Cognitive Behavioral Psychotherapy for Depression Following Stroke
A Randomized Controlled Trial
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Background and Purpose—There is inconclusive evidence of the effectiveness of psychological interventions for depression after stroke. We report the results from a randomized controlled trial of cognitive behavioral therapy (CBT).

Methods—Stroke patients admitted to hospital were invited to complete mood questionnaires 1, 3 and 6 months after stroke. Patients who were depressed were invited to take part in a trial and randomly allocated to receive CBT (n=39), an attention placebo intervention (n=43), or standard care (n=41). Outcome assessments were undertaken at 3 and 6 months after recruitment, on the Beck Depression Inventory, Wakefield Depression Inventory, Extended Activities of Daily Living scale, London Handicap Scale, and a rating of satisfaction with care.

Results—There were no significant differences between the groups in patients’ mood, independence in instrumental activities of daily living, handicap, or satisfaction with care.

Conclusions—CBT in the treatment of depression following stroke was found to be ineffective in this study. However, because of the small sample size, method of recruitment, and selection criteria, further randomized trials are required.

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Key Words: depression | mood disorders | rehabilitation | stroke | therapy

Depressive disorders following stroke are common. Estimates of the frequency range from 25% to 79%,¹ with most studies indicating the rate being approximately 30%. Variation in prevalence appears to be the result of differing methods of assessment, classification, and screening instruments used. However, the consistent finding is that many people have low mood, which may require treatment. In theory, the principal treatments available for depression in the general population also apply to depressed stroke patients.² Antidepressant medication is often used,³ but concomitant drug therapies⁴ and adverse effects may also limit the extent to which antidepressant drugs are appropriate.

Few studies have considered the use of psychological interventions in the treatment of depression following stroke. Cognitive behavioral therapy (CBT) is an effective treatment of depression in the general population⁵ and in the elderly,⁶ and there is some indication that it may be effective for people with stroke. Lincoln et al⁷ compared a 4-week baseline period with 10 sessions of CBT and found that there was a tendency for improvement in mood. Of the 19 patients who received CBT, 4 patients consistently showed benefit, 6 showed some benefit, and 9 showed no benefit from treatment. The authors concluded that CBT reduced depression in some stroke patients and further evaluation was required. Others³,⁸ have also reported single case studies that suggest that CBT may be useful for poststroke depression. Kemp et al⁹ investigated the effects of brief cognitive behavioral group psychotherapy for depression on 41 older adults with and without disabling illness. Older adults with disabling illness (n=18) included some people who had a stroke. Results indicated substantial decreases in depression, but the study did not include a control group.

The aim of the present study was to evaluate CBT as a treatment for depression following stroke. CBT requires a skilled therapist, but the effects observed in previous studies³,⁷–⁹ could have resulted from simply having an interested and supportive therapist available to listen to problems. An attention placebo group was therefore included to enable the effect of additional therapist time and support to be separated from the specific effects of CBT.

Subjects and Methods
Patients admitted to hospital with a stroke were identified from a register. Sociodemographic details and date of onset were recorded from the medical notes. Patients were excluded from the study if they were blind, were deaf, did not speak English, had dementia documented in their medical records, had been treated for depression in the preceding 5 years, or lived outside the locality specified.

Patients living at home were sent a letter 1 month after the stroke asking them to complete and return 2 mood measures, the Beck Depression Inventory (BDI)¹⁰ and the Wakefield Self-Assessment of Depression Inventory (WDI).¹¹ The BDI was chosen as the main...
measure of mood, which would be sensitive to the effects of CBT. The WDI was also included because it has been used in other stroke rehabilitation studies, which would enable comparisons to be made with previous work. Patients were also asked to complete the Barthel Index, and those who scored <10 were excluded because they would be unlikely to be able to participate in the behavioral components of CBT.

For patients who were in hospital or were residing in care establishments, senior members of staff were telephoned and the Barthel was completed. Patients who had a Barthel score >10 were visited by an assistant psychologist, who administered the BDI and WDI verbally.

Patients who scored >10 on the BDI or >18 on the WDI were considered depressed and eligible for inclusion in the study. These patients were sent the London Handicap Scale (LHS), which has 6 dimensions (mobility, physical independence, occupation, social integration, orientation, and economic self-sufficiency), as a measure of handicap. They were also sent the Extended Activities of Daily Living (EADL) Scale, a measure of independence in activities of daily living. These were collected by an assistant psychologist at a visit. Patients were given a brief outline of the study, and verbal consent was obtained. The assistant psychologist administered the Sheffield Screening Test for Acquired Language Disorders to assess any communication problems. A satisfaction with care rating was obtained to get an overall impression of whether services met their needs. This comprised a visual analogue scale on which patients were requested to indicate by marking across a 10-cm line the percentage of satisfaction with services that they received, from 0% to 100%. Those who had problems understanding the request or in marking the paper were asked to give a verbal percentage, based on the same scale.

