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# HEALTH OUTCOMES OF TWO TELEPHONE INTERVENTIONS FOR PATIENTS WITH RHEUMATOID ARTHRITIS OR OSTEOARTHRITIS

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*Objective.* **The effects of treatment counseling or symptom monitoring telephone intervention strategies on the health outcomes of patients with rheumatoid arthritis (RA) or osteoarthritis (OA), compared with usual care, were assessed.**

*Methods.* **A 3-group, randomized, controlled 9-month trial was conducted incorporating 405 patients with RA or OA and using the Arthritis Impact Measurement Scales (AIMS2) as the outcome measure.**

*Results.* **Analyses of covariance showed that the AIMS2 total health status of the treatment counseling group (effect size = 33, $P < 0.01$), but not the symptom monitoring group (effect size = 0.21, $P = 0.10$), was significantly improved, compared with usual care, for both RA and OA patients. The specific types of benefits differed significantly between RA and OA patients. The mean number of medical visits by OA patients in the treatment counseling group was also significantly reduced ($P < 0.01$).**

*Conclusion.* **Telephone contact using the treatment counseling strategy produced significant, but different, health status benefits for RA and OA patients. The symptom monitoring strategy produced modest benefits.**

Recent guidelines approved by the American College of Rheumatology (ACR) for the medical management of osteoarthritis (OA) of the hip and knee have recommended routine telephone contact with patients as one of the effective nonpharmacologic therapies (1,2). The purposes of the present study were to extend the research on telephone contact to patients with rheumatoid arthritis (RA), to evaluate 2 strategies of telephone contact, and to determine the effect of telephone contact on different health outcomes and on the frequency of physician visits.

Telephone contact has been used to manage a diverse set of health problems, such as smoking, colposcopy adherence, mammography acceptance, physical disability hypercholesteremia, psychological illness, cardiac rehabilitation, and diabetes (3–9). Counseling or educational assistance is needed for arthritis and other rheumatic diseases because their management requires extensive physician–patient communication, and patients with arthritis tend to retain only a moderate portion of what they are told and may misconstrue information (10–12).

The 2 key studies concerning telephone contact for management of arthritis have focused solely on persons with OA. The first study demonstrated a significant improvement over 6 months in the health status of patients with OA whose functional status was regularly monitored by telephone using the Arthritis Impact Measurement Scales (AIMS) (13–15). The relative effect of symptom monitoring in comparison with no telephone contact could not be fully assessed, since a control group was not used. The second study tested a brief, telephone-based directive intervention based on a social support model designed for patients with OA. The AIMS pain level and AIMS physical function level of the OA patients who received this directive telephone intervention were significantly improved, in comparison with controls who received no telephone contact (16,17).

The effectiveness of a telephone intervention strategy originally devised for patients with one form of arthritis may not be directly applicable to patients with other forms of arthritis. Even though persons with OA or RA tend to share the cardinal symptoms of chronic joint pain and swelling, they also tend to differ in their medical treatment plans, amount of systemic involvement, symptom severity, age, and impact on daily activ-

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ities; therefore, each patient may require different types of intervention strategies (18–20).

We also wished to test 2 different strategies of telephone contact. The first strategy, treatment counseling, was based on the patient participation model, in which improvements in a patient's involvement with medical care and self-care activities will lead to improved health status. According to this model, a patient who is assisted in communicating better with the physician also enhances the physician's communication with the patient. Medical treatment and treatment compliance improve, which subsequently improves health outcomes (21–24). Applications of this model have been attempted on patients with such chronic health problems as peptic ulcer (21) and diabetes (22), but have not been formally applied and tested on patients with arthritis. Because of its past evidence of effectiveness, the second strategy we wished to test in this study was the simple monitoring of the functional status of the patients. The underlying mechanism of this approach may be social support or possibly increased patient focus on medical problems (14).

