Motivational Interviewing Early After Acute Stroke
A Randomized, Controlled Trial

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Background and Purpose—The purpose of this study was to determine whether motivational interviewing, a patient-centered counseling technique, can benefit patients’ mood 3 months after stroke.

Methods—A single-center, open, randomized, controlled trial was conducted at a single hospital with a stroke unit. Subjects consisted of 411 consecutive patients on the stroke register who were over 18 years of age and who did not have severe cognitive and communication problems that would prevent them from taking part in an interview; were not known to be moving out of the area after discharge; and were not already receiving psychiatric or clinical psychology intervention. All patients received usual stroke care. Patients in the intervention group received 4 individual, weekly sessions of motivational interviewing with a trained therapist in addition to usual stroke care. The primary outcome was the proportion of patients with normal mood at 3 months poststroke measured by the 28-item General Health Questionnaire (normal, <5; low ≥5) using a mailed questionnaire.

Results—Eighty-one of 207 (39.1%) patients in the control group and 100 of 204 (49.0%) patients in the intervention group had normal mood at follow up. A significant benefit of motivational interviewing over usual stroke care (OR: 1.60, 95% CI: 1.04 to 2.46, P=0.03) was found.

Conclusion—Our results suggest motivational interviewing leads to an improvement in patients’ mood 3 months after stroke. (Stroke. 2007;38:1004-1009.)

Key Words: mood ■ motivational interviewing ■ stroke

There is a strong relationship between early psychologic problems and the rate and extent of recovery after stroke. Depressed patients with stroke lack the motivation to participate in rehabilitation, making less progress,1 staying in the hospital longer,2 failing to engage in leisure pursuits and social activities,3 and surviving for less time.4 These negative outcomes could be related to a failure to adjust or adapt to the effects of the stroke.

Several studies have attempted to address psychologic problems directly using either pharmacological5 or conventional cognitive–behavioral therapies.6–9 However, the results thus far have failed to give a clear message10 as have studies aiming to reduce psychologic problems indirectly, for example, by improving social support.11 Alternative approaches to addressing psychologic issues after stroke need to be explored.

Motivational interviewing is a specific talk-based therapy originally developed to help people with addictions.12 More recently, it has been used successfully with a wide range of health problems characterized by poor motivation and the necessity to make some form of health behavior change.13 Our aim is to intervene at an early stage after stroke using motivational interviewing to support and build patients’ motivation to adjust and adapt to having had a stroke. Through the use of motivational interviewing techniques, patients will be helped to recognize the importance of making psychologic adjustments and practical adaptations. Subsequently, they will be able to develop confidence in their ability to adjust and adapt and to identify realistic personal goals for their recovery. This will address low expectations14 and provide the psychologic impetus to engage in rehabilitation and improve recovery.15

Methods

Study Design
This was a single-center, open, randomized, controlled trial. Ethical approval was obtained from the local research ethics committee. This study is registered as an International Standard Randomized Controlled Trial, no. ISRCTN54465472.

Setting
This study was conducted at a hospital serving an urban population of approximately 250 000 people.
Patients
All patients with suspected acute stroke admitted to the hospital are identified on a stroke register. Patients admitted to the hospital between July 2002 and January 2005 and who met the inclusion criteria were invited to participate in the study. Inclusion criterion was patients over 18 years of age. Exclusion criteria were severe cognitive and communication problems preventing them from being interviewed; known to be moving out of the area after discharge; and already receiving psychiatric or clinical psychology intervention. Patients who agreed to participate and provided written informed consent were randomized between days 5 and 28 poststroke.

Randomization
A research nurse randomized the patients (one-to-one ratio) to either usual stroke care (control) or motivational interviewing (intervention) using a minimization computer program on a personal computer. Minimization was based on the following variables: age (<65 years; ≥65 years); sex (male; female); baseline Barthel as a marker of dependence (severe, ≤10; moderate, 11 to 17; mild/no, 18 to 20); and location (stay; no stay on acute stroke unit). To randomize a patient, data from each variable are entered in the program, which then allocates group membership. The same nurse then assigned patients in the intervention group to one of 4 therapists using an opaque sealed envelope so that no therapist’s caseload exceeded 6 patients per week. The therapist was informed of the patient’s name and location, arranged the first appointment, and subsequently, 3 further weekly appointments. If the patient was in the hospital, they were interviewed in a private room; if discharged, they were interviewed as an outpatient in a private room in the hospital or in their own home. One of the therapists left the project in April 2003 and was not replaced. The therapists were not involved in the initial assessment of the patients, the randomization procedure, or the assignment of patients to therapists.

