Allied Health Team Management of Rheumatoid Arthritis Patients

(health care delivery, occupational therapy practice, patient care team)

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In the delivery of health care to victims of acute catastrophic conditions, for example, spinal cord injury and stroke, teams of allied health professionals (AHPs) have been shown to be advantageous and are now commonly employed (1, 2). Although less data are available concerning the efficacy of such teams in management of patients with rheumatoid arthritis (RA), two controlled studies (3, 4) suggest that “team care” may be beneficial also for this population.

In a study conducted at the University of Michigan, 80 patients with RA were cared for by a team composed of a rheumatologist and a variety of other health workers, and were followed at home by a visiting nurse. Patients treated by the team showed greater amelioration of disease activity than control patients whose treatment consisted of conventional, often episodic management in the arthritis clinic (3).

In a similar study conducted in Cleveland (4), 40 outpatients with RA, whose care was provided by a multidisciplinary staff in an arthritis clinic and was supplemented by a visiting nurse, showed less deterioration in performance of activities of daily living (ADL), greater reduction in disease activity, and a greater tendency toward economic independence than a control group who received episodic care and no routine home follow-up.

Although the Michigan study focused on patients with relatively mild RA who were functionally independent, the Cleveland study included patients with relatively severe joint disease and advanced deformities. Furthermore, both studies were limited to 1 year. Thus, the long-term efficacy of team care in the management of patients with relatively early, or mild, RA has received little attention.

A rheumatology AHP team consisting of a nurse educator, physical therapist, occupational therapist, and social worker has been in operation at the Indiana University Medical Center (IUMC) since 1976. This team, on the premise that comprehensive care may help prevent future disability, is employed commonly in the management of patients with less severe disease along with those with...
were disability and advanced arthritis. This report describes the results of a 2-year prospective study of the efficacy of the AHP team in the management of patients with relatively mild RA.

Method
Patients. Twenty patients from the University Hospital Rheumatology Clinic and twenty patients attending the Lilly Arthritis Clinic were subjects in the study. The former were placed in the experimental group (EG), and the latter were placed in the comparison group (CG). All 40 patients met the following study criteria: 1) were diagnosed as having classical or definite RA (5); 2) were Functional Class I or II (6), that is, able to perform independently most or all daily activities; 3) had minimal fixed deformity in their hands, that is, no more than two finger joints with greater than 35° loss of passive motion.

Experimental group patients were admitted to the study at the time of their initial visit to the Rheumatology Clinic before having any interactions with the AHP team. Prior care by other rheumatologists or by AHPs was noted, but was not an exclusion factor. Comparison group patients’ previous contact with AHPs also was noted, as was their referral to AHPs during the course of the study.

Each EG patient was evaluated at the outset of the study and approximately every 3 months thereafter by one of the staff rheumatologists and each member of the AHP team. Comparison group patients were evaluated by a staff rheumatologist at identical intervals but were seen by a member of the AHP team only upon referral by the rheumatologist. Thus, in contrast to EG patients, no a priori requirement existed for referral of CG patients to an AHP.

Measurements. Data relevant to disease activity, range of joint motion, splint use, functional abilities, and psychosocial adaptation were obtained by the same recorder for each patient in both groups when entering the study and at 6-month intervals thereafter—a total of five evaluations. Concurrent medical conditions were also noted.

Disease activity. An articular index was recorded according to standard techniques (7). Hemoglobin concentrations were measured in the clinical laboratory. The erythrocyte sedimentation rate (ESR) was determined by the Westergren method (8). Grip strength was assessed with a Jaymar adjustable hand dynamometer (Asimow Engineering, Santa Monica, CA). Both the duration of morning stiffness and the interval between the time the patient awoke and the appearance of fatigue were documented by interview.

Range of joint motion. Range of motion (ROM) of finger joints and wrists was recorded according to a standard technique (9), and the ranges of the joints examined were totaled. Range of motion was characterized as full, mildly decreased, or markedly decreased (i.e., greater than 80%, 60 to 80%, or less than 60% of normal, total, and active motion, respectively). Ulnar deviation of the metacarpophalangeal (MCP) joints. MCP subluxation, the presence of swan-neck deformities, and the loss of active and passive flexion at the proximal interphalangeal (PIP) joints were documented at each visit.

Compliance with prescribed splint use. In those cases where bilateral resting splints for hands and wrists were prescribed, compliance with splint usage was monitored by patient report. A categorical definition of compliance was used: always = more than 75% of the prescribed time; sometimes = 50 to 75% of the prescribed time; and occasionally = less than 50% of the prescribed time.

