Telephone Intervention With Family Caregivers of Stroke Survivors After Rehabilitation

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Background and Purpose—Social problem-solving therapy shows promise as an intervention to improve the well-being of family caregivers. There is some evidence that training in problem solving may be effectively delivered by telephone. The purpose of this study was to quantify the impact of social problem-solving telephone partnerships on primary family caregiver outcomes after stroke survivors are discharged home from a rehabilitation facility.

Methods—Using a randomized 3-group repeated-measures experimental design, 74 stroke survivors with an admitting diagnosis of ischemic stroke and their primary family caregivers were entered into the study. The intervention consisted of an initial 3-hour home visit between a trained nurse and the family caregiver within 1 week after discharge to begin problem-solving skill training. This initial session was followed by weekly (the first month) and biweekly (the second and third month) telephone contacts.

Results—Compared with the sham intervention and control groups, family caregivers who participated in the social problem-solving telephone partnership intervention group had better problem-solving skills; greater caregiver preparedness; less depression; and significant improvement in measures of vitality, social functioning, mental health, and role limitations related to emotional problems. There were no significant differences among the groups in caregiver burden. Satisfaction with healthcare services decreased over time in the control group while remaining comparable in the intervention and sham intervention groups.

Conclusion—These results indicate that problem-solving training may be useful for family caregivers of stroke survivors after discharge from rehabilitative facilities. (Stroke. 2002;33:2060-2065.)

Key Words: caregivers ■ problem solving ■ rehabilitation ■ stroke
Participants, Settings, and Methods

Inclusion Criteria
Primary family caregivers were selected because the literature supported that 1 individual typically is responsible for caregiving, usually the wife, daughter, or daughter-in-law.20,21 Primary family caregivers (1) resided within a 100-mile radius of the study hospitals (for first home skill training session); (2) had primary nonremunerable responsibility for the stroke survivor an average of at least 6 hours per day after discharge; (3) were related by blood or marriage; (4) were 18 years of age or older; (5) were oriented and able to read and speak English and hear well enough to engage in telephone contacts; (6) were agreeable to random assignment to either the treatment, sham intervention, or control group; and (7) were reachable by telephone.

The stroke survivors were 35 years of age or older and had an admitting diagnosis of ischemic stroke (includes brain infarction) caused by either thrombi or emboli, had functional independence measure (FIM) scores23 between 36 and 96, and were discharged home from a rehabilitation facility. The stroke subtype was confirmed by imaging in the acute care facility before the patient’s transfer to the rehabilitation unit. Both family caregivers and stroke survivors were excluded if they had a history of major debilitating diseases (eg, DSM-IV schizophrenia, alcoholism, or dementia).

We included caregivers of stroke survivors with either embolic or thrombotic strokes because there were no clear data indicating a differential impact on caregiver study outcomes. Rather, the literature supports that stroke survivor functional deficits are a key factor. Moreover, after excluding cerebral hemorrhage, although the stroke survivor’s medical history may support etiologies such as embolus related to atrial fibrillation, diagnostic tests may fail to confirm it. The relatively high incidence of stroke recurrence (approximately one third of stroke survivors will have another stroke within 5 years; this rate increases 10% per year thereafter24) also led to the decision not to limit the study to caregivers of first-time stroke survivors.

Although the total number of strokes may influence functional deficits and subsequent primary family caregiver outcomes, we attempted to control for this variable by selecting stroke survivors with FIM scores between 36 and 96 (moderate disability). Individuals with these scores were used because those with scores <36 are commonly admitted to a long-term care facility and those with scores higher than 96 frequently require minimal assistance,25 reducing their chance of staying in the 12-week study.

The sample consisted of 74 stroke survivors and their family caregivers who were enrolled in the study over an 18-month interval. Supervisory personnel in the rehabilitative facilities used computerized printouts to identify stroke cases, and charts also were reviewed to confirm that the stroke survivors met the inclusion criteria. The usual time frame between stroke onset and enrollment in the study was 3 to 4 weeks (1 week in an acute care facility; 2 to 3 weeks in the rehabilitation facility).

