Cost-utility of Treatment of Bulimia Nervosa

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ABSTRACT

Objective: The costs of treating eating disorders are high. Our objective was to perform a cost-utility analysis of treatment of bulimia nervosa.

Method: 72 patients entering treatment of bulimia nervosa (ICD-10 diagnosis) completed the 15D health-related quality of life (HRQoL) questionnaire and the Eating Disorder Inventory (EDI) before and 6 months after the start of treatment. Quality-adjusted life years (QALYs) gained were calculated and cost-utility was assessed within the time horizon of 10 years.

Results: Baseline HRQoL was severely impaired in the patients. As a consequence of treatment, mean HRQoL improved clinically and statistically significantly. The cost per QALY gained varied from €1,455 to €16,481 (from €4,428 to €19,663 discounted at 5%) depending on the assumptions used in the analysis.

Discussion: HRQoL of bulimia nervosa patients is severely impaired, but treatment has a clear positive effect on HRQoL. The cost per QALY gained is comparable to many other treatments.

Keywords: bulimia nervosa; health related quality of life; cost of QALY

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Introduction

Eating disorders are serious psychiatric disorders affecting mostly adolescent girls and young adult women. They are usually divided into three categories: anorexia nervosa, bulimia nervosa, and atypical eating disorders (EDNOS) including binge-eating disorder (BED). The prevalence of bulimia nervosa in adolescent women varies from 1–2%.[1] Bulimia nervosa is much less frequent in men than in women.

The research regarding bulimia nervosa treatment has generated three robust findings. Firstly, the most effective treatment is a specific type of cognitive behavior therapy (CBT) that focuses on modifying the specific behaviors and ways of thinking that maintain these patients' eating disorders. It typically involves 16–20 sessions over 5 months. It results in substantial improvement with a third to a half of the patients making a complete and lasting recovery. The second finding is that antidepressant drugs have an anti-bulimic effect. The third finding is that combining cognitive therapy with antidepressant drugs results in few benefits over CBT alone. Interpersonal therapy may also be as effective as CBT, but it takes longer to work.[1]

Health-related quality of life (HRQoL) is a multidimensional construct that typically assesses the physical, psychological, and social dimensions of health and considers the patient's perception of the impact of an illness and its treatment on these domains and overall wellbeing. The measurement of HRQoL is important, because it reflects directly the patient's view on the effect of an illness on his/her wellbeing, not that of a health care professional.[2] There are generic HRQoL instruments such as the Nottingham Health Profile,[3] Medical outcomes study 36-item short form (SF-36),[4] and 15D.[5] There are also disease-specific HRQoL instruments developed in recent years for eating disorders such as the Eating Disorders Quality of Life Instrument (EDQOL),[6] the Eating Disorders Quality of Life

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Scale (EDQLS),[7] the Health-Related Quality of Life in Eating Disorders Questionnaire (HeRQoLEDv2),[8] and the Quality of Life for Eating Disorders (QOL ED).[9] Since 1994, there are about 40 studies published regarding HRQoL in eating disorders.[2,10] The studies have found out that patients with ED report lower HRQoL than healthy controls, HRQoL impairment occurs in patients with full DSM diagnoses as well as those who have sub-threshold ED symptoms, family caregivers of patients with ED experience HRQoL impairment, HRQOL impairment in patients with ED is considerable, patients with ED receiving treatment report improvements in HRQoL and that there are gender differences in HRQOL in patients with ED.[2] Studies to date have confirmed that HRQOL concerns are significant in patients with ED and highlight the importance of assessing HRQOL measures.[2] However, there may be problems when using HRQoL as an outcome measure, as for example, patients who demonstrate an extreme lack of insight may not provide accurate information.[2]