Finally, we sought to examine the effect of the telephone interventions on the frequency of patient visits to physicians as well as patient health outcomes, since an intervention that significantly increases visits to physicians may not be cost-effective. We simultaneously tested the 2 telephone intervention strategies, treatment counseling and symptom monitoring, in a randomized, controlled trial of patients with either OA or RA. The primary hypotheses of the study were that 1) each of the telephone interventions would cause a significant improvement in the health outcomes of both OA and RA patients compared with a control group receiving usual care, 2) the type of health outcome changed would be similar among persons with either of the 2 forms of arthritis, and 3) neither intervention would increase patient visits to physicians, compared with usual care.

## PATIENTS AND METHODS

**Patients.** To be eligible for this study, patients were required to 1) have a diagnosis of primary OA of the hip or knee or a diagnosis of primary RA, 2) have reported some current pain or some current disability due to arthritis, 3) be ≥21 years of age, 4) be able to communicate by telephone over a 9-month period, and 5) reside in Alabama. Each patient's physician was asked to return a letter documenting the patient's arthritis diagnosis and the physician's confidence in that diagnosis. If a physician expressed doubt about the diagnosis, the patient was excluded from the study. We did not ask the physicians to provide ACR criteria for their diagnoses. The study rheumatologist (LH) examined the medical records of a sample of 20 cases and agreed with all of the diagnoses in those cases. The patients could have other nonrheumatologic comorbidity as long as it was not serious enough to potentially affect their study participation. Patients with primary RA who also had OA were placed in the RA group for the purposes of our analyses.

The patients were recruited over a 2-year period from lists of previous callers to the Arthritis Information Service (AIS) of Alabama and subscribers to an arthritis newsletter, and from newspaper advertisements. The patients were under the care of either primary care physicians or rheumatologists from several medical practices throughout Alabama. Approximately 75% of the patients who were contacted agreed to participate in the study. The sample size goal was based on a plan to detect a minimal effect size of 0.40 using 2-tailed analysis of covariance with a minimal power of 0.80. The total number of study patients who were initially enrolled was 405 (186 with OA and 219 with RA).

**Study procedures.** Patients were initially asked if they would consent to be in a long-term telephone survey of arthritis. Those who consented at this point participated in a baseline assessment to evaluate their eligibility. Each eligible patient was then told of the nature of the study and randomly assigned, within the 2 diagnostic groups, to 1 of the 3 study patient management strategies. All but 1 patient consented at this stage. Patients were also told that they would receive a small gift, valued less than $5, upon their completion of the study. Contacts with the patients in this study were by telephone or mail only. Once any staff participated in the administration of either symptom monitoring, treatment counseling, or assessment protocols, they could not participate in any other study protocol.

**Usual care.** Patients in the usual care control group were not contacted by the study staff outside of their 3 assessments at baseline, 6 months, and 9 months. They were allowed to use any other outside sources of assistance, including the AIS of Alabama. Use of the AIS by all study subjects was specifically monitored by AIS staff during the intervention period, and it was found that such use was minimal.

**Symptom monitoring.** The purpose of the symptom monitoring strategy was to provide a detailed review of the patient's symptoms, and to provide attention to the patient in an amount equal to that provided the patients in the treatment counseling group. During each monitoring session, the monitoring specialist would administer questions regarding symptom assessment from the second version of the AIMS (AIMS2) (25). This particular section of the questionnaire consists of 57 items about functional status that are categorized into mobility, walking and bending, hand and finger function, arm function, self-care, household tasks, social activity, support from family, arthritis pain, work, level of tension, and mood. The symptom monitoring specialist was not allowed to ask any other questions concerning arthritis and did not provide any advice to the patient.

Each session was designed to take 20 minutes. Patients were scheduled to be contacted 5 times, at 2-week intervals, during the first 3 months of participation, and 6 more times, at 4-week intervals, during the last 6 months of their participation, for a total of 11 scheduled contacts over 9 months. The symptom monitoring specialists were temporary, part-time staff who tended to be college students with little or no training in arthritis education or counseling. They each received 2 hours of training in the administration of the AIMS2 by telephone.