Participant rates for those who met the inclusion criteria were 85%. Of the 74 participants, 11 were lost at some point during data collection from stroke survivor deaths or caregiver burden, yielding a 15% attrition and mortality rate.

Research Setting
The research setting for recruiting participants included 2 rehabilitation facilities (1 private and 1 state) located in the southeastern United States. These 2 facilities offered similar family discharge planning services (eg, education on stroke and caregiving and physical, occupational, and speech therapy) and served stroke survivors with caregivers who possessed a wide variety of demographic characteristics and socioeconomic status. Initial social problem-solving skill training for primary family caregivers in the SPTP intervention occurred either in a quiet place in the home of the caregiver or stroke survivor to avoid cross-contamination of participants in the rehabilitation facilities.

Study Design
A randomized, 3-group, repeated-measures experimental design was used. A trained research nurse made 3 preintervention screening contacts in the rehabilitation facility with family caregivers and care recipients to verify eligibility, explain the study, secure informed consent after first obtaining approval from the institutional review committee and study hospitals, and initiate an interpersonal relationship with the primary family caregivers that would sustain their participation throughout the data collection period. The trained research nurse also implemented the SPTP intervention.

Participants were randomly assigned to either the SPTP treatment, sham intervention, or control group after enrolling them in the study and the trained research nurse was blinded to sham intervention and control group assignments. A graduate research assistant implemented the intervention with the sham intervention group and remained blinded to the purpose of the study except to know that it was a study of family caregiving. An academic health science fellow collected data and was blinded to the purpose of the study, intervention, and group assignments.

Procedures
The SPTP intervention was derived from work on problem solving by D’Zurilla and colleagues.17–20 Work on family social problem solving by Grant et al21,22 and Houts et al16 was also used to assist family members to manage caregiving problems.

In the SPTP intervention, family caregivers were trained to use social problem-solving skills to manage caregiving problems and cope with the stresses of caregiving. The SPTP intervention consisted of an initial 3-hour face-to-face session with a trained nurse in the hospital. Family caregivers were taught to use a positive problem orientation (viewing problems as a normal part of life, that problem solving is a viable way to cope, and that problem-solving efforts will be successful) and the following 4 systematic steps when solving caregiving problems: (1) identify and define the problem, (2) decide what needs to be accomplished and list possible solutions to the problem, (3) choose and test the best solution(s), and (4) evaluate outcomes of problem solving.

In the initial session, family caregivers also practiced applying a positive problem orientation and problem-solving steps to the caregiving problem of safety because ≤75% of stroke survivors experience hemiplegia and safety is a common concern after stroke.26 After applying social problem-solving skills to the problem of safety, family caregivers also used these skills to address 2 additional problems that were unique to their caregiving situation.

The initial session was followed by weekly (occurring during weeks 2, 3, and 4 after discharge) and biweekly (occurring during weeks 6, 8, 10, and 12 after discharge) telephone contacts to develop and maintain these skills over a 12-week period. During the subsequent telephone contact, family caregivers were asked to identify the 3 most frequent and/or stressful caregiving problems they encountered since the last contact and how they were currently managing the problem. The trained nurse assisted the family caregivers to effectively apply problem-solving steps to address each problem in a sequential order prioritized by the family caregiver while also providing feedback to the caregiver on the appropriateness of the techniques currently being used to manage caregiving problems. A more detailed description of the intervention and the corresponding protocols is available.

Family caregivers assigned to the sham intervention group received the same number of weekly and biweekly telephone contacts. Using a protocol, family caregivers assigned to the sham intervention were asked to identify professional and skilled health services the stroke survivor received since the last contact. The following information was gathered: service date, type of postdischarge health care services, type and name of agency, reason for and number of visits, and the health professional rendering the visit.