Evidence about the cost-effectiveness of treatment of bulimia is scarce. One post hoc study compared the cost-effectiveness of five different treatment strategies in 71 women with bulimia and reported that desipramine for 24 weeks was more cost-effective than combining 15 weeks of CBT and 16 weeks of desipramine.[11] One study measured the quality of life of patients with eating disorders using the Nottingham Health Profile. Patients with anorexia and bulimia both showed significantly more impairment than average female student controls but, unfortunately, the study did not provide necessary data for a cost-utility analysis.[12]

The quality-adjusted life year that takes into account an intervention's effect both on the quantity and quality of life is currently considered one of the most important measures of effectiveness of care. In addition to allowing comparison across a broad array of interventions for the same condition, it also enables the comparison of the effectiveness of interventions across different conditions. Cost-utility analysis is a type of cost-effectiveness analysis that examines the costs and effectiveness of therapies by using the quality-adjusted life year gained as its unit of effectiveness. Cost-utility analyses, therefore, are considered the gold standard both for reporting cost-effectiveness results in the literature and for informing policy decisions on the allocation of health care resources.[13] To our knowledge, no studies so far have used quality-adjusted life years (QALYs) gained as outcome in the field of eating disorders despite the fact that the examination of cost per QALY in a cost-utility analysis appears particularly relevant to eating disorders because of their marked impact on HRQoL.

Method

We have been running a large trial exploring the feasibility of routine evaluation of cost-effectiveness of secondary health care since 2002 and have collected HRQoL data from more than 10,000 patients in approximately 20 different medical specialties before and after interventions performed in our hospitals.[14] To determine the cost-utility of various interventions, the observed change in HRQoL is related to routinely collected cost data of secondary care. The project allows meaningful comparisons of cost-utility of a range of interventions and has the ultimate goal of providing decision makers with relevant information for planning of future secondary health care services.

Altogether 359 consecutive patients, referred by primary care physicians, private practitioners, or psychiatric consultants, entering treatment in the eating disorder unit of the Helsinki University Central Hospital from June 2002 to December 2003 were invited to participate and fill in the 15D HRQoL questionnaire[5,15] and the Eating Disorder Inventory (EDI) questionnaire.[16] The eating disorder unit offers specialized treatment to the 1.4 million population of the Helsinki and Uusimaa hospital district. Follow-up questionnaires were mailed to all bulimia nervosa patients having returned the first questionnaire (n = 115). A psychiatric resident or consultant made the diagnosis according to clinical assessment. The follow-up questionnaires were not returned by 37% (n = 43) of patients, but their baseline HRQoL did not differ statistically significantly from that of the patients who returned. After data collection, 72 patients (63%) were available for analysis.

Clinical Assessment

Upon entering the eating disorder unit, patients were examined by a psychiatric resident or psychiatric consultant. Furthermore, internist and dietician consultation was provided if needed. After the consultations treatment, interventions were adjusted to each patient's needs by a multidisciplinary team.

Treatment Interventions

The treatment interventions followed the normal hospital routine. The treatment of bulimia nervosa patients follows the stepped-care program. First the patients receive psychoeducational lectures including elements of cognitive behavior therapy. Experienced dieticians and internists give the lectures. After them, those who are still

symptomatic are invited to cognitive-behavioral group therapy (8 times). It is held by an experienced dietician and a psychiatric nurse. After the group therapy, patients still symptomatic receive individual cognitive-behavioral psychotherapy by a psychiatric nurse (about 20 sessions). If the patients are not able to stop binging and purging in outpatient care, they are invited to a short interval treatment in the day hospital or at the inpatient ward. The patients also receive psychopharmacological treatment, and if needed, individual nutritional counselling and social skills training.