**Treatment counseling.** The treatment counseling strategy was based on a 13-page written, structured protocol especially designed for counseling patients with either OA or RA. The goal was to create a written set of counselor instructions, questions, and advice to the patient that could be quickly adopted by a counselor with little additional training. The protocol was devised over a 6-month period, with input from rheumatologists, physical therapists, nurses, health educators, counselors, psychologists, and patients. The protocol was tested on small groups of patients and revised twice prior to its use in the study. At the beginning of each session, the patient was read a prepared statement that explained the reasons for counseling and the belief that counseling could improve their health status.

In contrast to the symptom monitoring strategy, the treatment counseling intervention was more elaborate and multifaceted. Based both on our own experiences (26–28) with the problems of arthritis patients and on the results of a previous study (16), 6 categories of patient behavior were targeted for potential change.

The first 3 categories of patient behavior were related to improving patient interaction with the medical care system, and included patient–physician communication, medication compliance, and removing barriers to medical care. The 3 other categories of behavior were related to patient self-care, and included symptom reviews, self-care activities, and stress control.

For patient–physician communication, the patients were asked to identify questions that they had not been able to ask their doctor. They were given 8 communication tips to improve their ability to talk with their doctor. When necessary, the counselor would help the patient phrase the questions appropriately and rehearse the utterances with the counselor over the telephone.

For medication compliance, counselors asked the patients to describe their treatment regimen. If the patients had difficulty remembering their medications or their dosing frequency, or if the patient's report of medicines seemed inappropriate, the counselor would attempt to clarify this information or encourage the patient to contact the primary care physician's office for a clarification. After the regimen was clarified, the counselor would check for patient overdosing, underdosing, side effects, and the use of unproven remedies.

For removing barriers to medical care, counselors would assist the patients in keeping regular appointments, discovering how to reach their doctor for emergencies at off-hours, making new appointments when clearly needed, preventing new appointments that seemed unnecessary, deciding whether to switch doctors, giving financial tips when the patients were in a low income bracket or were without medical insurance, and providing information on disability determination. For symptom reviews, counselors would check with the patient for any new swelling or increased tenderness, new restrictions in activity, adverse effects of medications, and new nonrheumatologic warning signs such as shortness of breath. The counselor would encourage the patient to watch for those symptoms because they could require immediate medical attention.

For self-care activities, the counselor would discuss with the patient such topics as balancing rest and activity, eating a balanced diet, proper exercise, special aids and devices, and the use of cold and heat packs at home as the need arose. For controlling stress, the counselor would explain different relaxation or stress reduction strategies, and would discuss 11 tips for coping with stress.

Not all of the patient behaviors were targeted in any one session. During each session, a "worst-first" strategy was used, in which the counselor would, first, quickly assess the status of the patient on each of the 6 behaviors, and would focus most of the session's counseling on the behaviors most in need of improvement. In this way, the intervention was individualized to the specific needs of each patient at a particular point in time.

The counseling model used was reality therapy (29), a directive form of counseling that emphasizes present behavior and taking responsibility for actions. This model was chosen since it emphasized behavior change first, over cognitive or emotional change, and the study's chief counselor (JA) had received formal training in that form of therapy. Within the framework of reality therapy, the patient could be asked questions such as the following: "Do you want to feel better?"; "What do you really need to do to feel better?"; and "Can I get a commitment from you?".

The chief counselor had a master's degree in counseling, was certified in reality therapy, and had >5 years of experience in arthritis patient counseling. She counseled 72% of the patients. The other patients were counseled by another experienced, master's level counselor or a physical therapy assistant with experience in arthritis patient counseling. These other 2 counselors received 8 hours of training in the use of the protocol from the chief counselor. Standardization of counseling was achieved by the simultaneous participation of all 3 counselors, by conference call, in the counseling of several patients. In addition, the counselors and the principal investigator (RM) also met regularly to discuss specific cases and counseling issues. To provide continuity of care, the same counselor was assigned to conduct all the counseling sessions for any one patient. Patients undergoing the treatment counseling protocol were contacted at the same frequency and intervals as the patients undergoing the symptom monitoring protocol.

