Evaluation of a Clinic Education Program for Patients with Rheumatoid Arthritis

PAUL J. VIGNOS, WILLIAM T. PARKER, and HELEN M. THOMPSON

Abstract. A group education program was developed for clinic patients with rheumatoid arthritis. Teaching methods used included the Arthritis Foundation's handbook, Rheumatoid Arthritis, and a lecture by a rheumatologist. The 20 patients in the study were given a multiple choice test before and after the teaching program to determine their knowledge of arthritis. Results showed group education to be an effective teaching device. It was demonstrated that patients learned from reading the handbook alone, but the combination of reading and lecture was found to be a more effective method. Correlation studies showed that prior to group education, patients had a significant knowledge of their disease which was related to native intelligence, formal education, and socio-economic status, but not to duration of disease or length of clinic attendance. This suggests that future patient education experiments should include a pre-instruction test to document prior knowledge. (J Rheumatol 3: 155-165, 1976)

Key Indexing Terms:
RHEUMATOID ARTHRITIS PATIENT EDUCATION GROUP INSTRUCTION

Successful comprehensive management of rheumatoid arthritis (RA) requires that the patient has some knowledge of the disease process and the rationale for treatment. Yet clinical studies to determine the effectiveness of patient education in arthritis have rarely been attempted.

A survey of arthritis textbooks or of books on arthritis written expressly for patients by physicians, reveals that the subject of patient education has been either neglected entirely, or mentioned only briefly, as an important factor in securing patients’ cooperation in the management of their disease. None of these are experimental data cited to document the value of patient education or the effectiveness of methods available for the instruction of patients with arthritis.

A few studies have been published in the
medical literature concerning the education of patients with arthritis. Valentine has described a comprehensive outpatient clinic education program for patients with arthritis. However, an objective study of the effectiveness of the program was not attempted. Rosenstock et al reported on a program designed to rehabilitate adults with chronic disabling diseases which included a patient education seminar. Evaluation was done only in behavioral and attitudinal areas and no attempt was made to measure patient learning. Moll and Wright evaluated the effectiveness of the Arthritis and Rheumatism Council’s handbook, Gout, as a teaching instrument in a group of clinic patients. Knowledge acquired by the patients was measured by a post-instructional multiple choice test. The patients were not pretested before reading the handbook so that it is not clear what portion of the patients’ knowledge had been acquired from reading the booklet and what portion had been obtained during prior care for their gout.

The study of patient education in RA reported in this paper employed a group lecture, combined with reading assignments from the Arthritis Foundation’s handbook, Rheumatoid Arthritis. There were four major objectives: first, to develop a pilot education program for patients with RA; second, to determine the effectiveness of this program in teaching clinic patients about their disease; third, to relate the effectiveness to education, intelligence, socio-economic status, and disease duration; and fourth, to determine whether the effectiveness of learning from the booklet could be improved by use of an illustrated group lecture.

MATERIALS AND METHODS
Selection of Study Patients
The study sample consisted of 20 patients with RA, as determined by the American Rheumatism Association (ARA) criteria, who were selected from those currently attending the Arthritis Clinic of University Hospitals in Cleveland, Ohio. Patients over 65 years were excluded from the study, to minimize the effects of aging on the learning process and because U.S. National Census data on education level according to age group show that the urban, black, female population over 65 has a median grade level of school attendance of only 6.4 to 7.0. The low education level in this older age group could make learning from the arthritis booklet difficult since the reading level of the booklet was estimated to require a 12th grade education. Results of the study are applicable only to patients below age 65. Patients selected for the sample were limited to Class 1, 2, or 3 by ARA functional criteria. Class 4 patients were excluded since it would have imposed a hardship on these severely involved patients to come to the clinic for a voluntary education program. Patients selected for participation in the study were required to have a clinic attendance of at least 50 per cent during the previous year. These patients had demonstrated, by their attendance record, that they had a definite interest in obtaining regular care for their disease. Patients with diseases such as organic brain dysfunction and significant vision or hearing impairment which might interfere with the normal learning process were excluded from the study. Patients selected for the study were restricted to those residing within the greater Cleveland area, in order to avoid excessive travel time to the teaching sessions. All potential study patients were interviewed concerning their interest in participating in an education program, and only those giving a positive response were asked to participate.

Educational Variables
Sections of the handbook judged to contain essential information were outlined in red to help focus the patient’s attention on the important areas. This procedure reduced the required reading material from 19 to 13 pages. The material in the handbook was then divided into major subject areas and
approximately half of these subject areas were chosen for reinforcement by a carefully-prepared, 35 minute, illustrated lecture given by a rheumatologist to the group of study patients at the second visit.