Baseline and Follow-Up Measurements

HRQoL was assessed by the 15D.[5,15] It is a generic, 15-dimensional, standardized, self-administered HRQoL instrument that can be used both as a profile and a single index score measure. The 15D dimensions are: moving, seeing, hearing, breathing, sleeping, eating, speech, eliminating, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity. For each dimension, the respondent must choose one of the five levels that best describes his/her state of health at the moment (the best value = 1; the worst value = 5). The valuation system of the 15D is based on an application of the multiattribute utility theory. A set of utility or preference weights, elicited from the general public through a 3-stage valuation procedure, is used in an additive aggregation formula to generate the utility score, that is, the 15D score (single index number) over all the dimensions. The maximum score is 1 (no problems on any dimension), and the minimum score 0 (being dead).[5,17,18] The minimum clinically important difference (MID) is $\geq$0.03.[19] In most of the important properties (reliability, content validity, discriminatory power, and responsiveness to change), the 15D compares at least equally with other similar HRQoL instruments.[20–22] HRQoL of patients at baseline was compared with that of a representative sample of the general population studied in the Finnish National Health Survey in 1995–96 (n = 1482 in the same age range as our patients).[23] The population sample was weighted to correspond to the age and gender distribution of the patients.

Clinical outcome was measured by two disease-specific measures: the Eating Disorder Inventory (EDI)[16] and a specific questionnaire, which was developed for the needs of this study. The EDI is one of the most widely used self-report inventories in eating disorders. It is a 64 item self-report and multiscale measure designed to assess psychological characteristics in anorexia nervosa and bulimia nervosa.[16] The EDI has been repeatedly shown to be a reliable and valid instrument.[16,24] The specific questionnaire developed for the needs of this study is a 33-item, self-report, multiscale measure designed to assess distorted eating patterns, suicidal intents, and contentment to different areas of life. Eating disorder patients have been extremely accurate at self-reporting their weight, although anorexia nervosa patients slightly over-reported their weight and bulimia nervosa patients slightly under-reported their weight.[25]

Cost-utility

The Perspective Taken for the Analysis was that of the Provider of Secondary Health Care.

Direct hospital costs of treatment were obtained from the Ecomed® clinical patient administration system (Datawell, Espoo, Finland). In the database, all cost data concerning treatment of individual patients in the hospital are routinely stored. The cost data used here covered all relevant secondary care costs (interventions, ward, ambulatory visits, laboratory, and radiology) starting from the first HRQoL measurement and ending with the 6-month follow-up. Costs included the special treatment at the eating disorder unit. Productivity loss due to potential work disability and other nonhealth care costs were not included. Medication costs during the inpatient treatment are included in the costs, but other medication costs not.

According to the literature, the number of women who continue to meet full criteria of bulimia nervosa decline as the duration of follow-up increases. Approximately 30% engage in recurrent binge or purging behavior in a 10-year follow-up.[26] In a community-based cohort, there was a marked initial improvement followed by gradual improvement thereafter in a 5-year follow-up.[27] Based on this, we assumed in the base case cost-utility analysis that if we do not treat the patients, their HRQoL improves linearly in 10 years to the same level as the treated patients had after 6 months of treatment. For those treated, we assumed that the HRQoL gain by 6 months would persist until 10 years, and calculated the QALYs gained by the treatment accordingly. By dividing the mean costs by the mean number of QALYs gained gives the cost per QALY gained.

In a best case sensitivity analysis, we also analyzed a scenario where HRQoL would not improve without treatment and the HRQoL gain from the treatment by 6 months would last till the end of the remaining statistical life expectancy of each patient, and calculated the QALYs gained by the treatment accordingly. As the gain of treatment is expected to last for many years, the number of QALYs and consequent cost per QALY figures are also reported using discount rates of 3 and 5%. Sensitivity analyses were performed using the upper and lower values of the 95% confidence interval (CI) for the mean costs and QALYs gained.

Ethical Considerations

All patients received routine treatment and were not, besides being asked to fill in the questionnaires and to

give a written informed consent, approached in any other way. The study protocol was approved by the Ethical Committee of the Helsinki and Uusimaa Hospital District.