All 3 groups received usual discharge planning services provided by the study hospitals (the control group received usual discharge
planning services only). In the study hospitals, family caregivers observed and participated in stroke survivors’ physical, occupational, and speech therapy. Family caregivers also received literature published by the American Heart Association and National Stroke Association.

**Instruments**

Data collection for the 3 groups occurred preintervention 1 to 2 days before discharge, during the intervention at 5 and 9 weeks after discharge, and after the intervention at 13 weeks after discharge. Measures were administered in a random order in the rehabilitation facility and home. All instruments in this project were used previously with caregivers of stroke survivors and were pilot tested to examine their internal consistency and stability. Data related to stroke survivor and family caregiver demographic characteristics were collected using a demographic family data sheet. The following instruments were used to collect data related to the study variables.

**General Health**

General health was measured with the Medical Outcomes Study Short Form Health Survey (SF-36). The instrument measures 8 dimensions related to physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. Several studies have supported adequate psychometric properties. Higher scores indicate better health. In providing guidelines for scoring the SF-36, Ware et al recommend transforming raw data scores so the transformed scores can be compared with norms. Therefore, transformed scale scores were used in analyzing these data.

**Social Problem-Solving Abilities**

Social problem-solving abilities were measured with the sixth grade version of the Social Problem-Solving Inventory—Revised, a 52-item Likert-type measure that assesses 2 problem-orientation dimensions (positive and negative) and 3 problem-solving dimensions (rational problem solving, impulsivity/carelessness, and avoidance tendencies). Empirical evidence supports the content and construct validity of the instrument for general populations, including family caregivers. Estimates of reliability indicate that the inventory is internally consistent as well as stable over time. Higher scores indicate better problem-solving skills.

**Satisfaction With Health Care**

The Client Satisfaction Questionnaire, an 8-item Likert-type scale, was used to measure global satisfaction with SPTP and healthcare services provided by rehabilitation and home healthcare facilities. Empirical evidence supports its content and construct validity and reliability with older adults (α = 0.80), comparable with our pilot data (α = 0.71; r = 0.89). Higher scores indicate greater satisfaction with healthcare services.

**Depression**

Depression was measured with the 20-item Center for Epidemiological Studies Depression Scale. Several studies have supported adequate psychometric properties. Higher scores indicate greater depressive behavior.

**Caregiver Preparedness**

Caregiver preparedness was measured by the Preparedness for Caregiving Scale, a 5-item Likert-type scale that appraises caregivers’ perceptions about their preparedness to give care and to handle the stresses of caregiving. Comparable with our pilot data (α = 0.77 to 0.88; r = 0.89), estimates of reliability indicate it is internally consistent (α = 0.67 to 0.92) as well as stable over time (r = 0.81 to 0.92) for primary family caregivers. (The Family Caregiving Inventory is available from Patricia G. Archbold, Department of Gerontological Nursing, School of Nursing, Oregon Health & Science University, Portland, OR 97201-3098.) Higher scores indicate greater caregiver preparedness.

**Levels of caregiving burden**

Levels of caregiving burden were measured with the “difficulty” subscale of the Caregiving Burden Scale. This 14-item, 5-point rating scale measures difficulty associated with completing direct, instrumental, and interpersonal care tasks. There is support for content validity of the measure with chronically ill populations. Comparable with our pilot data (α = 0.87 to 0.91), estimates of reliability indicate it is internally consistent (α = 0.91). Higher scores indicate greater caregiver burden.

**Statistical Analyses**

Demographic data were analyzed using mean and SD or frequencies and percentages for nominal variables. Baseline group comparability was analyzed using ANOVA or χ² for nominal variables. Characteristics of the stroke survivors and family caregivers are presented in Table 1. There were no significant differences among the groups on demographic and baseline outcome variables.