Patients were then visited by a research community psychiatric nurse (CPN), who obtained written consent. A semi-structured psychiatric interview was conducted using the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). Responses were entered directly on to a laptop computer program (CATEGO5) that provided a diagnostic classification using International Classification of Diseases, 10th Edition (ICD-10). The SCAN includes the Mini-Mental State Examination (MMSE) as a test of cognitive function. Patients were excluded from the study if they scored ≤23 on the MMSE.

Patients were then randomized to 1 of 3 groups. A computer-generated random number sequence was prepared in advance and sealed in opaque, consecutively numbered envelopes by an independent researcher. The random allocation was not stratified, as there was no prior information on variables likely to affect outcome. The CPN opened the envelopes in sequence, according to the patient number, to determine the intervention.

The three groups were defined as follows:

1) No intervention (NI): Following randomization, patients in this group had no further contact with the research CPN.

2) Attention placebo (AP): Patients in this group were offered 10 visits of one-hour duration for 3 months by the research CPN. No formal therapeutic intervention was offered. During the visits, the CPN had a conversation, which focused on day-to-day occurrences and discussion regarding the physical effects of stroke and life changes.

3) Cognitive behavioral psychotherapy (CBT): Patients were offered 10 one-hour sessions of CBT by the same research CPN over 3 months. Treatment consisted of cognitive and behavioral techniques as used in the treatment of depression and were based on a manual produced from the pilot study. The techniques included education, graded task assignment, activity scheduling, and identification and modification of unhelpful thoughts and beliefs. Interventions were tailored to meet the individual’s needs.

Patients who did not complete the BDI and WDI at 1 month, were not depressed or were too disabled, scoring <11 on the Barthel Index were reviewed 3 months after stroke, and the same recruitment procedure followed. Those who were reviewed were also asked to complete the BDI and WDI again 6 months after the stroke using the same procedure.

Outcome assessments were administered by an assistant psychologist, who was blind to the group allocation, and 3 and 6 months after randomization. The primary outcome measures were the BDI and WDI, which were sent for patients to complete prior to a visit. The sample size had been calculated on the basis of the pilot study using these measures. The secondary outcome measures included the EADL scale, the LHS, and a rating of satisfaction with care.

Because the questionnaires used yielded ordinal data, nonparametric statistics were used. A Kruskal-Wallis 1-way ANOVA was performed to compare the 3 groups at each time point. The power calculation indicated that with a significance level of 0.05 and a power of 0.80 it would be possible to detect a difference of 5.3 points on the BDI and 4.7 points on the WDI with 40 patients in each group.

**Results**

There were 2533 patients admitted with stroke to the Nottingham hospitals between January 1995 and November 1997. Of these, 2361 had 1 stroke during the study period, 77 had 2 strokes, and 6 had 3 strokes. Therefore, the number of people admitted for stroke during the study period and eligible for inclusion was 2444. The recruitment is summarized in Figure 1.

In total, 123 patients were recruited into the study between 1 and 6 months following stroke and randomly allocated. Half the patients (n=61) were recruited at 1 month, 27 at 3 months, and 35 at 6 months after stroke. The distribution of treatment groups (NI, AP, CBT) was equivalent at all 3 time points of recruitment (1, 3, and 6 months) ($\chi^2=2.3, P=0.7$). The characteristics of the patients recruited are shown in Table 1.

The mean number of sessions for the CBT group was 9.85 (SD 2.31), ranging from 0 to 15 (95% CI 9.11 to 10.58). The mean number of sessions for the AP group was 10 (SD 0.55), ranging from 8 to 11 (95% CI 9.84 to 10.16). There was no significant difference between the groups in number of sessions that patients received (t=0.41, P=0.68).
As diagnosing of depression may be difficult in the early period following a stroke, the outcome was examined in relation to the time of recruitment. No significant differences among the groups were found at baseline, 3 months, and 6 months in those recruited early (1 to 3 months) or late (>3 months) after stroke.