Procedure
Between days 5 and 7 poststroke, routine clinical data were recorded on age; sex; history of stroke or transient ischemic attack; type (ischemic stroke or intracerebral hemorrhage) and class; of stroke; and function (Barthel). Patients who consented to participate completed a baseline assessment with a research nurse between days 5 and 28 at the time of randomization. The assessment included mood (28-item General Health Questionnaire [GHQ-28]); beliefs and expectations of recovery (Stroke Expectations Questionnaire [SEQ]); and function (Barthel).

Usual Stroke Care
Patients in the control group received usual medical, nursing, and therapy input, including inpatient care and discharge planning, through regular multidisciplinary team meetings and a stroke review clinic appointment at 3 months poststroke. There is no clinical psychology service for patients with stroke; if a patient has psychological problems, it is reported to the clinician in charge of their care who reassesses the patient and refers them to a psychiatrist if appropriate.

Motivational Interviewing
Patients in the intervention group received up to 4 individual sessions of motivational interviewing, one per week, with the same therapist; sessions took place in a private area and lasted between 30 and 60 minutes. In the initial session, the therapist set the agenda so that the patient talked about adjustment to having had a stroke and their current concerns, for example, relating to physical, functional, or social support issues. Therapists elicited patients’ personal, realistic goals for recovery and their perceived blocks to attaining these goals. By working with patients’ dilemmas and ambivalence and through supporting and reinforcing optimism and self-efficacy, therapists enabled patients to identify their own solutions.

Therapists received 4 days of training in motivational interviewing by a specialist followed by up to 10 practice sessions until competent and confident of the technique. The therapists were supervised by a clinical psychologist through team meetings and one-to-one clinical supervision sessions on a monthly basis with additional informal support throughout the study. Therapy sessions were audio recorded to allow the therapist to reflect on and prepare for the next session. The therapists had backgrounds in nursing and psychology (nonclinical).

The quality of the application of motivational interviewing was assessed by analyzing a purposive sample of 60 sessions from different patients. The sample was balanced across therapist, session number (ie, 1 to 4), and when, over the 31-month recruitment period, the patient was recruited. A clinical psychologist reviewed the content of 20 therapist utterances around the midpoint of each session using a structured evaluation tool, “Motivational Interviewing Skill Code (version 2).”18 Utterances rated motivational interviewing-consistent included: open questions, reflections, advise with permission, affirm, emphasize control, reflect, reframe, and support. Utterances rated motivational interviewing-inconsistent included: advise without permission, confront, direct, raise concern without permission, and warn. The percentage of motivational interviewing-consistent utterances was determined [total MI-consistent/(total MI-consistent plus MI-inconsistent)×100].

Outcome Assessments
At 3 months poststroke, patients were sent a mailed questionnaire. In addition to the outcome data detailed subsequently, the questionnaire also recorded place of residence, availability of significant other, social support, further stroke events, or other new comorbidity. If the patient did not return the questionnaire within 2 weeks, they were telephoned by a second research nurse, blind to group allocation, and given the option of declining, having a further questionnaire mailed, completing the questionnaire over the telephone, or receiving a home visit to assist with completion.

The responses on returned questionnaires were checked for completeness and any sign of emotional distress (GHQ-28 >14 and/or responding positively to any items indicating suicidal tendency). For any missing items, the patient was contacted and asked for their response. Data entry was by a person blind to group allocation. For patients showing signs of emotional distress, the hospital clinical team or general practitioner was contacted.

Primary Outcome
Mood was assessed with the GHQ-28. Secondary outcomes included depression screen (Yale); function (Barthel); and beliefs and expectations of recovery (SEQ).

Statistical Analysis
Mood (GHQ-28) was dichotomized into “normal” (<5) or “low” (≥5). The Yale was treated as dichotomous (“yes” or “no”), the Barthel as categorical (18 to 20, good; 11 to 17, moderate; 0 to 10, poor; dead) and the SEQ as scale data. For the SEQ, we examined beliefs (SEQ Help subscale), expectations (SEQ Happen subscale), and the difference between expectations and beliefs.