**Assessments.** The primary health status assessment measure of the study was the AIMS2 total health status scale score. The AIMS2 has well-documented reliability and validity for use with arthritis patients (25). In this study, the AIMS2 3-component model of health status (i.e., physical, affect, and pain) was used. The work and social interaction scales were not used. The AIMS2 total health status score was computed by taking the average of the scores for the 3 components. AIMS2 scale scores have a range of 0 to 10 units, where higher scores indicate worse functioning. In addition to the AIMS2, the patients were asked how many visits they had made to their physician since the last interview. Other measures, which took an additional 20 minutes to administer, were also included in the assessment and were unrelated to this report.

The assessments for the treatment counseling and symptom monitoring groups were performed at baseline and at 3, 6, and 9 months. To ensure that patients in the usual care group were given little additional attention beyond their usual medical care experience, contact with the patients in the usual care group was minimized. Patients in the usual care group were only assessed at baseline, 6 months, and 9 months. The assessment interviewers were mostly college students who were not told of the overall purpose of the study, and were blinded to the group assignment of the patients they were interviewing. Assessment interviewers were not allowed to perform any monitoring or any counseling. The duration of the assessment interview ranged from 30 to 45 minutes since other questionnaires were administered in addition to AIMS2.

**Statistical analysis.** The $t$-test and chi-square analysis were used to compare the background characteristics among the 3 groups, and to compare the patients who dropped out with those who completed the study. The primary statistical analysis concerning health status was a 2-factor multivariate analysis of variance (MANOVA) model. This model used the 9-month AIMS2 scores, which had been adjusted by their covariate baseline scores using a regression procedure. The independent factors of MANOVA were strategy type and diagnosis. Each of the 2 intervention strategies was contrasted with usual care. The dependent factors were the 3 component, continuous scale scores of the AIMS2 (physical function, pain, and affect). All second-order and third-order interaction effects were tested within the model. Preliminary tests showed that the assumptions of normality, equal slopes, and homogeneity of variance were met.

The number of physician visits was transformed to ranks for analyses. Effect sizes were computed by dividing the difference between the covariate-adjusted 9-month mean scores of the usual care group and an intervention group by the pooled, adjusted, within-group standard deviations (30). This calculation method yields estimates similar to those obtained by other methods (31), without relying on the assumptions that the comparison group scores are unchanged and that the baseline scores of the 2 groups are equivalent. The criterion level for statistical significance for this study was set at 0.05. The SPSS statistical package, which includes the MANOVA procedure, was used for all analyses (32).

## RESULTS

The characteristics of the patients in each of the 3 groups are shown in Table 1. The age of the patients ranged from 22 to 89 years, with a mean of 60.5 years. The self-reported duration of disease ranged from 1 to 51 years, with a mean of 16.0 years. There were no statistically significant differences among the 3 groups with regard to age, sex, race, education level, disease duration, or type of physician. The 9-month dropout rates were also low and similar among the 3 groups. The reasons for withdrawal included death, loss of telephone service, being too busy, and for reasons unknown. At 9 months, the sample size was 379, including 175 OA patients and 204 RA patients. Chi-square tests revealed no significant differences in the demographic characteristics among the study dropouts and the study completers.

**Table 1.** Characteristics of the patients by intervention strategy

| Characteristic | Usual care | Symptom monitoring | Treatment counseling |
|---|---|---|---|
| Mean age, years | 60.5 | 60.7 | 60.1 |
| Mean years of schooling | 12.2 | 12.0 | 12.1 |
| Mean disease duration, years | 15.7 | 15.9 | 16.5 |
| Female, % | 87 | 94 | 96 |
| White, % | 82 | 85 | 87 |
| Seeing specialist, % | 50 | 51 | 43 |
| Initial sample size, no. | 135 | 135 | 135 |
| Final size, no. | 127 | 124 | 128 |
| Nine-month dropout rate, % | 6 | 8 | 7 |

The mean adjusted AIMS2 total health status scores for each of the 3 groups at baseline and at 3, 6, and 9 months are displayed in Figure 1. The graphs show a steady improvement (lower scores indicate improvement in health status) in total health status scores for each of the telephone intervention groups over the 9-month period. The scores of the treatment counseling group were consistently lower than those of the other 2 groups.

