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Cost-effectiveness of an internet-based booster program for patients with obsessive–compulsive disorder: Results from a randomized controlled trial

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ABSTRACT

Cognitive behavior therapy (CBT) is an effective treatment for OCD when delivered face-to-face, in group-format and also via the internet. However, despite overall large effect sizes, a considerable amount of the patients relapse. One intervention that has the potential to reduce these relapse rates is booster programs, but if booster program is a cost-effective method of preventing relapse is still unknown. We used health economical data from a recent randomized controlled trial, where patients who had undergone an internet-based CBT were randomly allocated to receive an additional booster program. Assessment points were 4-, 7-, 12- and 24-month. Health economical data were primarily analyzed using a societal perspective. Results showed that the booster program was effective in preventing relapse, and the cost of one avoided relapse was estimated to $1066–1489. Cost-effectiveness acceptability curves showed that the booster program had a 90% probability of being cost-effective given a willingness to pay of $1000–1050 the first year, but this figure grew considerably after two years ($2500–5500). We conclude that internet-based booster programs are probably a cost-effective alternative within one-year time frame and that more treatment may be needed to maintain adequate cost-effectiveness up to two years.

1. Introduction

Cognitive behavior therapy (CBT) is an effective treatment for obsessive–compulsive disorder (OCD) with responder rates averaging 50–70% and also sustained long-term effects up to five years after completed treatment (Abramowitz, 2006; Fisher & Wells, 2005; Rufer et al., 2005; Simpson, Huppert, Petkova, Foa, & Liebowitz, 2006). CBT can be delivered both in individual format and as group therapy (Gava et al., 2007), and a recent innovation is internet-based CBT with therapist support (ICBT), where the therapist communication is primarily provided via the internet (Andersson, 2009). There are to date five studies investigating ICBT for OCD, all showing large within and between group effect sizes, in the same range as face-to-face CBT, and also sustained long-term effects up to two years after completed treatment (Andersson et al., 2011, 2012, 2014; Herbst et al., 2014; Wootton, Dear, Johnston, Terides, & Titov, 2013; Wootton et al., 2011).

Despite that a majority of patients respond to CBT, between 7% and 36% experience relapse after the treatment has ended (Braga, Cordioli, Niederauer, & Manfro, 2005; Rufer et al., 2005; van Oppen, van Balkom, de Haan, & van Dyck, 2005; Whittal, Robichaud, Thordarson, & McLean, 2008). One possible way to reduce relapse rates is to offer booster programs as an addition to the main treatment. Booster programs can be defined as a continued, but spaced apart, additional treatment (e.g. one or two additional treatment sessions one to six months after main treatment completion). The benefit with booster sessions is that the therapist and patient can use information obtained after the acute treatment has ended and discuss possible problems that have occurred during this time (Eyberg, Edwards, Boggs, & Foote, 1998; Whisman, 1990). Our research group recently conducted a randomized trial were all patients ($n=93$) first received a ten week ICBT treatment and were then randomly allocated to also receive an internet-based three week booster program 6 months after treatment or to receive no additional treatment. Results showed that patients who received the booster program had a small but significant

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reduction in relapse (Andersson et al., 2014). Thus, preliminary results suggest that booster programs may be an effective additional intervention that can decrease the risk of relapse. However, there is no data on the health economical aspects of this type of intervention.

Cost-effectiveness analysis is a type of health economical evaluation where the treatment effects are related to the economical costs (Drummond, 2005). The question this type of analysis answers is basically "how much does each additional unit of improvement achieved by the new treatment cost?" (Drummond, 2005). Cost-effectiveness analyses are, from a societal view, important as implementation of less cost-effective treatments can lead to comparably higher societal costs, suboptimal flow in the health care system and, as a consequence, fewer persons can be offered effective treatment (Drummond, 2005; Saha et al., 2001). In light of this, this study set out to investigate the cost-effectiveness of adding an internet-based booster program to patients who had already received ICBT. We used cost-data from the recent randomized controlled trial (Andersson et al., 2014) and estimated the economical cost of avoiding one relapse by adding a booster program to ICBT.

2. Methods

2.1. Participants and assessment points

We used health economical data from the randomized controlled trial where OCD patients first received ICBT and, patients who completed the assessments at the 4-month follow-up ($n=93$), were then randomized to either receive additional booster treatment or no booster treatment (Andersson et al., 2014).[1] This study was powered to detect a between group effect size of $d=0.6$ (80% power, $\alpha=0.05$) between the participants who received the booster and participants who did not. Assessment points were 4- (booster baseline), 7-, 12- and 24-month after completed ICBT. The study flowchart is shown in Fig. 1.

Participants (adults) were eligible for the present study if they fulfilled the diagnostic criteria of OCD according to the DSM-IV-TR (American Psychiatric Association., 2000) and had between 12 and 31 on the Yale–Brown obsessive–compulsive scale (Y-BOCS; Goodman et al., 1989). Exclusion criteria were severe comorbidity such as alcohol- or drug abuse, severe suicidal ideation, bipolar- or psychotic symptoms. We also excluded patients who had received CBT in the last two years or who had changed their psychotropic medication in the last two months. More details about the assessments and inclusion procedure can be found in the main outcome paper (Andersson et al., 2014). This trial was approved by the regional ethic committee and registered at clinicaltrials.gov, registration ID: NCT01525576.