The lecture was prefaced by a brief, poster-illustrated description of the gross anatomy of a normal joint together with the pathological changes in joint structure induced by progressive rheumatoid arthritis.

The lecture served principally to emphasize and elaborate on certain selected topics in the assigned reading from the Arthritis Foundation's handbook, *Rheumatoid Arthritis*. The following topics were emphasized:

1. **Joint inflammation**, including its symptoms, signs and associated tissue changes together with the progression of the disease if left untreated.

2. **The basic methods of conservative treatment**, with special emphasis on medications, systemic rest, and physical exercise programs.

3. **The proper use of aspirin**, including the need for adequate doses, proper timing of drug ingestion, common side effects and means of minimizing the undesirable side effects.

4. **The role of cortisone in the management of RA**, with special emphasis on the actual medication, safe dosage levels, and the dangers of steroid therapy in general.

5. **The use of therapeutic exercise**, including a simple classification of different types, reasonable goals, and number of daily repetitions.

6. **The proper balance of systemic and local rest**, in conjunction with the program of therapeutic exercise.

The lecture was specifically designed for clinic patients whose educational and socioeconomic backgrounds varied widely. Simple terms were used throughout and more complicated terms were clearly defined. The phraseology of the lecture and the content of the posters were reviewed to ensure that the level of the presentation was consistent with the educational background of the patients.

**Tests and Measures**

The characteristics of the patients in the study are summarized in Table 1. The extent of a patient's previous exposure to informal education in the clinic was determined from the clinic records by using the total length of time the patient had attended the Arthritis Clinic and by the number of clinic visits. Intellectual function was measured with the aid of Raven's Coloured Progressive Matrices15, which we have previously found to be reliable for this purpose16,17. Hollingshead's two factor index18 was used to define social position as a function of education and occupation.

The patients in the study group, which consisted of 19 women and one man, ranged in age from 33 to 64 years (mean 53.3). The Raven scores ranged from nine to 35 (maximum = 36) with a mean of 25.3 (Figure 1). On the Hollingshead index of social position, patients in the study scored from 44 to 77 (maximum = 77, minimum =

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of men</td>
<td>1</td>
</tr>
<tr>
<td>of women</td>
<td>19</td>
</tr>
<tr>
<td>Number of blacks</td>
<td>16</td>
</tr>
<tr>
<td>of whites</td>
<td>4</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>53.3 ± 8.6*</td>
</tr>
<tr>
<td>Mean length of time attending clinic (years)</td>
<td>5.7 ± 5.5</td>
</tr>
<tr>
<td>Mean number of clinic visits</td>
<td>42.7 ± 40.2</td>
</tr>
<tr>
<td>Mean Raven intellect score (units)</td>
<td>25.3 ± 7.4</td>
</tr>
<tr>
<td>Mean formal education (years)</td>
<td>9.1 ± 2.7</td>
</tr>
<tr>
<td>Mean Hollingshead score (units)</td>
<td>66.1 ± 9.9</td>
</tr>
</tbody>
</table>

*Mean ± 1 SD.
Education for rheumatoid arthritis patients

11) with a mean of 66.1 (Figure 2). Higher scores in this index are associated with less formal education and less responsible occupations.

A test with 12 multiple choice questions was devised to measure the level of a patient’s knowledge about arthritis (see Appendix 1). Each question was followed by six alternatives with a variable number of correct answers for each question. The patients were instructed to select one correct answer for each of the first two questions, and two correct answers for each of the remaining 10 questions. Scoring was done by grading as wrong any correct alternative that was not marked and also any incorrect alternative that was marked. Hence it was possible to miss two on each of the first two questions, and four on each of the last 10 questions. One point was deducted for each wrong answer so that the best possible score attainable was 44. Probability calculations showed that the average score which could be obtained by guessing at every question, would be 14.

Half of the material in the handbook was selected for reinforcement in the lecture by the rheumatologist. Questions relating to information reinforced by the lecture are designated by the letter (L) in Appendix 1. Some of the test questions were constructed to measure information covered only by the handbook, while others measured material covered in the handbook and then reinforced by the lecture (Table 2). It was hoped there-

Table 2. Material in Educational Program for Rheumatoid Arthritis Patients

<table>
<thead>
<tr>
<th>normal joint anatomy and rheumatoid joint pathol</th>
<th>Booklet</th>
<th>Lecture</th>
<th>Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etiology</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Inflammation</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Laboratory tests</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Prognosis</td>
<td>+</td>
<td>partial</td>
<td>+</td>
</tr>
<tr>
<td>Symptoms</td>
<td>+</td>
<td>partial</td>
<td>+</td>
</tr>
<tr>
<td>Treatment:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cortisone</td>
<td>+</td>
<td>partial</td>
<td>+</td>
</tr>
<tr>
<td>Rest</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Exercises</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Heat</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Surgery</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Mechanical aids</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Hospital confinement</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
by to measure the teaching effectiveness of the handbook alone, as compared with the handbook reinforced by the lecture. The effectiveness of the entire education program was measured by using the total test score.