Functional assessment. By interview, an assessment was made of the patient’s ability to perform seven general ADL: feeding, hygiene, dressing, ambulation, transfers, and light and heavy homemaking. Patients were judged to be independent, to require adaptive equipment or the assistance of another person, or to be dependent. Use of specific items of adaptive equipment was documented.

Psychosocial adaptation. A six-item questionnaire was developed to examine the patient’s perception of how arthritis had affected his or her self-respect, sexual function, general life style, and relationships with family members and others. Each patient was asked to indicate on a Likert-type scale how his or her status in each of the six areas had changed since developing arthritis. Responses for each question were rated as follows: much worse = 1; somewhat worse = 2; unchanged = 3; somewhat better = 4; and much better = 5.

Responses to each of the six questions on the psychosocial adaptation questionnaire were summed to determine mean scores for EG and CG patients. A cumulative score of 18 was taken to represent a perception by the patient that the development of arthritis had not affected his or her psychosocial adjustment; a cumulative score of greater than 18 was considered to represent improvement in psychosocial parameters since the development of arthritis; and
a cumulative score less than 18 represented deterioration in this respect.

Statistical Analysis. During the 2-year course of the study, we were unable to follow up on some patients, leaving 10 EG and 15 CG patients. Based on the data of these 23 patients, comparisons were made between EG and CG patients at each 6-month time interval and between the initial and 2-year evaluations within groups. The Mann-Whitney U Test was used for between-group analyses, and the Wilcoxon Signed Rank Test was used for within-group analyses. Between-group analyses of duration of morning stiffness, onset of fatigue, and joint ROM were performed by use of Chi-square test for 2 × 3 tables. Statistical significance at the .05 level or less is noted in the following results.

Results

Demographic and Referral History. Results are reported for the 23 patients who remained in the study for the full 2 years. EG and CG patients appeared to be similar demographically (Table 1). The typical patient in each group was a married Caucasian housewife, 50 or more years old. On the average, RA had been present, for 10 years in the CG patients and 5 years in the EG patients. However, the mean duration of disease in the control group drops to 6 years if two outliers (i.e., patients with greater than a 25-year history of arthritis) are removed from the calculation. One patient in each group had concurrent cardiac disease, and one in CG also had secondary osteoarthritis. Although the patients were not all treated by the same rheumatologist, there were no appreciable differences between the EG and CG patients with respect to the types and doses of antirheumatic drugs (salicylates and other nonsteroidal anti-inflammatory agents) prescribed.

Prior to the study, four CG patients had been referred to a physical therapist for instruction in exercises and heat application (paraffin baths and whirlpool), and three CG patients had been referred to an occupational therapist for splinting of the wrist and/or fingers. In contrast, no EG patient prior to the study had been referred to a physical or occupational therapist, and no patient in either group had had any prior contact with a social worker or nurse educator.

During the study, two CG patients were referred to a physical therapist, whereas eight were referred to an occupational therapist. No CG patient was referred to a social worker or nurse educator during the study. Although CG and EG patients were treated by different AHPs during the study, the services provided by the AHPs to both groups were comparable.

Disease Activity. ESR. At the outset of the study, the mean ESR for EG patients was considerably higher than that for CG patients (50 and 28 mm/hour, respectively; \( p < .02 \)) (see Figure 1). In EG patients, the ESR fell to a mean of 47 mm/hour during the initial 6 months of the study and to 40 mm/hour after 2 years. In contrast, the mean ESR for CG patients remained relatively constant until the final 6 months of the study, when it rose from 30 to 38 mm/hour. Thus, after 2 years the dif-
ference between mean ESRs of EG and CG patients (40 and 38 mm/hour, respectively) was insignificant.

Articular index. The mean articular index for EG patients initially was 91, whereas that for CG patients was 85 (see Figure 2). Six months later, the index for EG patients had fallen to 57, whereas that for CG patients fell to 54. After rising at the 12-month evaluation, the index for EG patients continued to fall, so that at the conclusion of the study it was 40, whereas the index for controls rose from a nadir of 51 at 12 months to 57 at 24 months. Thus, after 2 years the mean articular index for EG patients was lower than that for CG patients (see Figure 2). The change in the articular index within EG patients during the 2 years of the study was significant (p < .01), whereas that within CG patients was not.

Hemoglobin concentration. At the outset of the study, the mean hemoglobin concentration in each group was approximately 13.5 g/dcliter. It changed little in either group throughout the study.

