of bulimia nervosa treatment reported by Koran et al. (1995). This analysis, using the results of a randomized, controlled trial of different treatments for bulimia nervosa, found that the use of medications for 24 weeks was the most cost-effective strategy in terms of cost per abstinent patient. (These results also highlight one possible outcome of cost-effectiveness analyses: although 24 weeks of medication was the most cost-effective treatment, it did not provide the overall highest abstinence rate. In these situations, the less cost-effective intervention might be more clinically desirable). A second modeling study, using hypothetical data, has examined cases of bulimia nervosa treatment (Mitchell, Peterson, & Agras, 1999).

The goal of the current study was to use cost-effectiveness modeling to compare the incremental cost-effectiveness of more extensive multimodal AN treatment to a highly limited treatment model advocated by some third-party payers in the United States in recent years.

METHODS

Choice of Analytical Methods

Cost-effectiveness analysis can be either data based or hypothetical data can be used for modeling purposes. In many respects, data-based studies are advantageous. They represent real-world clinical phenomena and many people may find them more convincing. Conversely, sufficient data of the type needed to conduct such an analysis are not always available, and are not available in the case of AN. For this reason, a modeling approach was chosen for the cost-effectiveness analysis.

Assumptions

In any such analysis, a variety of assumptions need to be made, particularly in modeling analyses. The assumptions for the current study are described below.

Perspective

Cost-effectiveness analyses can be conducted from a third-party or societal perspective. The third-party perspective involves the costs of health care to the institution providing the care. The societal perspective includes these costs but also attempts to measure and quantify other important aspects of the illness and its treatment including most prominently the time costs of the illness, both to the patient and to the family. The societal perspective provides a more well-rounded and more thorough picture of the true costs of an illness. However, for AN (and other eating disorders), accurate estimates of the time costs associated with the illness do not yet exist. Therefore, for this modeling study, a third-party payer perspective was chosen.

Assumptions about Mortality Rates

In the current study, the major outcome measure is cost for year of life saved. To make these calculations, assumptions must be made about mortality rates. In this area, ample data do exist for AN. Longer-term studies of AN mortality with high ascertainment rates have generally found mortality rates to be at or to exceed 10% (Crow, Praus, & Thuras, 1999; Eckert, Halmi, Marchi, Grove, & Crosby, 1995; Sullivan, 1995). For the purposes of the current study, a 10% mortality rate was assumed. Further, to calculate the years of life saved, in addition to the crude mortality, the age at the time of death and life expectancy are also needed. For the current analysis, a mortality age of 25 was used, based on previous work examining the time from illness onset to mortality in AN patients (Crow et al., 1999). A life expectancy of 80.2 years was selected based on Year 2000 figures for life expectancy for all races, female, in the United States (Minino & Smith, 2001).

Treatment

For the current study, it was necessary to make assumptions about a model of treatment to be provided. Two treatment models were selected. The ''usual care'' model represents an approach to treatment commonly supported by third-party payers in the United States. The ''adequate care'' approach to treatment represents a more traditional treatment approach involving inpatient weight restoration to close to 100% of ideal body weight followed by more extensive and aggressive follow-up care. The usual care and adequate care models are shown in Table 1.

Assumptions about Treatment Efficacy

In addition to assuming a treatment model or models, assumptions must be made about the outcome of treatment. Currently, data do not exist that allow for the precise estimation of the treatment impact of either the usual care or the adequate care model. For the purposes of the analysis, we assume (a) that currently reported mortality rates represent the benefit derived from the usual care model and (b) that the adequate care

Table 1. Care models

	Usual Care	Adequate Care
Inpatient hospital	7 days	45 days
Partial hospital	15 days	20 days
Psychotherapy (50 mins)	25 sessions	50 sessions
Medication management	20 sessions	20 sessions
Fluoxetine (60 mg/d)	2 years	2 years

model provides enough treatment impact to ameliorate the mortality risk associated with AN for 50% of those who receive the treatment.