2.2. Outcome measures

2.2.1. Treatment outcome

Relapse was used as the primary outcome in this study. A relapse was defined as being a responder at the booster baseline (i.e. 4-month after receiving ICBT) but not at follow-up. We used the clinician rated Y-BOCS and responder status was defined as the Jacobson and Truax (1991) criteria of clinical significant improvement, where the change criterion was that participants had to make a reduction by at least 4 points on the Y-BOCS and the absolute criterion was that participants had to score less than 12 on the same measure, i.e. two standard deviations below the mean pre-treatment value. All assessments were done via telephone, a format that has been shown to be as reliable as face-to-face assessments (Crippa et al., 2008; Hajebi et al., 2012; Rohde, Lewinsohn, & Seeley, 1997). Treatment outcome was assessed at 4- (booster baseline), 7-, 12- and 24-month.

2.2.2. Cost-data

Health economical data was assessed using the Trimbos and Institute of Medical Technology Assessment Cost Questionnaire for Psychiatry (TIC-P; Hakkaart-van Roijen & Donker, 2002), which is a self-rated questionnaire widely used in cost-effectiveness analyses (e.g. Smit et al., 2006; van Roijen, van Straten, Al, Rutten, & Donker, 2006). This questionnaire collects monthly data health care visits, medication use, unemployment, sick leave, and work- and household cutback (i.e., both direct and indirect costs are included in this questionnaire). Costs for medications and health care visits were calculated based on the national tariffs in Sweden. All costs were converted to US dollars, using power purchasing parities (OECD, 2013). The "human capital approach" was used, which means that costs related to work loss were estimated based on the average gross earnings. Domestic loss hourly tariff was estimated to $12, based on Smit et al. (2006). The treatment costs associated with the booster treatment were based on hourly tariff of an appointment with a clinical psychologist in the Swedish health care system. The cost-data was assessed at 4- (booster baseline), 12- and 24-month (the 7-month follow-up only included effectiveness data i.e. the TIC-P was not administered at this time point).

2.3. The booster treatment

All patients had previously received a 10-week ICBT treatment, which consisted of a self-help manual that was divided into 10 modules (i.e. chapters) and was supported by an online therapist. The booster treatment was three weeks long and followed the same format as the main treatment, i.e., it was a text-based treatment manual and all therapist contact was conducted through a secure message system (similar to email). The booster program was given 6 months after the ICBT treatment and it was divided into three different modules that were focused on 1) that the patient would make a retrospective analysis of the treatment progression the last 6 months, 2) make a plan of how to continue ERP (e.g. planning weekly appointments with a friend or relative that can coach the patient, and 3) make a long-term plan with goals on how to proceed with the treatment. More detailed information about the treatment content can be found in the main outcome paper (Andersson et al., 2014).

2.4. Statistical analyses

The outcome was analyzed according to intention-to-treat principle i.e. all patients were included in the analysis. Booster effectiveness was tested using a binomial log-linear regression framework with relapse as dependent variable, group as independent variable (i.e. booster or no booster) and baseline Y-BOCS were also hold as covariate to level out potential baseline differences (Cummings, 2009).

As for the health economic analysis, between group cost differences were analyzed using a mixed model regression framework, fitted with full information maximum criteria, using all available data points i.e. 4-, 12- and 24-month. Linear mixed models incorporates the non-independence of intra-individual change and are superior to traditional intention to treat methods for handling missing data (Lane, 2008; Mallinckrodt, Clark, & David, 2001). Between group cost-effectiveness was estimated using incremental cost-effectiveness ratio (ICER) where the between group cost-changes are compared and divided with the between group effects in the following formula: $(\Delta^{C1}-\Delta^{C2})/(\Delta^{E1}-\Delta^{E2})$ (Drummond, 2005). Consequently, we estimated the regression coefficient of the cost-change (from all available cost-data assessment points) and this was then divided by the regression coefficient of the treatment effectiveness. As we expected the cost-data to be non-normally distributed, the ICER estimates were bootstrapped 5000 times to give a probabilistic figure of the cost-change and this was then plotted in a cost-effectiveness plane (Fig. 2) (Drummond, 2005).

We also analyzed each TIC-P assessment point using the net benefit approach with the following formula: $(\lambda \times E)-\Delta^{C}$. In this formula, λ is the willingness to pay (i.e. the different values that the society is willing to pay for avoiding one relapse), E is the efficacy (i.e. relapse status), and Δ^{C} is the cost change from baseline- to follow-up. Individual net benefits for the 12- and 24-month follow data were calculated and analyzed using different willingness to pay values. Each net benefit analysis was bootstrapped 5000 times and probability rates for each λ were then plotted in a cost-effectiveness acceptability curve (Fig. 3) (Drummond, 2005; McCrone et al., 2012).

3. Results

3.1. Demographics, adherence and attrition

There were no significant baseline differences between the two groups except for responder rates, where 17/47 were responders in the booster group and 29/46 in the control group ($\chi^2_{1,\ 93}=6.72$, $p<0.05$). Thirty-two out of 47 participants participated in the booster program (the main reason for not attending in the booster program was that these patients felt confident in that they would make further progress by their own and did not experience any more demand for professional help). The mean therapist time for the patients who received the booster program was 72 min (SD=45), including both active treatments (e.g. emailing the participants) and other work (e.g. reading the communication from the original ICBT

[1] The present sample participants were first randomized to ICBT or to control condition (online support therapy). Participants in the control condition were crossed over to ICBT after 10 weeks. Thus, this study comprises two cohorts of participants, that were pooled into one sample. There were no significant differences between the two cohorts regarding baseline severity of OCD symptoms, demographic characteristics and in improvement rates after completed ICBT.