Statistical Analysis

Data were analyzed using the statistical software SPSS for Windows version 11.0 (SPSS, Chicago, IL). The results are given as means and standard deviations (SD), and in the case of the skewed cost data, also as medians. The statistical significance of differences between before and after treatment scores was analyzed with Student's two-tailed paired *t*-test for dependent samples, and the difference between the patients and the general population with the two-tailed independent samples *t*-test. Correlations were analyzed using the Pearson correlation coefficient.

TABLE 1. Baseline characteristics and follow-up outcomes

Variable	Baseline	After 6 months
Age, years	25 (6)	
Female %	100	
Duration of illness (years)	8.0 (6.3)	
HRQoL score	0.80 (0.09)	0.85 (0.10)[a]
EDI score	80 (28)	67 (27)[a]
BMI	22.0 (3.9)	23.2 (6.2) n.s.

[a] Denotes a statistically significant improvement from baseline at the $p < 0.001$ level; n.s, not significant.
HRQoL, health-related quality of life; EDI, eating disorder inventory; BMI, body mass index.
Values are means (standard deviations) or percentages.

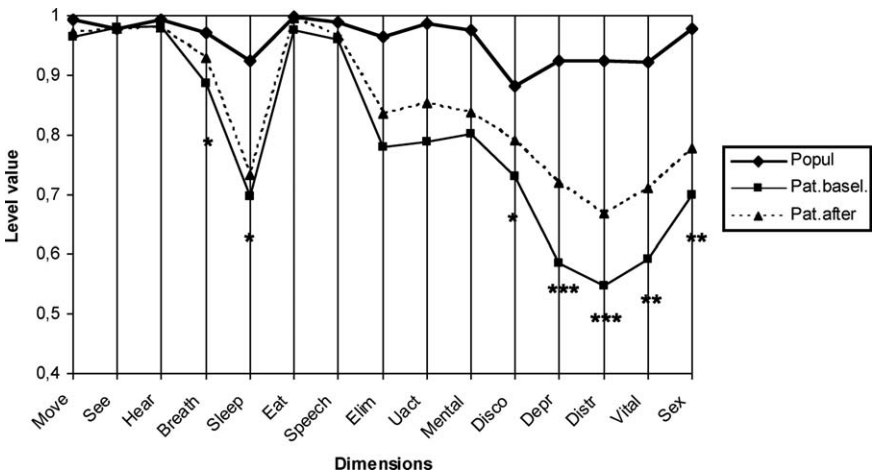
Results

Clinical Outcomes

The baseline patient characteristics are presented in **Table 1**. When compared with the mean 15D score of the age- and gender-standardized general population, bulimia nervosa patients had a global, severe deterioration in their HRQoL (**Fig. 1**). The mean HRQoL score of the patients improved in a statistically significant and clinically important manner during the 6 months of treatment ($p < 0.001$) (**Table 1**), although it still remained significantly worse ($p < 0.001$) than that of the general population (**Fig. 1**). The dimensions on which significant improvement occurred were breathing, sleeping, discomfort, depression, distress, vitality, and sexual activity ($p < 0.05$). Concurrently, there was also a significant decrease in the EDI score ($p < 0.001$) indicating an improvement in the psychological characteristics of bulimia, but no statistically significant change in the BMI of the patients ($p = 0.1$). The increase in the HRQoL score correlated statistically significantly with the decrease in the EDI score ($r = 0.59$, $p < 0.001$) and the decrease observed in self-induced vomiting ($r = 0.35$, $p < 0.05$). Those with a more favorable treatment outcome ($\geq$0.03 increase in the HRQoL score, 56% of the bulimia patients) had a significantly lower baseline HRQoL score than those with a less favorable outcome (0.77 $\pm$ 0.08 vs. 0.84 $\pm$ 0.08, $p < 0.005$) but the groups did not differ from each other with regard to age, duration of illness, or baseline EDI score.

Costs. The mean cost of providing treatment during the 6-month follow-up was €3,972 $\pm$ 5,518. The mean distribution of costs is presented in **Table 2**.