Grip strength. All patients were right-hand dominant. The mean dominant hand grip strength at the outset of the study was similar in both groups (25 and 22 pounds, EG and CG, respectively) (see Figure 3). In EG patients this value tended to rise slightly and then reached a plateau, whereas in CG patients it remained relatively constant until the 24-month evaluation, when it declined. Thus, after 2 years the mean grip strength in EG patients was about 50% greater than that in CG patients (29 and 19 pounds, respectively; p < .05).

Morning stiffness. The duration of morning stiffness in EG patients initially was greater than that in CG patients. Only one EG patient initially described stiffness, which subsided within 30 min, whereas six CG patients were in this category (see Table 2). However, as the study progressed, morning stiffness tended to diminish in EG patients, so that after 2 years six EG patients had stiffness lasting only 30 min less. In contrast, relatively little change in morning stiffness occurred in CG patients. After 2 years, 7 of the 13 CG patients (1 more than at the initial evaluation) reported morning stiffness less than 30 min in duration.

Fatigue. Initially, fatigue also tended to be more marked in CG patients than in EG. At the outset,
5 of the 10 EG patients and 8 of the 13 CG patients noted fatigue within 8 hours after awakening. After 2 years, this changed little in either group (see Table 3).

**Joint ROM and Hand Deformities.** Initially, four patients in each group showed full ROM of hand joints (see Table 4). In CG patients there was some tendency to loss of hand ROM during the study. Thus, comparison of each patient's initial and final evaluations indicated that 3 of the 13 CG patients had developed sufficient loss of joint motion over the study period to result in reclassification of their range (e.g., from mild to marked decrease). Only one EG patient demonstrated similar loss of motion. In both groups, changes in wrist range of motion tended to parallel those of hand joints.

The two groups differed at the outset with respect to the prevalence of ulnar deviation of the fingers (which was noted initially in 5 CG patients and no EG patients) and subluxation (which was seen initially in 2 CG patients and no EG patients) (see Table 5). A loss of active PIP extension was noted initially in one CG and two EG patients. In addition, the presence of fixed PIP flexion deformities (e.g., loss of active and passive extension) was noted in four CG and five EG patients. A swan-neck deformity was present initially in one CG patient, but this was not noted in any of the EG patients.

With respect to the frequency with which patients acquired ulnar deviation, MCP subluxation, and swan-neck deformities after entry into the study, the two groups were roughly comparable (see Table 5). However, they differed markedly with respect to loss of active PIP extension subsequent to their initial evaluation, which was observed in 10 of the 13 CG but only 1 of the 10 EG patients ($p < .01$). One CG patient, but no EG patients, lost active and passive PIP extension during the study.

As expected, no patient who initially had ulnar deviation, MCP subluxation, or swan-neck deformities exhibited improvement in these during the study. In some instances, however, improvement of PIP flexion deformities was observed. As noted above, two EG

### Table 3

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<thead>
<tr>
<th>Comparison Group (n = 13)</th>
<th>Experimental Group (n = 10)</th>
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<tbody>
<tr>
<td>Time of evaluation, months</td>
<td>Time of evaluation, months</td>
</tr>
<tr>
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<td>12</td>
</tr>
<tr>
<td>Interval, time of awakening to onset of fatigue, hours</td>
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</tr>
<tr>
<td>&lt;3</td>
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<tr>
<td>3-8</td>
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<tr>
<td>&gt;8</td>
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### Table 4

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<th>Comparison Group (n = 13)</th>
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<tbody>
<tr>
<td>Time of evaluation, months</td>
<td>Time of evaluation, months</td>
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<td>12</td>
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<tr>
<td>Range of motion</td>
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<td>Mild loss</td>
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<td>Marked loss</td>
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### Table 5

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<tr>
<th>Comparison Group (n = 13)</th>
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<tr>
<td>DPIE ADDS</td>
<td>DPIE ADDS</td>
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<td>Deformity</td>
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<tr>
<td>Ulnar deviation</td>
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<tr>
<td>MCP subluxation</td>
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<tr>
<td>Swan neck deformity</td>
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<tr>
<td>Loss of active PIP extension</td>
<td>1</td>
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<tr>
<td>Loss of active and passive PIP extension</td>
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Results give number of patients under the following conditions: DPIE, deformity was present at initial exam; ADDS, acquired deformity during the study. Joints: MCP, metacarpophalangeal; PIP, proximal interphalangeal.
patients exhibited some loss of active PIP extension at the outset. In both, full PIP extension was regained during the study. Similarly, three of the four EG patients, but none of the five CG patients, who had lost both active and passive PIP range at the time of the initial evaluation improved; 2 years later they were judged to have normal PIP range of motion.

