Cost-effectiveness of computerised cognitive-behavioural therapy for anxiety and depression in primary care: randomised controlled trial


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of a computerised cognitive-behavioural therapy (CBT) programme ('Beating the Blues') for the treatment of anxiety and depression. The intervention consisted of a 15-minute introductory video followed by eight 50-minute sessions of CBT.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis; cost-utility analysis.

Study population
The study population comprised patients aged 18 to 75 years with a diagnosis of depression, mixed depression and anxiety, or anxiety disorders. The patients were not receiving face-to-face psychological therapy.

Setting
The setting was primary care. The economic study was conducted in the UK.

Dates to which data relate
The dates when the effectiveness and resource use data were collected were not reported. The costs were presented in 1999/2000 values.

Source of effectiveness data
The effectiveness evidence was derived from a primary study, the main results of which had been published elsewhere (Proudfoot et al., see Other Publications of Related Interest).

Link between effectiveness and cost data
The costing was conducted both prospectively and retrospectively on a sub-sample of patients included in the effectiveness study.

Study sample
The use of power calculations was not reported. A sample of 502 patients was initially identified. However, of these, 228 did not meet the study criteria, 132 refused to participate, and 96 were excluded because the Clinical Interview Schedule-Revised score was less than 12. Therefore, the final study sample comprised 274 patients. There were 146 patients in the intervention group and 128 in the control group. The patients in the intervention group had a mean age of
43.6 (+/- 14.3) years and 73% were women. The patients in the control group had a mean age of 43.4 (+/- 13.7) years and 75% were women.

**Study design**
This was a prospective, randomised clinical trial that was conducted at 12 general practices in Southeast England. The methods of randomisation and outcome assessment were unclear. The outcomes were assessed at baseline and at follow-up post-randomisation (up to 8 months after randomisation). Complete follow-up data were available for 148 patients (57%), 65 (53%) in the control group and 83 (60%) in the intervention group.

**Analysis of effectiveness**
The authors stated that the analysis of effectiveness was conducted on an intention to treat basis. Although a substantial loss to follow-up was observed, missing values were imputed using best regression analysis. The primary outcome measure used in the analysis was the change in the level of depression, as rated using the Beck Depression Inventory (BDI). The secondary outcome measures were the Beck Anxiety Inventory (BAI), the Work and Social Adjustment (WSA) scale, and the number of depression-free days. Depression-free days were based on the BDI scores at four assessment points (immediately post-treatment, and 1, 3 and 6 months following treatment, which corresponded to 8 months post-randomisation). The baseline comparability of the two groups was not discussed. However, a table that reported the sociodemographic characteristics of the patient sample showed similarities between the two groups.

**Effectiveness results**
There was limited information on the results of the analysis, as most of the details were presented in the primary study.

The authors stated that computerised CBT resulted in improved scores on the BDI, BAI and WSA scales.

The mean reduction in BDI score with computerised CBT over control was 3.5 (95% confidence interval, CI: 0.6 - 6.4).

The mean number of depression-free days was 61 (+/- 67.1) in the control group and 89.7 (+/- 74.2) in the intervention group.

After controlling for phase of data collection, the difference in depression-free days was 28.4 (95% CI: 10.7 - 45.5).

**Clinical conclusions**
The effectiveness analysis showed that computerised CBT was more effective than standard care in terms of improvements in standard depression and anxiety scales, as well as in symptom-free days.

**Measure of benefits used in the economic analysis**
The benefit measures used were improvements in BDI scores, depression-free days, and quality-adjusted life-years (QALYs). The utility values used to calculate the QALYs were based on a score of 0.59 for a day with depression, and a score of 1 for a depression-free day. The number of depression days was calculated using a straight-line interpolation (i.e. if a patient was depressed at month 0 and not depressed at month 1, the number of days in depression was estimated to be 15). The utility score for a day of depression was derived from a published study (Lave et al., see Other Publications of Related Interest).

**Direct costs**
Discounting was not relevant since the costs were incurred during a short time. The unit costs were not reported separately from the quantities of resources used, but the total number of patients using each item was reported. The health services included in the economic evaluation were:

contacts with mental health care staff (psychiatrists, psychologists, community mental health nurses, counsellors and
other therapists,

contacts with primary care staff (GPs, practice nurses, district nurses, and health visitors),

contacts with hospital services (inpatient care for psychiatric and physical health reasons, outpatient care, day surgery, and accident and emergency attendance),

contacts with home helps,

medications (antidepressants, anxiolytics and sedatives), and

contacts with other services (chiropodists, physiotherapists and dieticians).

The cost of buying the licence to use 'Beating the Blues' (plus overheads) was also considered. The cost/resource boundary of the National Health Service (NHS) was adopted for the direct costs. Resource use was estimated using actual data derived from a sub-sample of patients involved in the effectiveness study (123 patients in the control group and 138 patients in the intervention group). The costs came from a recognised national source (PSSRU) and the British National Formulary. The price of the computer program licence was obtained from the manufacturer. The costs were presented in 1999/2000 values.

**Statistical analysis of costs**

Bootstrapped CIs (based on 5,000 repetitions) were constructed to test the statistical significance of differences in the costs. A multiple regression analysis was used to control for baseline cost-differences and phase of data collection.

**Indirect Costs**

The indirect costs were included in the analysis since a societal perspective was adopted. The human capital approach was used to estimate productivity losses on the basis of days of lost employment. The resource use data came from the same sample of patients as that used in the analysis of the direct costs. The costs were based on national average daily wages. The unit costs and the quantities of resources used were not presented separately. The costs were presented in 1999/2000 values. Discounting was not relevant because of the short time horizon of the analysis.