We chose a sample size of 200 per group. In a previous study, 44.4% of patients suitable for entry into this trial had GHQ-28 scores of below 5 at 3 months.23 We deemed a 15% between-groups difference in percentage of patients with normal mood to be clinically relevant. We calculated that 187 patients per group were needed, which we inflated to 200 to allow for 5% to 10% dropout.

Data analysis was by intention-to-treat and was undertaken according to an analysis plan drawn up by the trial statistician in conjunction with the trial steering group. The plan was peer-reviewed by 2 stroke experts (PL and NL) and was posted on the Clinical Practice Research Unit web site before any analysis being performed. No interim analyses were undertaken. The analysis of the primary outcome was performed blind to group membership.

The effects of intervention on mood and depression screen were analyzed using logistic regression and its effect on the Barthel was analyzed using general ordered regression. The effects of the intervention on the SEQ beliefs, expectations, and the difference between SEQ beliefs and expectations scores was analyzed using general linear modeling. In each case, the analysis was adjusted using the baseline value of the outcome variable and the factors used...
for minimization. For any missing data required for statistical adjustment, hot-deck imputation was applied. This involved imputing missing item or score total values for a patient from another comparable, randomly selected patient. This selection was done, with replacement, from those with an observed value of the item or score and within the same stratum formed by the combination of the design minimization factors as the patient with the missing value. For outcome mood, imputation was based on the “assumptions” that those who are dead had psychologic distress, ie, using worst case imputation, and that the mood status of those who had data missing for any other reason had not changed since baseline, ie, using last observation carried forward.

All analyses were performed using SPSS (version 13) for Windows or Stata (version 9). All inferential analyses used a 5% significance level; 95% CIs were also obtained using bootstrapping when any necessary parametric assumptions appeared not to hold.

**Results**

During the recruitment period, 1388 patients were entered onto the stroke register and screened for the trial. Of these, 696 (50.1%) met the inclusion criteria. We consented 411 patients to our study (age: median 70, interquartile range: 61 to 77 years; 58.4% male). Of the patients entering the trial, 207 were randomized to control and 204 to intervention. The groups were similar on most characteristics (Table 1). Patient flow through the trial is shown in the Figure.

Of the patients allocated to intervention, 146 (71.6%) received 4 motivational interviewing sessions, 16 (7.8%) received no sessions, and of the remainder, similar numbers received 1, 2, or 3 sessions (Table 2). Patients typically started the intervention between 2 and 4 weeks poststroke and many patients (80.1%) had at least one session at home (Table 2).

The Motivational Interviewing (MI) Skill Code ratings demonstrated high-quality motivational interviewing technique across all 60 interview extracts (mean % MI-consistent: 98.1%, range: 80% to 100% with 51 being 100% MI-consistent and 9 being 80% to 93.3% MI-consistent).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control (n=207)</th>
<th>Intervention (n=204)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (interquartile range) age, years</td>
<td>70 (61–77)</td>
<td>70 (61–78)</td>
</tr>
<tr>
<td>Male sex</td>
<td>122 (58.9%)</td>
<td>118 (57.8%)</td>
</tr>
<tr>
<td>Stroke type (n=197; 192)</td>
<td>Ischemic stroke 187 (95.4%) 178 (92.7%)</td>
<td>Primary intracerebral hemorrhage 10 (4.6%) 14 (7.3%)</td>
</tr>
<tr>
<td>Oxford Community Stroke Project classification (n=190; 184)</td>
<td>Not classifiable 4 (2.1%) 7 (3.8%)</td>
<td>TACI 7 (3.7%) 5 (2.7%)</td>
</tr>
<tr>
<td></td>
<td>PACI 88 (46.3%) 84 (45.7%)</td>
<td>LACI 67 (35.3%) 62 (33.7%)</td>
</tr>
<tr>
<td></td>
<td>POCI 22 (11.6%) 21 (11.4%)</td>
<td>Unconscious 2 (1.1%) 5 (2.7%)</td>
</tr>
<tr>
<td></td>
<td>Median (interquartile range) Barthel at day 7 (n=180; 183)</td>
<td>History of stroke or transient ischemic attack (n=204; 199)</td>
</tr>
<tr>
<td></td>
<td>16 (9–20) 16 (9–20)</td>
<td>61 (29.9%) 43 (21.6%)</td>
</tr>
<tr>
<td></td>
<td>Normal mood (GHQ-28 &lt;5) (n=197; 195)</td>
<td>Not often feeling sad or depressed (Yale) (n=200; 197)</td>
</tr>
<tr>
<td></td>
<td>74 (37.6%) 72 (36.9%)</td>
<td>108 (54.0%) 114 (57.9%)</td>
</tr>
<tr>
<td></td>
<td>SEQ (n=200; 197)</td>
<td>Mean (SD) beliefs 55.8 (6.1) 56.4 (6.3)</td>
</tr>
<tr>
<td></td>
<td>Mean (SD) expectations 53.7 (7.7) 55.0 (7.1)</td>
<td>Mean (SD) difference between expectations and beliefs −2.1 (4.6) −1.4 (4.0)</td>
</tr>
<tr>
<td></td>
<td>Functional dependence (Barthel at pretrial screen)</td>
<td>Mild (18–20) 99 (47.8%) 100 (49.0%)</td>
</tr>
<tr>
<td></td>
<td>Moderate (11–17) 62 (30.0%) 61 (29.9%)</td>
<td>Severe (0–10) 46 (22.2%) 43 (21.1%)</td>
</tr>
</tbody>
</table>