The AIMS2 total health status scores at 9 months, adjusted for baseline scores along with effect sizes and the percentage of patients who improved at least 10%, stratified by strategy and diagnosis, are

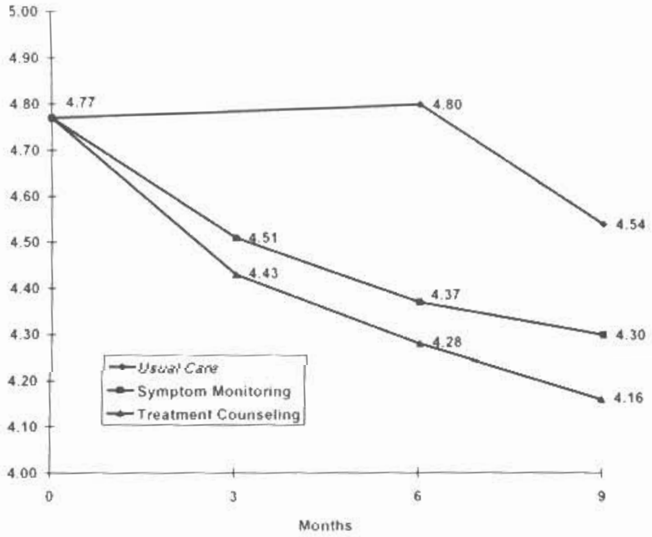

**Figure 1.** Mean adjusted total health status scores on the Arthritis Impact Measurement Scales, second version, for each of the 3 groups at baseline and at 3, 6, and 9 months.

**Table 2.** Mean adjusted total health status scores on the Arthritis Impact Measurement Scales, second version, % improved, and effect size, by strategy and diagnosis

| Group, strategy | n | Adjusted mean ± SD score at followup | % improved* | Effect size (95% confidence interval)† |
|---|---|---|---|---|
| All patients | | | | |
| Treatment counseling | 128 | 4.16 ± 1.17 | 57 | 0.33 (0.09, 0.56)‡ |
| Symptom monitoring | 124 | 4.30 ± 1.22 | 51 | 0.21 (−0.04, 0.45) |
| Usual care control | 127 | 4.54 ± 1.14 | 38 | |
| Rheumatoid arthritis | | | | |
| Treatment counseling | 66 | 4.22 ± 1.16 | 54 | 0.31 (0.04, .58)‡ |
| Symptom monitoring | 70 | 4.35 ± 1.26 | 47 | 0.19 (−0.14, 0.52) |
| Usual care control | 68 | 4.58 ± 1.16 | 35 | |
| Osteoarthritis | | | | |
| Treatment counseling | 62 | 4.08 ± 1.14 | 60 | 0.36 (0.06, 0.66)‡ |
| Symptom monitoring | 54 | 4.22 ± 1.05 | 56 | 0.25 (−0.12, 0.62) |
| Usual care control | 59 | 4.49 ± 1.12 | 40 | |

* Percentage of patients with at least a 10% improvement in total health status score from baseline to 9 months.

† Compared with usual care, effect size = (adjusted mean$_{\text{usual care}}$ − adjusted mean$_{\text{strategy}}$)/pooled adjusted SD.

‡ $P < 0.01$ compared with usual care, by analysis of variance.

presented in Table 2. The results showed that the AIMS2 total health status score for all patients, OA patients, and RA patients in the treatment counseling groups were each significantly improved ($P < 0.01$) compared with the mean AIMS2 scores of patients in the usual care group. The effect sizes for treatment counseling among the different patient groups ranged from 0.31 to 0.36. The percentage of patients with at least 10% improvement in health status was also significantly higher ($P < 0.05$) for the treatment counseling group (all patients) than the usual care group.