FIGURE 1. The 15D profiles of bulimia nervosa patients ($n = 72$) at baseline and after 6 months of treatment as well as of age-and gender-standardized general population ($n = 1,482$). * denotes a statistically significant improvement from baseline at the $p < 0.05$ level; ** at the $p < 0.01$ level, and * at the $p < 0.001$ level.**



The treatment of the bulimia nervosa patients was mostly ambulatory and only 18% ($n = 13$) received treatment at the inpatient ward for a mean duration of 45 ± 27 days. Those with a more favorable result from treatment (≥0.03 increase in the HRQoL score) did not differ from the rest of the patients regarding costs (data not presented).

Cost-utility and Sensitivity Analysis. The mean number of QALYs gained ranged from 0.241 (base case analysis) to 2.729 (best case analysis) and the mean undiscounted cost per QALY gained from €16,481 (base case) to €1,455 (best case)(**Table 3**). The corresponding discounted (5%) figures ranged from €19,663 to €4,428 per QALY gained, respectively. The worst-case scenario with lower 95% CI for QALYs gained and upper 95% CI for costs resulted in €46,628 per QALY gained. Overall the results were to some extent sensitive to the variation in the estimates of QALYs gained (**Table 3**).

Discussion

This study is to our knowledge the first attempt to quantify the effectiveness of treatment of bulimia patients in the form of QALYs gained, which for instance the National Institute for Health and Clinical Excellence (NICE) considers the principal measure of health outcome.[28] Cost-utility analysis is also the recommended method for economic evaluation of health care.[29]

Based on our findings, the mean HRQoL score of bulimia patients is severely impaired (0.80) when compared with that of age- and gender-standardized general population (0.96), and although there was a clinically important improvement in HRQoL after 6 months of treatment, the HRQoL score still remained compromised (0.85). These findings are in line with previous studies, which found that eating disorder patients have a global deterioration in their perception of HRQoL[2,10,30] and that after 2 years of treatment, there is a significant improvement in HRQoL.[31] In the latter study, all eating disorder patients, however, were grouped together, which precludes conclusions concerning bulimia nervosa patients.[31] The baseline HRQoL of bulimia nervosa patients in our study was in the same range than that seen in much older patients suffering from chronic conditions such as stroke, macular degeneration, or coronary heart disease, which underlines the severe detrimental effect of the condition on HRQoL. When compared with other psychiatric disorders studied using the 15D in a population based study, bulimia nervosa patients had even worse HRQoL than older (45–49 years) patients suffering from depression (0.84), alcohol dependence (0.89), or panic disorder (0.86).[32] The HRQoL of bulimia nervosa patients was in the same range than that of people suffering from dystymia, anxiety disorder, agoraphobia, or GAD (generalized anxiety disorder),[32] but better than that of patients being hospitalized because of depression.[33] These results indicate that the eating

TABLE 2. The distribution of mean treatment costs by items and service use in specialized health care during the six-month follow-up

Variable	Bulimia nervosa ($n = 72$)
Total costs (€)	3,972 (5,518)
Inpatient costs (€)	1,986 (5,006)
Outpatient costs (€)	1,879 (1,563)
Laboratory costs (€)	84 (100)
Radiology costs (€)	19 (64)
Inpatient treatment (days)	8 (21)
Number of outpatient visits	15 (12)

Values are means (standard deviations).

TABLE 3. The results of cost-utility analysis and sensitivity analyses: base case analysis and best case analysis using mean values, and using the upper and lower values of the 95% confidence interval (CI) for the mean differences in treatment effectiveness (QALYs gained) and costs