Of the 123 patients recruited, 42 received antidepressant medication during the 6-month study period (NI 13 [32%]; AP 15 [36%]; CBT 14 [36%]). No significant differences were found among the groups in the proportion who received antidepressants ($\chi^2=0.2$, $P=0.9$); they did not have significantly higher scores on the BDI or WDI (BDI $P=0.23$, WDI $P=0.82$), and those who were diagnosed with depressive disorder were no more likely to be on antidepressant medication than those not diagnosed with depressive disorder ($\chi^2=0.01$, $P=0.92$).

**Discussion**

Most participants recruited had mild and moderate depression and therefore an appropriate severity for CBT. There was significant improvement in mood over time, but this was independent of the intervention received. The lack of differences observed may have been due to the short duration and low intensity of CBT. Previous studies have identified gains from courses of 15 to 18 sessions, and a review of 7 empirical studies of cognitive therapy in elderly people with depression found the average length of treatment to be 16.5 weeks. This suggests we may not have offered sufficient treatment. However, the pilot study had suggested an improvement in mood with an average of 8.4 sessions per patient. Others have also found that patients can benefit from shorter interventions, especially if patients are able to assimilate the cognitive model. The lack of treatment effectiveness could have been due to lack of understanding, willingness, and belief in the therapy rather than the limited number of sessions. In clinical practice, patients would be selected who were able to assimilate the cognitive model. However, this did not occur in the present study, as there was no objective criterion available to indicate who would benefit from treatment. In clinical practice, the number of CBT sessions would be negotiated and discharge planned at treatment onset. The delivery of therapy is also more flexible than can be achieved in a trial, because of the need to define the sessions in advance in order to provide an attention placebo treatment of equivalent intensity and duration. However, the choice was informed by the pilot study and was expected to be appropriate for most patients.

Recruitment for this study was from a stroke register, whereas in clinical practice patients would be referred for CBT. Thus the selection was less able to take into account other factors related to the choice of treatment strategy, and patients were identified only on the basis of severity of mood disorder. Although mood measures such as the BDI are frequently used to obtain information about the problem, monitor symptom severity, and assess change, they are not primarily used for selection purposes. Thus selection on this basis also may not reflect the way therapy would be applied clinically. We used both the BDI and WDI to select participants. Both are used as screening measures, but the correspondence between questionnaire measures is only moder-
We therefore adopted a policy that would be likely to ensure that we identified all those who were depressed. However, it is also possible that this policy resulted in some depressed patients not being recruited. Patients may have failed to complete or return the questionnaires as a consequence of their depression. This would have excluded those with most severe depression, but these patients might have been less suited to CBT, and therefore this may not have substantially affected the results.

Studies of cognitive therapy in depression have highlighted the experience of the therapist as an important factor. Although the therapist in this study received training and clinical supervision by an experienced cognitive therapist, this training was not as frequent or structured as in some other studies, and there was no formal evaluation of the quality of therapy provided. This level of experience is representative of what is likely to be provided for stroke patients in clinical practice; therefore, had therapy been effective, the findings would have been widely applicable. The same therapist delivered the attention placebo and active treatment (CBT).

An intention of the study had been to videotape treatment sessions in order to be able to monitor the content of the treatment. However, this proved impractical because patients were seen in their own homes and patients were reluctant to be recorded; videotaping was therefore discontinued. It is unlikely that any contamination between treatments affected the results, as there was no difference between either treatment (AP or CBT) and the NI control group.

Another limitation of the study was the small sample size. The study may not have had sufficient power to detect differences between groups. The sample size was comparable to that in studies that have shown beneficial effects of drug treatment, but trials that have indicated positive effects of psychological treatments have usually been larger. This is unlikely to have been a major reason for the lack of treatment effects found, as there was no trend to differences failing to reach statistical significance, and no differences were observed. In further evaluations of CBT for stroke patients, assessing for CBT suitability prior to randomization would ascertain patients’ willingness and ability to work with this

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**TABLE 2. Comparison of Groups on Outcome Measures**