The results also showed that the AIMS2 total health status score for all patients, OA patients, and RA patients in the symptom monitoring groups were not significantly improved ($P = 0.10$) compared with the mean AIMS2 scores of patients in the usual care group. The effect sizes for symptom monitoring among the different patient groups ranged from 0.19 to 0.25. The percentage of patients with at least a 10% improvement in the symptom monitoring group was numerically higher than for the usual care group, but was not significantly higher.

The effect sizes and 95% confidence intervals for each intervention strategy, compared with usual care, for the AIMS2 physical, pain, and affect scale outcome scores, stratified by diagnosis, are presented in Table 3. MANOVA showed that the AIMS2 physical scale scores for the OA patients and AIMS2 affect scale scores for the RA patients in the symptom monitoring groups were each significantly improved ($P < 0.05$) in comparison with their respective usual care groups. The AIMS2 physical scale scores for all patients, and the AIMS2 pain scale scores of the OA patients, as well as the AIMS2 physical scale scores and AIMS2 affect scores of the RA patients, in the treatment counseling groups, were each significantly improved ($P < 0.05$) in comparison with their respective usual care groups.

MANOVA indicated that the strategy-by-diagnosis-by-outcome interaction was significant ($P = 0.008$). Further tests indicated that the relative improvement of AIMS2 pain scores, compared with usual care, with the treatment counseling intervention was significantly greater ($P = 0.02$) for the OA patients than for the RA patients. The relative improvement of the

**Table 3.** Effect sizes (95% confidence interval) between telephone contact and usual care groups, stratified by telephone intervention strategy, health outcome, and diagnosis*

| Strategy, outcome | Rheumatoid arthritis patients | Osteoarthritis patients | All patients |
|---|---|---|---|
| Counseling | | | |
| Physical | 0.39 (0.06, 0.72)* | 0.26 (−0.11, 0.62) | 0.34 (0.08, 0.58)* |
| Pain† | 0.00 (−0.34, 0.33) | 0.44 (0.08, 0.80)* | 0.20 (−0.04, 0.45) |
| Affect | 0.34 (0.04, 0.64)* | 0.15 (−0.32, 0.43) | 0.29 (0.03, 0.55) |
| Monitoring | | | |
| Physical | 0.15 (−0.27, 0.48) | 0.29 (0.01, 0.76)* | 0.22 (−0.04, 0.46) |
| Pain | −0.05 (0.37, 0.29) | 0.22 (−0.16, 0.58) | 0.12 (−0.18, 0.31) |
| Affect† | 0.46 (0.11, 0.79)* | −0.06 (−0.45, 0.31) | 0.22 (−0.03, 0.48) |

* $P < 0.05$ versus usual care, by analysis of covariance.

† $P < 0.05$, rheumatoid arthritis patients versus osteoarthritis patients, by analysis of covariance.

**Table 4.** Patient visits to physicians during the intervention period, by intervention strategy and diagnosis*

| Intervention strategy | Osteoarthritis | Rheumatoid arthritis | All patients |
|---|---|---|---|
| Treatment counseling | 2.71 (62)† | 4.55 (66) | 3.64 (138) |
| Symptom monitoring | 3.88 (54) | 4.78 (70) | 4.39 (124) |
| Usual care | 4.28 (59) | 4.06 (68) | 4.16 (127) |
| All | 3.58 (175) | 4.47 (204) | 4.06 (379) |

* Values are the mean number of physician visits (sample size). $P < 0.01$ between diagnostic groups, by analysis of variance.
† $P < 0.01$, versus usual care.

AIMS2 affect scores, compared with usual care, with the symptom monitoring intervention was significantly greater ($P = 0.04$) for the RA patients than for the OA patients. No other interaction effects were significant.