Compliance With Splint Use. During their initial evaluation by the occupational therapist, all EG patients were fitted with bilateral resting hand splints for nightly use. Such splints had been prescribed for four CG patients prior to the study, and six additional CG patients were fitted with resting splints during the course of the study.

In both groups, compliance with splint use was generally poor throughout the study, that is, less than half of EG and CG patients used their splints 50% of the prescribed time. For both EG and CG patients, frequency of splint use was associated with greater disease activity, as reflected by the degree of ESR elevation and duration of morning stiffness. In both groups, the relationship between splint use and ESR was significant \((p < .05)\) at all time periods examined, whereas the relationship between morning stiffness and splint usage was significant only at 12 and 24 months.

Functional Assessment. Most patients in both groups were ADL independent at the outset, and no appreciable changes were noted in this respect in either group during the study. At the outset of the study, no patient in either group used adaptive equipment. Two years later, however, 9 of the 10 patients remaining in the EG reported that they used adaptive equipment for some ADL purposes, whereas the other patient was provided with adaptive equipment but did not use it. In contrast, at the 2-year follow-up evaluation only 1 of the 13 CG patients acknowledged use of adaptive equipment. Another patient had been given such equipment but did not use it.

Psychosocial Adaptation. The initial evaluations indicated that EG patients perceived that development of arthritis had adversely affected their psychosocial adaptation to a greater extent than CG patients (see Table 6). Thereafter, little change occurred in CG patients until the 2-year follow-up evaluation, when these individuals felt that the adverse effect of their arthritis was somewhat greater than they had previously indicated.

In contrast, EG patients exhibited a marked positive change at 6 months, which persisted throughout this study. Seven of the 10 EG patients who completed the study reported that their psychosocial adaptation had improved after entering the study, whereas this was true of only 2 of the 13 CG patients. Furthermore, at the close of the study only one EG patient, but seven CG patients, felt that development of arthritis was followed by some deterioration in their psychosocial adjustment. The difference in psychosocial adaptation between the initial and 2-year evaluations in the EG patients was significant \((p < .02)\).

Discussion

These results indicate that after 2 years, EG patients experienced better outcomes than CG patients with respect to disease activity, hand ROM, development of joint deformities, and psychosocial adaptation. These results are similar to those of other investigations (3, 4) of the effects of team care for outpatients with RA, which, in contrast to our study, included a visiting nurse as a member of the team and were limited to 1 year. An uncontrolled 5-year study has suggested that the rehabilitation efforts of a health team may be beneficial also for RA patients who are much more severely disabled than those in this study (10).

It should be emphasized that the AHP team at Indiana University Medical Center (IUMC) is not merely a loose affiliation of specialists but provides comprehen-

<table>
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<th>Time of Evaluation, months</th>
<th>Comparison Group ((n = 13))</th>
<th>Experimental Group ((n = 10))</th>
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<tbody>
<tr>
<td>Initial</td>
<td>17.6</td>
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</tr>
<tr>
<td>6</td>
<td>17.6</td>
<td>19.0</td>
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<tr>
<td>12</td>
<td>17.6</td>
<td>18.9</td>
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<td>18</td>
<td>17.8</td>
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<tr>
<td>24</td>
<td>16.8</td>
<td>19.1</td>
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The scale consists of six items; for each, 3.0 means "no change." A score of 18 on the scale, therefore, indicates no net change in psychosocial adaptation. A score less than 18 represents some change for the worse, and a score greater than 18 represents some change for the better.
sive care in an integrated, coordinated fashion. The interactions of the team members and the dynamics of this "team approach" have been described elsewhere (11). In brief, coordination between team members occurs by means of weekly team rounds with the rheumatologist, informal contact among team members, and written communication in the medical record. In addition, all team members incorporate into their patient interactions the findings and treatment plans of other members; thus, the team is highly integrated. Team members routinely reinforce each other's instructions and provide feedback to each other regarding a patient's reactions to their intervention. This enhances the possibility that the effectiveness of the team will be greater than the collective contributions of its individual members.

It should be noted that the dropout rate in both groups in this study was relatively high, as it was in the Michigan study (3). Some of the patients who dropped out moved out of the area or elected to obtain medical care closer to their homes. Others were not available for follow-up at the designated intervals. Possibly, the six EG patients who were lost after the initial assessment dropped out because they were simply looking for a second opinion and had not intended to remain within IUMC for their medical care.