Analysis	Costs (€)	QALY Gain	Cost Per QALY Gained
Base case analysis using mean values for costs and QALYs gained	3,972	0.241	16,481
Base case analysis using discounting (5%) for QALYs gained	3,972	0.202	19,663
Base case analysis using discounting (3%) for QALYs gained	3,972	0.223	17,812
Sensitivity analysis varying the QALYs gained			
Upper 95% CI	3,972	0.339	11,717
Lower 95% CI	3,972	0.113	35,150
Sensitivity analysis varying the costs			
Upper 95% CI	5,269	0.241	21,863
Lower 95% CI	4,702	0.241	19,510
Sensitivity analysis varying the QALYs gained and costs (worst case)			
Lower 95% CI for QALYs gained, upper 95% CI for costs	5,269	0.113	46,628
Best case analysis using mean values for costs and QALYs gained	3,972	2.729	1,455
Best case analysis using mean values for costs and QALYs gained and QALYs discounted at 5%	3,972	0.897	4,428

disorder patients have very poor HRQoL when compared with many other medical conditions.

Health economic studies on treatment of eating disorders have indicated that the costs of treating bulimia are lower than those in schizophrenia, but higher than those in OCD (obsessive compulsive disorder).[34] Although costs of treating eating disorders have been studied in detail, knowledge on the cost-effectiveness and cost-utility of this treatment is scarce. Consequently, some health insurance providers have limited the amount of treatment provided for anorexia in the United States.[35]

Costs as such are not very informative if they are not related to the effectiveness of treatment. In the field of psychiatry, the cost per QALY in maintenance treatment for older adults with depression varied from $38,000 (∼€20,000) to $58,000 (∼€47,000) during one year.[36] In depression, the cost per QALY was reported to be under $50,000 (∼€38,000) for pharmacologic interventions, $24,000–$34,000 (∼€18,000–26,000) for psychotherapy, and $24,000–$76,000 (∼€18,000–58,000) for care management efforts.[13] In another study, the cost per QALY for schizophrenia was ∼£6,000 (∼€9,000, ∼$12,000), for affective disorder £10,000 (∼€15,000, ∼$20,000), and for neurotic disorder £25,000 (∼€37,000, ∼$50,000) during 1 year of treatment (5% discount rate).[37]

In our study, the cost per QALY gained, based on the 6-month follow-up results ranged from €1,455 (∼$1,960) to €16,481 (∼$22,170) undiscounted, from €4,428 (∼$60,00)to €19,663 (∼$26,680) (discounted at 5%) depending on the assumptions made about the duration of the HRQoL gain from the treatment. For comparison, in some other interventions so far studied in our project with similar methodology, the cost per QALY gained was €3,704 (∼$5,030) in lumbar spine surgery,[38] €7,967 (∼$10,800) in the best case of cataract surgery (both eyes were operated),[39] and €12,340 (∼$16,700) in primary total hip arthroplasty[40] (all discounted at 5%). It is questionable whether our results can be compared with those for other psychiatric interventions discussed above, as there may be crucial differences in the methodology used (e.g., HRQoL instrument, time horizon, range of resource use items considered and their unit costs, exchange rate variations). However, it is noteworthy that the cost per QALY for specialized treatment of bulimia nervosa was less than commonly cited guidelines for adoption of health care interventions. These guidelines recommend adoption of interventions that cost less than $20,000 to $100,000 per QALY (∼€16,400 to €82,000).[41–43]

As our patient material consisted of unselected "real-world" patients receiving standard care at the eating disorder unit, and the economic calculations were based on actual costs having materialized during treatment, we feel that our study has strong relevance to decision-making and priority setting in health care. Furthermore, the effectiveness of treatment was evaluated using patient-derived data reflecting the true benefit the patients experienced from treatment, and at the same time allowing the possibility to determine the cost-effectiveness of treatment in terms of cost per QALY.

However, there are also some limitations to the study. First, 359 subjects were approached, of whom 115 agreed to participate, and of whom 72 actually completed initial and final assessments. Secondly, the cost data used for analysis covered only secondary care costs and not the costs of primary health care and outpatient medication or productivity costs. This, however, is the approach typically used for the calculation of QALYs gained by medical interventions. So far, it is very difficult to be certain about the actual cost per QALY in bulimia, as long-term data on HRQoL and treatment costs are still lacking.

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