*For the variable column, numbers in parentheses indicate number of patients for whom data were available for variables in which some data were missing (control; intervention). Results are frequency (percentage) unless stated otherwise.

TACI indicates total anterior circulation infarction; PACI, partial anterior circulation infarction; LACI, lacunar infarction; POCI, posterior circulation infarction.

No significant difference in effect was found between intervention and control on mean SEQ beliefs subscale score (P=0.64; 95% CI: −1.9 to 1.2) or mean SEQ expectations subscale score (P=0.75; 95% CI: −1.5 to 2.1), or on their difference (P=0.11; 95% CI: −0.2 to 1.8).

**Discussion**

This study has shown that in a representative sample of hospitalized patients with stroke, motivational interviewing has a beneficial effect on patients’ mood using the GHQ-28 and on self-reported depression using the Yale screening tool. There was no demonstrable effect of motivational interviewing on either function or expectations of recovery. The number of deaths was not significantly greater in the control group than in the intervention group.
This was a methodologically robust study, meeting the criteria set by Knapp and colleagues in a review of strategies to resolve psychosocial difficulties after stroke.11 Our study was a trial of sufficient size to detect a difference between groups, and the sample size was informed through an appropriate power calculation. The study did not have an attention control, rather a usual care arm, and it has been suggested that the use of such a “care as usual” arm makes interpretation of the results easier.11 Trained therapists, under close supervision, provided a theoretically driven intervention that was delivered in a high-quality way consistent with motivational interviewing principles. Few published studies have examined the effects of talk-based interventions on patients’ mood after stroke, and none has shown a benefit on patient mood.11 There are a number of methodological issues that may explain the difference between the results reported here and other studies, including when the intervention is started, the intensity of the intervention, and the training of the therapists. In not having an attention control group, there is the possibility that the positive finding on mood may be attributable to bias. That is, a placebo effect or a kind of social desirability could have elicited a more positive response from the intervention group than the usual care group. Two factors mitigate against this. First, it would make the assumption that the patients “knew” the primary outcome was the GHQ-28

### TABLE 2. Therapy Details for Patients in the Intervention Group*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention group (n=204)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (interquartile range) time in days from stroke to first session (n=188)</td>
<td>18.5 (12–29)</td>
</tr>
<tr>
<td>No. of motivational interviewing sessions</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>16 (7.8%)</td>
</tr>
<tr>
<td>1</td>
<td>16 (7.8%)</td>
</tr>
<tr>
<td>2</td>
<td>14 (6.9%)</td>
</tr>
<tr>
<td>3</td>
<td>12 (5.9%)</td>
</tr>
<tr>
<td>4</td>
<td>146 (71.6%)</td>
</tr>
<tr>
<td>One or more sessions held at home (n=146)</td>
<td>117 (80.1%)</td>
</tr>
</tbody>
</table>

*Figures are frequency (percentage) unless stated otherwise. For the variable column, the number in parentheses indicates the number of patients for whom data were available for the variable in which some data were missing.
and altered their response on this; there were no group differences for the other scales. Second, given the time between the last contact with the patient and the mailed questionnaire, we believe it is unlikely that the patients in the intervention group would exhibit social desirability. An alternative approach would have been to consent patients to follow up rather than randomization as has been done previously; however, such a procedure poses an ethical dilemma. Perhaps the most methodologically sound approach would be to have both a usual care group, could have a negative impact on the outcome of the study, and the total number of deaths was quite low, but this is worth exploring in the future. Further exploration is also required to identify the characteristics of patients benefiting from the intervention.