The largest effect size of both interventions across all patients was on the AIMS2 physical scale. The largest effect size of treatment counseling for OA patients was on the AIMS2 pain scale scores. The largest effect size of symptom monitoring for OA patients was on the AIMS2 physical scale scores. Neither of the interventions had much relative effect on the affect scale scores of the OA patients.

The largest effects of treatment counseling for RA patients were on the AIMS2 physical scale scores and the AIMS2 affect scale scores. The greatest effect of symptom monitoring for RA patients was also on the AIMS2 affect scale scores. Neither of the interventions had much relative effect on the AIMS2 pain scale scores for the RA patients.

MANOVA was also used to compare the effectiveness of the treatment counseling intervention directly with that of the symptom monitoring intervention. No statistically significant differences were found between these intervention groups for either diagnostic group on any scale.

The mean number of patient visits to physicians during the intervention phase, stratified by strategy and diagnosis, is presented in Table 4. The results show that the mean number of visits for patients in the 2 intervention strategy groups combined was numerically smaller than the mean number of physician visits for the usual care group. A 2-factor ANOVA revealed that the mean number of visits by the RA patients was significantly higher ($P < 0.01$) than the mean number of visits by the OA patients, and that there was a significant interaction effect between diagnosis and strategy. Followup $t$-tests showed that the mean number of visits to physicians by OA patients in the treatment counseling group was significantly lower ($P < 0.01$) than for OA patients in the usual care group.

## DISCUSSION

The main findings of the study were that 1) the overall health status of patients with either RA or OA who received treatment counseling by telephone was significantly improved in comparison with those receiving usual care, 2) the overall health status of patients who received symptom monitoring by telephone was also somewhat improved, but not significantly, 3) the specific components of health status that were improved by telephone contact differed between OA and RA patients, 4) telephone contact did not significantly increase the number of patient visits to a physician, and 5) the number of visits to physician by OA patients who received treatment counseling by telephone was significantly reduced compared with those who received usual care.

The results show, for the first time, that the health status of patients with RA may be improved by routine telephone contact. In terms of proportions of patients, ~20% more patients with RA who received telephone contact using the treatment counseling strategy had improvement in their total health status compared with the usual care group. In addition, improvements in mean physical function and mean psychological function, but not pain, occurred for these patients compared with the usual care group. These findings suggest that RA patients who received telephone contact using the treatment counseling strategy became less disabled and coped better in the face of chronic pain.

The RA patients who received telephone contact using symptom monitoring improved only with respect to psychological affect, with little or no change in total health status, physical function, or pain, compared with those receiving usual care. This particular result might be explained simply by increased attention, except that such an improvement did not occur in the psychological affect of the OA patients.

The OA patients in this study also seemed to benefit from telephone contact using treatment counseling, but the pattern of benefits differed from those in the RA patients. OA patients who received treatment counseling were found to have relative improvements in physical function and pain, with a minimal improvement in affect. These findings generally support the findings from a previous study that used a social support strategy (25). The strategy for the present study's form of telephone contact was based more on increasing patient involvement than on social support, but both studies produced similar results. The pattern of effects of treatment counseling on the different components of the health status of OA patients was also similar to that observed in the study.

The OA patients also may have benefited modestly from telephone contact using symptom monitoring. Physical function and pain were relatively improved, but affect showed no improvement. This evidence provides some support to the findings of the previous telephone monitoring study, but the results of the present study, in which a usual care group was used for comparison, indicate that the effect was not as great as that shown in the earlier investigation (14,15). The underlying mechanism for these effects is still unclear. The previous telephone monitoring study found that one possible explanation, the buffering of stress through social support, was weakly supported by the results (15). Another possible explanation is that monitoring served as a reminder to patients to concentrate on improving their functional status, rather than to avoid dealing with it.