**Currency**

UK pounds sterling (£). 

**Sensitivity analysis**

A one-way sensitivity analysis was conducted on the cost of the computerised CBT programme, as this was the most uncertain factor. The authors chose the ranges used.

**Estimated benefits used in the economic analysis**

BDI scores and depression-free days have been reported already (see Effectiveness Results). The improvement in QALYs with the computerised CBT over standard care was 0.032 (3%).

**Cost results**

At baseline, the direct costs were 236 (+/- 404) in the control group and 203 (+/- 262) in the intervention group. At the end of the study period, these costs were 357 (+/- 575) in the control group and 397 (+/- 589) in the intervention group. The difference of 40 was not statistically significant (95% CI: -28 - 148).

When the indirect costs were considered, at baseline, the societal costs were 803 (+/- 2,307) in the control group and 504 (+/- 1,656) in the intervention group. At the end of the study period, these costs were 900 (+/- 2,428) in the control group and 533 (+/- 998) in the intervention group. The difference of 367 was statistically significant (95% CI: 123 -
Synthesis of costs and benefits
The costs and benefits were combined using the net benefit approach, where the cost-effectiveness of computerised
CBT over standard care was assessed through cost-effectiveness acceptability curves (CEAC). These showed the
probability that the intervention was cost-effective on the basis of theoretical, but unknown values that society was
willing to pay for improvements in the benefit measures. Details of the stochastic approach used in the paper were
satisfactorily reported.

In terms of the reduction in BDI score, the CEAC showed that the probability of the intervention being cost-effective
over standard care was greater than 80% at a value of 40 per unit reduction in BDI score.

If the cost of the computerised CBT programme was 5 (it was 14.50 in the base-case), then even with a zero value given
to a unit reduction in BDI score, there was a 45% chance that the intervention was cost-effective. Higher values were
required when the cost of the programme increased.

In terms of depression-free days, the CEAC suggested that if society placed a value of 5 on a depression-free day, then
there would be an 80% chance of the intervention being cost-effective.

In terms of QALYs, if society placed a value of 15,000 on a QALY, then there would be a 99% chance of the
intervention being cost-effective. At a value of 5,000 per QALY, the probability of the intervention being cost-
effective was 85%.

Authors' conclusions
The use of computerised cognitive-behavioural therapy (CBT) for the treatment of patients with depression and anxiety
in primary care was cost-effective in comparison with standard care. The 'Beating the Blues' programme improved
clinical outcomes at negligible extra costs and reduced productivity losses. It was also associated with a high probability
of being cost-effective from the perspective of the NHS.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear, as it represented standard practice in primary care. You
should decide whether this is a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness was based on a randomised trial. This was appropriate for the study question, owing to the
high internal validity. There was limited information on the design and results of the analysis as the clinical trial had
been published already. The length and loss to follow-up were reported, as were the methods used to estimate missing
data and to select the sample. The clinical study was analysed on an intention to treat basis, although a substantial loss to
follow-up was observed. It was not stated whether power calculations, to determine the appropriate sample size, were
conducted in the trial. The study sample is likely to have been representative of the patient population since the
evidence came from several centres. However, it should be noted that a substantial percentage of patients refused to
participate and, even among participants, the rate of follow-up was low. The use of a randomised method of allocating
the patients reduced the impact of confounding and bias. Further, the study groups were comparable at baseline. These
issues should be considered when assessing the validity of the effectiveness evidence.

Validity of estimate of measure of benefit
Several benefit measures were considered in the analysis. Some of them were disease-specific, but the use of QALYs
allows comparisons to be made with the benefits of other health care interventions. The improvement in QALYs
appeared small, but this was due to the short time horizon of the analysis. The choice of a longer follow-up would have
been interesting. The source of the utility values was reported.
Validity of estimate of costs
The authors adopted a societal perspective, which was appropriate. As such, all the relevant categories of costs appear to have been included in the analysis. The indirect costs were assessed using the human capital approach, which represents a validated method. Discounting was not relevant. The source of the data was reported. Some statistical tests were conducted to deal with the non-normal distribution of costs. In fact, large standard deviations were reported, which reflected the skewed distribution of the costs. However, the cost estimates were specific to the study setting and only the cost of the computer program was varied in the sensitivity analysis. The price year was reported, which makes reflation exercises in other settings possible. The unit costs were not reported separately from the quantities of resources used. The authors noted that the number of days of lost employment could have been underestimated, as depression and anxiety often result in short, uncertified episodes of absence from work. However, the costs associated with GP visits in the intervention groups could have been overestimated. Other costs borne by agencies other than the NHS, such as criminal justice, were not considered.

Other issues
The authors made some comparisons of their findings with those from other studies. They stated that their estimates of the total costs were comparable with those from another published study. However, they did not address the issue of the generalisability of the study results to other settings, and sensitivity analyses were conducted only on one cost item. Therefore, the external validity of the analysis is low. The study involved the general population of patients suffering from depression and anxiety, and this was reflected in the conclusions of the analysis. The authors underlined the fact that there were some limitations in their study, but it would appears that a conservative approach was undertaken.

It is worthy of note that two of the authors are minority partners in the commercial exploitation of 'Beating the Blues', the computer program used in the study.

Implications of the study
The authors suggested that the cost per QALY of computerised CBT is well below the conventional threshold for cost-effectiveness in the UK. They also suggested that computerised CBT could have a role in a stepped care model enabling cognitive-behavioural therapists to conserve their limited resources for more complex and challenging cases. Future studies should directly estimate utility weights associated with depression and anxiety alongside the assessment of computerised CBT.

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None stated.

Bibliographic details

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Other publications of related interest

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