The therapists in our study received 4 days of training in motivational interviewing by a consultant followed by 10 practice sessions and were closely supervised by a clinical psychologist. In the Life After Stroke study, the psychologic input was provided by psychology assistants who were closely supervised by a clinical psychologist. Although training has been given in other studies, the level of intervention-specific, psychology-based training does not appear to have been as high.

This application of motivational interviewing to patients with stroke appears to have been appropriate, because it had a beneficial effect on patients’ mood. The lack of effect on expectations may be attributable to the inability of the SEQ to detect change and may be more a reflection of the person’s attitude to achieving desired outcomes. Given the positive effect of motivational interviewing on mood, its lack of effect on function was surprising given that mood is suggested to be related to function poststroke. However, because no other study had demonstrated the effectiveness of a talk-based therapy on mood 3 months after stroke, it is difficult to make suggestions about why a change in mood was not matched by a change in function. In the study reported here, there were fewer deaths in the intervention group, which may reflect previous research that has demonstrated the detrimental effect of depression on survival. Mortality was not a defined outcome of the study, and the total number of deaths was quite low, but this is worth exploring in the future. Further exploration is also required to identify the characteristics of patients benefiting from the intervention.

Motivational interviewing was effective with up to just 4 sessions, which would facilitate its introduction as part of usual stroke care. The technique of motivational interviewing is relatively straightforward to learn, so it may be possible to include training in motivational interviewing as part of the curriculum for healthcare professionals. From a service point of view, the lack of availability of staff, skilled in providing psychologic input after stroke, could be addressed in part by

### TABLE 3. Effect of Motivational Interviewing on Outcomes at 3 months Poststroke*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control</th>
<th>Intervention</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal mood (GHQ-28 &lt; 5) (n=167; 172)</td>
<td>70 (41.9%)</td>
<td>94 (54.7%)</td>
<td>1.60 (1.04 to 2.46)</td>
</tr>
<tr>
<td>Not often feeling sad or depressed (Yale) (n=167; 172)</td>
<td>71 (42.5%)</td>
<td>91 (52.9%)</td>
<td>1.65 (1.06 to 2.58)</td>
</tr>
<tr>
<td>Functional independence (Barthel) (n=179; 176)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild/no dependence (18–20)</td>
<td>105 (58.7%)</td>
<td>105 (59.7%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Moderate dependence (11–17)</td>
<td>51 (28.5%)</td>
<td>54 (30.7%)</td>
<td>0.97 (0.62 to 1.52)</td>
</tr>
<tr>
<td>High dependence (0–10)</td>
<td>11 (6.1%)</td>
<td>13 (7.4%)</td>
<td>1.13 (0.59 to 2.17)</td>
</tr>
<tr>
<td>Dead</td>
<td>12 (6.7%)</td>
<td>4 (2.3%)</td>
<td>3.70 (0.68 to 20.22)</td>
</tr>
<tr>
<td>Mean (SD) SEQ beliefs (n=167; 172)</td>
<td>53.7 (8.6)</td>
<td>53.5 (9.0)</td>
<td>−0.4 (−1.9 to 1.2)</td>
</tr>
<tr>
<td>Mean (SD) SEQ expectations (n=167; 172)</td>
<td>50.2 (10.3)</td>
<td>50.9 (9.9)</td>
<td>0.3 (−1.5 to 2.1)</td>
</tr>
<tr>
<td>Mean (SD) difference between SEQ expectations and beliefs</td>
<td>−3.5 (6.1)</td>
<td>−2.6 (4.7)</td>
<td>0.8 (−0.2 to 1.8)</td>
</tr>
</tbody>
</table>

*Results are frequency (percentage) unless stated otherwise.
enabling healthcare professionals with the skills of motivational interviewing. The techniques involved in motivational interviewing can be used in the context of "normal" conversation. Therefore, further research is needed then on the impact of, training, for example, nurses, and therapists, to provide motivational interviewing within the context of their usual interactions with the patient. However, it should be emphasized that the therapists in this study received regular clinical psychologic supervision throughout.

Similarly, although healthcare professionals may use motivational interviewing as an intervention in its own right, further research may examine the use of motivational interviewing as an adjunct to other talk-based or pharmacological therapies.

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Disclosures
None.

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