Several comments on the results of the present study are necessary. Although EG and CG patients were similar demographically, it is important to note that most EG patients had not been evaluated and treated by a rheumatologist prior to entry into the study, whereas many CG patients had been under the care of a rheumatologist for months, even years. Whether this factored into the observation that disease activity (e.g., ESR, duration of morning stiffness) was more marked in EG than in CG patients at the outset of the study is not known. Possibly, the striking improvement in these parameters noted in EG patients during the study may, to some extent, have reflected regression to the mean. Still, although both groups were under the care of a rheumatologist throughout the study, the mean ESR of CG patients rose during the period of observation, whereas that of EG patients decreased, and the articular indices showed greater reduction in the number of swollen or tender joints in EG than in CG patients.

The duration of limitation in hand joint motion prior to initiation of the study was not known. It is possible that this may have influenced the changes seen during the study, because arthritis in the CG patients had been present on average 5 years longer than in the EG patients. Nonetheless, hand deformities may develop quickly in rheumatoid arthritis and do not necessarily correlate with duration of disease.

The two groups differed also with respect to the acquisition of specific hand deformities during the study (see Table 2). This difference was significant (p < .01) with respect to loss of PIP extension. Furthermore, one CG patient, but no EG patients, lost passive as well as active PIP extension during the period of observation. Notably, two EG patients with loss of active and three EG patients with loss of both active and passive PIP extension at the outset had normal PIP ROM two years later.

In contrast, no CG patient with loss of PIP extension at the outset showed improvement in PIP range during the study.

While compliance with prescribed splint use in these patients was poorer than that which we had noted previously, a correlation between disease activity and the use of splints was noted here, in support of our previous findings (12). No striking difference between CG and EG patients existed with respect to compliance with splint use. Although we did not assess adequacy of fit or ease of application and removal of the splints in CG patients, we consider it unlikely that these factors accounted for the poor compliance in this group.

A higher proportion of EG patients than CG patients was given self-help devices. Provision of adaptive equipment (e.g., jar openers, built-up handles) in the early stages of RA, when it involves the small joints of the hand, may be considered as a form of joint protection and not only a means of increasing ADL independence. It is not possible to conclude from the present data whether use of adaptive equipment accounted for the lower prevalence of hand deformities in EG patients. A controlled study of this issue is warranted.

Rheumatoid arthritis is a chronic disease that may impose a variety of changes in the patient's life-style (e.g., change in self-esteem, employment status, family relationships). Thus, the patient and the health professional must often contend with a variety of emotional factors that are related to the disease and influence health. Two EG patients underwent a total knee arthroplasty during the study, and two CG pa-
tients reported significant emotional stresses (e.g., moving to another city, divorce), these occurrences may have influenced the patients' responses to the psychosocial adaptation statements. However, these stressful events occurred in the first year of the study and may not have affected responses as strongly at the 24-month evaluation.

Our initial psychosocial evaluations indicated that EG patients perceived their arthritis to have affected adversely their psychosocial adaptation more than CG patients. However, after 2 years EG patients felt that their arthritis had a less negative effect overall, whereas CG patients responses were more negative. Possibly, exposure to the team approach helped some EG patients identify and deal with their psychosocial adjustment problems.

This study was designed and carried out by an occupational therapist, and many of the assessed areas relate directly to the role of the occupational therapist (e.g., hand ROM, prevention of hand joint deformities, and preservation of functional abilities) in management of patients with RA. As a component of a comprehensive management team, the occupational therapy program is reinforced by other team members and supported by the referring rheumatologist. Although the number of patients was small and therefore the results cannot be generalized, the results are encouraging in the sense that they support the efficacy of the involvement of occupational therapists in particular and an AHP team in general in management of patients with mild RA.

Summary
This prospective study suggests that regular, ongoing involvement of a coordinated team of AHPs in management of patients with mild RA may be more beneficial than episodic care by AHPs. The use of a team appears to have a favorable effect on outcomes related to disease activity and on functional ability and psychosocial adaptation. It should be noted, however, that the follow-up period in this study was limited to 24 months and that the number of patients studied was small. In addition, the two study groups were not equivalent at the initiation of the study, which made interpretation of the data more complex. On the basis of these results, an analysis of the effects of the team approach on outcome of patients with RA followed for a longer period, and using a larger number of matched patients, is warranted. It should also be pointed out that this study did not include a cost/benefit analysis of the team approach. Even if the initial costs of the team approach are greater than those of episodic AHP care, we feel that the investment is justified, if the program helps to maintain the patient's functional status and reduces the frequency of hospitalization.

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