Hierarchical linear models were used to examine the effectiveness of the intervention. This technique allows individual, person-specific time trends to be modeled as random components and within-person covariances produced by the repeated-measures time effect to be appropriately modeled. Further, the technique uses all available data (not just complete cases) and can deal with differential attrition commonly present in intervention studies, such as this one.

Likelihood ratio χ² statistics were used to test the significance of differences in means instead of the more familiar F test because they are not as severely affected by small sample size and nonnormality as is the F. The time-by-group interaction effect is key for this study, as a statistically significant result indicates that change over time was influenced by treatment. Simple main-effects analyses, controlling for group, were used to identify the differential time responses. A 0.05 significance level was used for all inferential tests.

**Results**

Table 2 presents simple main-effects analysis results for those dependent variables for which there were dissimilar changes over time between the treatment groups. The time regression
TABLE 2. Simple Main-Effects Results for Variables Having Significant Time by Intervention Interaction

<table>
<thead>
<tr>
<th>Dependent Variables and Treatment Groups</th>
<th>Time Regression Weight</th>
<th>( \chi^2 ) (df)</th>
<th>( P ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitality</td>
<td>Intervention</td>
<td>4.391</td>
<td>6.16 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>-0.469</td>
<td>0.08 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-1.755</td>
<td>1.58 (1, 65)</td>
</tr>
<tr>
<td>Role limitations related to emotional problems</td>
<td>Intervention</td>
<td>7.936</td>
<td>7.37 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>3.405</td>
<td>1.63 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-4.731</td>
<td>2.70 (1, 65)</td>
</tr>
<tr>
<td>Mental health</td>
<td>Intervention</td>
<td>4.414</td>
<td>17.07 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>1.601</td>
<td>1.38 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-2.414</td>
<td>7.69 (1, 65)</td>
</tr>
<tr>
<td>Problem-solving</td>
<td>Positive problem orientation</td>
<td>0.298</td>
<td>1.08 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>0.023</td>
<td>0.01 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-0.698</td>
<td>7.97 (1, 65)</td>
</tr>
<tr>
<td></td>
<td>Negative problem orientation</td>
<td>-1.871</td>
<td>12.72 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>-0.717</td>
<td>3.26 (1, 62)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.146</td>
<td>0.07 (1, 64)</td>
</tr>
<tr>
<td></td>
<td>Rational problem solving</td>
<td>1.985</td>
<td>5.00 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>-0.872</td>
<td>0.99 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-0.944</td>
<td>1.80 (1, 65)</td>
</tr>
<tr>
<td></td>
<td>Impulsivity/carelessness style</td>
<td>-1.57</td>
<td>7.20 (1, 59)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>0.001</td>
<td>0.00 (1, 62)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.302</td>
<td>1.19 (1, 64)</td>
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<td>Health care satisfaction</td>
<td>Intervention</td>
<td>0.194</td>
<td>0.97 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>-0.618</td>
<td>2.34 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>-0.757</td>
<td>6.97 (1, 65)</td>
</tr>
<tr>
<td>Caregiving preparedness</td>
<td>Intervention</td>
<td>0.919</td>
<td>19.12 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>0.195</td>
<td>0.78 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.026</td>
<td>0.01 (1, 65)</td>
</tr>
<tr>
<td>Caregiver depression</td>
<td>Intervention</td>
<td>-2.918</td>
<td>14.68 (1, 61)</td>
</tr>
<tr>
<td></td>
<td>Sham</td>
<td>-1.523</td>
<td>3.56 (1, 63)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.182</td>
<td>0.08 (1, 65)</td>
</tr>
</tbody>
</table>

weights provided in Table 2 are an estimate of dependent variable change per unit change in time in the respective treatment group. Because measurement points were 4 weeks apart, the value represents estimated change over a 4-week period. Sham group participants did not demonstrate statistically significant changes over time on any of the dependent variables.