The testing and education program was completed in two sessions. At the first meeting, the Raven test, Hollingshead test, and arthritis pre-education test were administered. The arthritis handbook was given to each patient with instructions that it should be read by the next session three weeks later. At the second session, the rheumatologist presented the illustrated lecture and the arthritis post-test was given. The same test was given at the pre- and post-instruction examinations. The patients were not given the correct answers to the test questions so that simple recall would not influence their score on repeat examinations.

The p-values for the significance of score differences were computed using a two-sided t-test of differences. Correlation coefficients were computed using Pearson’s method. The corresponding p-values were calculated using a two-sided test on Fisher’s Z transformation of the correlation coefficients.

RESULTS

The results of the pre-instruction test show that prior to the education program, these patients had acquired considerable knowledge about arthritis. The average pre-instruction test score was 26.4 of 44 possible points (Table 3), which is significantly better than the random score of 14 ($p < .0005$). The distribution of individual pre- and post-instruction scores suggests that the test was appropriate for the patients in the study.

The average post-instruction test score of 33 was significantly better than the pretest score ($p < .001$). The patients’ scores showed significant improvement both on that part of the test based on the booklet alone and on that derived from material covered by the booklet and reinforced by the lecture. However, the average improvement in test score for questions based on material in the booklet and reinforced by lecture was significantly greater ($p < .025$) than that for material solely covered in the booklet. This suggests that the patients learned more from the combined education program than from simply reading the handbook, *Rheumatoid Arthritis*.

The test scores obtained before the patients received the educational material were examined to determine if there was a correlation with the six descriptive characteristics listed in Table 1. There was a significant correlation between the pre-instruction level of knowledge with the results of the Raven intelligence and Hollingshead socio-economic tests and the extent of formal education (Table 4). However, the improvement observed in the first post-instruction test did not correlate with any of the six patient characteristics (Table 5).

The long-term retention of information was measured by repeating the test one year after the instruction period (Table 3). After one year, performance on the total test was better than on the pre-instruction test al-

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Table 3. *Comparison of Arthritis Test Scores*

<table>
<thead>
<tr>
<th></th>
<th>Pre-instruction</th>
<th>Post-instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.4</td>
<td>33.0</td>
</tr>
<tr>
<td>$p$</td>
<td>$&lt;.001$</td>
<td>$&lt;.01$</td>
</tr>
<tr>
<td>Total test score (average)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portion of test covered by booklet</td>
<td>8.3</td>
<td>9.8</td>
</tr>
<tr>
<td>$p$</td>
<td>$&lt;.006$</td>
<td>$&gt;.2$</td>
</tr>
<tr>
<td>Portion of test covered by booklet and lecture</td>
<td>12.3</td>
<td>15.9</td>
</tr>
<tr>
<td>$p$</td>
<td>$&lt;.001$</td>
<td>$&lt;.01$</td>
</tr>
</tbody>
</table>

*Seventeen of the original 20 patients were available to take this test.*
Fig. 3. Distribution of individual arthritis pretest and post-test scores.

Table 4. Summary of Correlation Studies Relating Arthritis Pretest Scores with Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Correlation Coefficient</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.31</td>
<td>.19</td>
</tr>
<tr>
<td>Length of time attending clinic</td>
<td>.14</td>
<td>.58</td>
</tr>
<tr>
<td>Number of clinic visits</td>
<td>.27</td>
<td>.25</td>
</tr>
<tr>
<td>Raven intellect score</td>
<td>.55</td>
<td>.010</td>
</tr>
<tr>
<td>Formal education</td>
<td>.53</td>
<td>.015</td>
</tr>
<tr>
<td>Hollingshead score</td>
<td>-.60*</td>
<td>.0046</td>
</tr>
</tbody>
</table>

*A negative correlation with the Hollingshead score means that those with more formal education and more responsible occupations had higher pretest scores. The Hollingshead index is described in the text.