<table>
<thead>
<tr>
<th>Measure/Time</th>
<th>No Intervention Group</th>
<th>Attention Placebo Group</th>
<th>Cognitive Behavior Therapy Group</th>
<th>Comparison, P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI R Median</td>
<td>18</td>
<td>15</td>
<td>17</td>
<td>0.2</td>
</tr>
<tr>
<td>IQR</td>
<td>13–23</td>
<td>12–20</td>
<td>13–22</td>
<td></td>
</tr>
<tr>
<td>3 months</td>
<td>14.5</td>
<td>13</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>IQR</td>
<td>11–23</td>
<td>10–20</td>
<td>10–20</td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td>15</td>
<td>12.5</td>
<td>13</td>
<td>0.6</td>
</tr>
<tr>
<td>IQR</td>
<td>7–21</td>
<td>7–17</td>
<td>8–18</td>
<td></td>
</tr>
<tr>
<td>WDI R Median</td>
<td>22</td>
<td>21</td>
<td>23</td>
<td>0.2</td>
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<tr>
<td>IQR</td>
<td>19–26</td>
<td>17–24</td>
<td>20–26</td>
<td></td>
</tr>
<tr>
<td>3 months</td>
<td>19.5</td>
<td>20</td>
<td>18.5</td>
<td>0.9</td>
</tr>
<tr>
<td>IQR</td>
<td>15–25</td>
<td>14–25</td>
<td>13–26</td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td>21</td>
<td>16</td>
<td>18</td>
<td>0.4</td>
</tr>
<tr>
<td>IQR</td>
<td>13–26</td>
<td>11–25</td>
<td>15–24</td>
<td></td>
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<tr>
<td>EADL R Median</td>
<td>27</td>
<td>26.5</td>
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<td>0.4</td>
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<tr>
<td>IQR</td>
<td>15–38</td>
<td>18–35</td>
<td>14–34</td>
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<tr>
<td>3 months</td>
<td>35</td>
<td>29</td>
<td>29</td>
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<tr>
<td>IQR</td>
<td>20–45</td>
<td>18–44</td>
<td>21–39</td>
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<tr>
<td>6 months</td>
<td>30</td>
<td>31.5</td>
<td>30</td>
<td>0.9</td>
</tr>
<tr>
<td>IQR</td>
<td>21–43</td>
<td>22–44</td>
<td>17–43</td>
<td></td>
</tr>
<tr>
<td>LHS R Median</td>
<td>0.49</td>
<td>0.47</td>
<td>0.47</td>
<td>0.2</td>
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<tr>
<td>IQR</td>
<td>0.44–0.65</td>
<td>0.40–0.56</td>
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</tr>
<tr>
<td>3 months</td>
<td>0.51</td>
<td>0.49</td>
<td>0.52</td>
<td>1.0</td>
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<tr>
<td>IQR</td>
<td>0.42–0.63</td>
<td>0.41–0.62</td>
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</tr>
<tr>
<td>6 months</td>
<td>0.50</td>
<td>0.51</td>
<td>0.48</td>
<td>0.8</td>
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<tr>
<td>IQR</td>
<td>0.38–0.58</td>
<td>0.45–0.57</td>
<td>0.42–0.62</td>
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</tr>
<tr>
<td>SWC R Median</td>
<td>81</td>
<td>81</td>
<td>79</td>
<td>0.9</td>
</tr>
<tr>
<td>IQR</td>
<td>62–89</td>
<td>61–96</td>
<td>65–94</td>
<td></td>
</tr>
<tr>
<td>3 months</td>
<td>81</td>
<td>80</td>
<td>80</td>
<td>0.8</td>
</tr>
<tr>
<td>IQR</td>
<td>65–91</td>
<td>52–91</td>
<td>63–94</td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td>90</td>
<td>88</td>
<td>84</td>
<td>0.5</td>
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<tr>
<td>IQR</td>
<td>50–98</td>
<td>71–98</td>
<td>70–91</td>
<td></td>
</tr>
</tbody>
</table>

*Kruskal-Wallis 1-way ANOVA.

R indicates recruitment; 3 months, 3 months after recruitment; 6 months, 6 months after recruitment; BDI, Beck Depression Inventory; WDI, Wakefield Depression Inventory; EADL, Extended Activities of Daily Living scale; LHS, London Handicap Scale; SWC, rating of satisfaction with care.

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**Figure 2.** Comparison of groups on the Beck Depression Inventory (BDI).
form of psychological intervention. Increasing the duration of therapy and number of sessions to between 16 and 20 sessions would make the intervention comparable to other studies that have been conducted in CBT in depression in the elderly and medically ill. A larger sample would reduce the chances of a treatment effect being missed. In addition, there was little information available on the type of stroke or comorbidity, which might have influenced outcome. Although the sample size would not have permitted subgroup analyses even if they had been available, such factors might need to be explored in future studies.

CBT in the treatment of depression following stroke was found to be ineffective in this study. However, because of the small sample size, method of recruitment, and selection criteria, further randomized trials are required.

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References
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