Groups changed similarly over time, with no statistically significant group-by-time effect in 5 of the 8 dimensions of general health, as measured by the SF-36, as follows: social functioning, role limitations related to physical health problems, bodily pain, general health, and physical functioning. Although there were no significant changes over time in social functioning, there were significant differences among groups (\( P=0.0176 \)), with the intervention group having a larger mean (83.84) than either the sham intervention (69.59) or control (69.93) group. Caregivers in the intervention group had statistically significant improvements in vitality, mental health, and role limitations related to emotional problems. Caregivers in the control group had decreased levels of mental health over time.

There was a statistically significant group-by-time effect (\( P=0.0059 \)) for problem solving. The intervention group had significantly better social problem-solving skills than either the sham intervention or the control group. The intervention group had significantly less negative orientation and impulsivity/carelessness but more rational problem-solving skills. Although there was no statistically significant change over time regarding positive problem orientation for either intervention or sham group participants, control group participants deteriorated. There also was no statistically significant group-by-time effect in using avoidance tendencies to solve problems.

The intervention group also showed significantly greater caregiver preparedness and less depression than either the sham intervention or the control group. There were no significant differences among the groups regarding caregiver burden. Satisfaction with healthcare services decreased over time in the control group while remaining comparable in the intervention and sham intervention groups.

Discussion

Compared with the sham intervention and control groups, family caregivers who participated in the SPTP intervention group had better problem-solving skills, greater caregiver preparedness, less depression, and significant differences in vitality, social functioning, mental health, and role limitations related to emotional problems. There were no significant differences among the groups in caregiver burden. Satisfaction with healthcare services decreased over time in the control group while remaining comparable in the intervention and sham intervention groups. There were no substantial differences in these outcome variables between the sham intervention and control groups.

The intervention had a significant beneficial impact on caregivers’ problem-solving abilities. Caregivers who received problem-solving training were less negative. Perhaps viewing problems as a normal part of life and believing that problem-solving efforts would be successful also increased caregivers’ capacity to endure and feel vigor in their lives, lessening depression and improving psychological well-being.

Telephone sessions may be more effective, in part, because they identify and address the unique concerns and issues of...
each individual caregiver. Interventions that adopt a standard-ized protocol approach may be insensitive and ignore the highly subjective yet dynamic nature of the caregiving experience.47 Perhaps the initial interpersonal relationships developed with the research nurse in the rehabilitation facility and subsequent telephone contacts assisted caregivers to share information that would have been more difficult in face-to-face contacts. Family members arranged to talk with the research nurse later in the day if they were busy with other activities. Perhaps this flexibility in rescheduling telephone contacts allowed caregivers to better focus and develop more rational problem-solving skills in addressing problems.

It is possible these changes may have beneficial effects for the stroke survivor, although this was not examined in the present study. Future work should investigate possible beneficial effects of caregiver problem solving training on care recipient adjustment, as some research indicates that many stroke survivors are indeed sensitive and reactive to caregiver coping behavior.48

The extant literature is mixed regarding the effects of demographic characteristics on adjustment. Some research has found that caregiver characteristics are related to adjustment.49–51 Studies that control for the patient’s physical and cognitive functioning (as in this study) commonly report no differences in caregiver adjustment.52 In this study, recruitment was confined to care recipients who had moderate levels of disability and demographic variables were comparable across groups initially. Because of the sample size and small cell sizes, it was not possible to examine the influence of some measured variables that changed during the study. These variables include factors such as stroke survivors’ functional ability, number of caregiver hours, number of other individuals who assisted with caregiving, caregiver participation in discharge planning, and usage of antidepressant medication by either the stroke survivor or family caregiver. In future studies and in studying other populations, examining the importance of these variables would be valuable.

In conclusion, healthcare professionals are challenged to develop effective intervention programs that will assist family caregivers to effectively manage caregiving problems. Problem-solving training by telephone may be useful for family caregivers of stroke survivors after discharge from rehabilitative facilities.

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