The effect sizes for pain, physical function, and affect produced by telephone contact in this study compared favorably with the effect sizes reported in a meta-analysis of psychoeducational interventions delivered, in person, to patients with combined arthritis diagnoses (33), but was not quite as high as the effect sizes estimated for the effectiveness of 6 months of methotrexate on pain, depression, and disability for RA patients with >2 years disease duration (34), or for a selected subsample of OA patients (35) who received telephone counseling. Further research to identify patients who would benefit most from telephone counseling would be valuable.

It is possible that while telephone contact may have improved patient health status, it may have done so by increasing the number of visits to physicians, thus increasing the cost of patient care. However, the study findings do not support this criticism. In fact, the number of visits to physicians by OA patients was significantly reduced in the treatment counseling group. This suggests that telephone contact using a treatment counseling strategy can reduce health care utilization, especially for OA patients. These results are consistent with the findings of a randomized study that compared the substitution of clinician-initiated telephone calls for clinic visits with usual care for patients in a general primary care clinic. In that study, the patients receiving telephone care had fewer total clinic visits and less total health care expenditures. For a subgroup of these patients who had fair or poor health, physical function also improved (36).

Several steps were taken to maximize the validity of our study results. Interviewers were naive about the overall purpose of the study and blinded to patient group assignment. None of the assessment interviewers served as interventionists, and none of the interventionists served as assessment interviewers. The possible contamination of conditions was minimized, and the generalizability of the study results was increased by recruiting patients from the statewide community from many different medical practices rather than from one tertiary care clinic. The randomized, controlled design was used to minimize several possible threats to validity. The low dropout rate and the lack of a differential dropout rate among the study groups minimized those explanations of the study findings. The patients assigned to the different interventions were also similar in their background characteristics. The outcome measure, scores from the AIMS2, was an improved version of a well-validated measurement tool.

One of the strengths of this study may have been the diversity of the patients. Study patients were of a diverse age distribution, from both primary care and specialist care practices, and had a wide range of disease durations. The patients who participated in the previous directive telephone study tended to be low-income blacks, while the subjects of the present study tended to be whites with average education levels (25). The combined positive results of these studies using directive telephone contact suggest that telephone contact may be effective for all demographic groups.

One study limitation may have been the incomplete ascertainment of cases. Because we relied on the judgment of the patients' primary care physicians, the diagnoses may or may not have matched strict ACR criteria. Case misclassification was, therefore, possible. We tried to minimize this problem by excluding patients whose physicians had less confidence about the diagnosis, checking with the patient and physician over the course of the study for any changes in the diagnosis, and having our own study rheumatologist examine a subsample of the patients' medical records to confirm diagnoses. Even with improved classification, the main findings of the study would probably not have changed.

Another limitation of the study was that much of the treatment counseling was delivered by one individual. It would have been helpful to compare the effectiveness of several counselors using the same protocol, to be assured that the training and the protocol were more responsible for the results than the individual skills of the chief counselor. Two other counselors administered treatment counseling to patients in the study, but the power to statistically detect differences among the patients counseled by them was too low to be meaningful. The chief counselor and the principal investigator often observed counseling sessions, reviewed counseling notes that were kept for each counseling session, and interacted with the counselors during case discussion conferences. These experiences also revealed no apparent differences in the quality of the counseling among the 3 counselors.

Although the 9-month period of the present study was longer than many intervention studies, it would have been helpful to determine the effectiveness of telephone contact over a longer period of time or after a noninterventional followup period. It is unclear whether health status benefits would increase further or would level off with routine telephone contact given over a longer period.

These study findings provide support for telephone contact strategies for arthritis patients that are based on increasing patient participation in medical and self-care activities. Telephone interventions have several potential advantages over in-person or group interventions. Patient or counselor travel is not needed; multiple counseling sessions are easier to schedule; persons in distant rural areas or with mobility impairment may more easily participate; quality control may be improved since all counseling can be centralized; persons with arthritis seem receptive to talking on the phone; caregivers may be disturbed less; and assistance can be individualized to each patient. These advantages, coupled with the findings of improved health outcomes in the present study, provide further support for the addition of telephone contact to the spectrum of arthritis patient care.

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