Cost of Treatment

The cost of treatment was derived from costs charged to third-party payers at local institutions or in the case of fluoxetine, the local average wholesale price for brand name fluoxetine. Cost assumptions include the following: inpatient treatment, $2,000 per day; partial hospitalization, $800 per day; psychotherapy, $120 per visit; medication management, $90 per visit; and fluoxetine (Prozac, Eli Lilly Co., Indianapolis, IN) 60 mg per day, $7.41 per day. (All costs are quoted in U.S. dollars.)

Cost-Effectiveness Analysis

The analytic approach used in this study involves the calculation of an incremental cost-effectiveness ratio (ICER). The ICER represents the difference between two treatments in terms of the cost associated with improved health outcomes with more expensive treatment. In general, the calculation is as follows:

$$\text{ICER} = \frac{(\text{tc}_1 - \text{tc}_2)}{(\text{e}_1 - \text{e}_2)}$$

where tc_1 and tc_2 equal the total cost of treatment 1 and treatment 2, respectively, and e_1 and e_2 equal the health outcome for treatment conditions 1 and 2, respectively. More specifically,

$$\text{ICER} = \frac{\text{total cost}_{\text{adequate care}} - \text{total cost}_{\text{usual care}}}{\text{mortality rate}_{\text{adequate care}} - \text{mortality rate}_{\text{usual care}}}$$

RESULTS

The cost of the usual care treatment package is $36,200 per subject and the cost of the adequate care treatment package is $119,200 per subject. Using the assumptions listed above for mortality rate, age at mortality, treatment response, and life expectancy, the ICER of adequate care is $30,180 per year of life saved.

DISCUSSION

The main finding of this study is that ICER calculations for the adequate care model for AN yield a cost per year of life saved of only about $30,000 per year, as opposed to a minimal usual care model. To allow for the interpretation of the results of the cost effectiveness analysis, it is necessary to make assumptions about the value of 1 year of life. Many methods have been used to estimate the value of 1 year of life. They have resulted in estimates ranging from as little as $25,000 per year to as much as $425,000 per year (Hirth, Chernew, Miller, Fendrick, & Weisster, 2000). Based on these assumptions, the cost of AN treatment appears reasonably to be cost-effective.

Compared with other medical interventions, AN treatment again appears to be highly cost-effective. For example, recent analyses suggest that placing defibrillators on all commercial aircraft to be used in cases of cardiac arrest would yield an ICER of $94,700 per year of life saved (Groeneveld et al., 2001), compared with limited deployment on large aircraft only. Similarly, the combination of human papilloma virus testing and Papanicolaou testing every 2 years yields an ICER of $76,183 (Mandelblatt et al., 2002) compared with Papanicolaou tests alone every 2 years.

Why does AN treatment appear to be so cost-effective? This result is not consistent with the prevailing view, at least among third-party payers in the United States. Much of this finding is driven by the startling high mortality rate associated with AN, but a critical factor is that when mortality occurs, it occurs at a very young age. Also, treating AN may be expensive relative to other mental health interventions. However, compared with other more technology-intensive health care treatments, the treatment itself is fairly inexpensive.

There are several limitations to the current study. Chief among them is the use of modeled rather than actual data. Unfortunately, there are relatively few controlled trials of any treatments for AN thus far and none of them provide sufficient size, health care utilization data, or long-term mortality data that would allow us to conduct a data-based analysis at this time. A second limitation is the use of the third-party payer perspective. This approach actually has some practical advantages. For instance, it may be more likely to impact third-party payer policies and it is much simpler to conduct. However, critically important factors such as time cost of the illness and quality of life go unmeasured.

In summary, providing substantial amounts of multimodal treatment for AN appears to be quite cost-effective in terms of cost per year of life saved. These results emphasize the high mortality rate associated with AN.

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