Table 5. Summary of Correlation Studies Relating Learning from the Education Program with Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Correlation Coefficient</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.355</td>
<td>.82</td>
</tr>
<tr>
<td>Length of time attending clinic</td>
<td>.027</td>
<td>.91</td>
</tr>
<tr>
<td>Number of clinic visits</td>
<td>-.035</td>
<td>.89</td>
</tr>
<tr>
<td>Raven intellect score</td>
<td>.34</td>
<td>.15</td>
</tr>
<tr>
<td>Formal education</td>
<td>.20</td>
<td>.40</td>
</tr>
<tr>
<td>Hollingshead score</td>
<td>-.014</td>
<td>.95</td>
</tr>
</tbody>
</table>

though the average score was lower than it had been immediately after the education program. Nevertheless, after one year patients continued to score better on that por-
tion of the test dealing with material covered in the booklet and reinforced by the lecture, whereas retention of material covered by booklet alone was no better than at the time of the pre-instructional test.

DISCUSSION

An illustrated lecture by a clinical rheumatologist combined with self-instruction utilizing the Arthritis Foundation’s handbook, *Rheumatoid Arthritis*, produced an improvement both in short-term and long-term retention of patients’ knowledge of arthritis. Individual instruction of patients, which might be more effective than group instruction, is time consuming and physicians vary considerably in their ability to communicate information.

The results of the pre-instructional test showed that the patients in this study were relatively well informed about arthritis even before receiving the education program. Omission of pre-education testing might have resulted in an overly optimistic estimate of the effectiveness of the teaching program.

The initial scores did not reflect either the length of time the patients had been attending the Arthritis Clinic or the total number of clinic visits. The physician should not assume that a patient with chronic arthritis and a large number of clinical appointments will have a better knowledge of his disease than a patient with a shorter clinical course.

The test scores obtained before exposure to the educational material showed a close correlation with formal education, the Raven score, and the Hollingshead index. Better educated patients with higher native intelligence and positions of higher social responsibility apparently acquire more knowledge about their disease through informal education than patients of a lesser educational and socio-economic background. This has important educational implications in the planning of teaching programs in arthritis; different teaching methods may be required for patients with different socio-intellectual backgrounds.

In their first post-instructional test the patients showed a significant improvement in knowledge gained simply from reading the Arthritis Foundation’s handbook, *Rheumatoid Arthritis*. The improvement was unanticipated with this patient population, since the CWRU Department of Education estimated the booklet to be appropriate for a 12th grade reading level, while the mean education level of the study patients was only 9.1 years. The initial improvement in information gained from reading alone was lost by one year. The patients demonstrated a significantly better, long-term retention when the reading material was reinforced by a lecture.

Improvement in the scores on the post-instructional test can reasonably be attributed to the teaching program although some of the improvement may have resulted from other factors. Thus, the pre-instructional test might have directed attention toward information in the booklet that was subsequently tested. We tried to minimize this effect by allowing a period of three weeks between the pretest and the post-test. In addition, we tried to minimize inappropriate motivation by not informing patients of either examination in advance.

The proximity of the lecture to the first post-instructional test might possibly have influenced the results of the initial examination. This would not explain the continued improvement demonstrated one year later on the test material, which was based on reading with reinforcement by the lecture, especially when compared to the test results on information given only in the booklet but without lecture reinforcement.

Improvement in test scores in the first post-instructional test could not be correlated with any of the patients’ clinic attendance or socio-economic characteristics listed in Table 1. The absence of any such correlation suggests that the Arthritis Foundation’s hand-
book, *Rheumatoid Arthritis*, and the group lecture were well suited for teaching this group of patients. A successful group education program should be capable of reaching patients with varying intellectual and educational backgrounds. The success of such an approach is validated if it can be shown that there is no correlation between learning and the socio-intellectual characteristics of the patients studied. The lack of significant correlations with any of these variables suggests that this goal was achieved in this study.

The results of the study were obtained from an urban population with a preponderance of black females. The results should be applicable to similar populations in other metropolitan arthritis clinics. One might expect comparable or better results in other groups of arthritis patients with higher educational and socio-economic backgrounds.

This experiment in patient education did not attempt to determine if compliance was altered as a result of the instruction program. There are at present few reliable methods for objectively determining the degree of compliance with a comprehensive program of management of rheumatoid activities. It is not possible to determine, except by subjective interview techniques, whether a prescribed rest program is being followed or whether physical exercises are being performed regularly. The goal of this study was intentionally limited to determining if the patient’s knowledge and understanding of arthritis could be improved by a formal educational program.

The results of this education program suggest that studies of teaching programs for arthritis patients must include an evaluation of the pre-instruction knowledge of the patients. Measurements of intelligence, education, and socio-economic position of the patient population are necessary in order that the educational material will be appropriate for the characteristics of the group being studied.

REFERENCES
APPENDIX 1. MULTIPLE CHOICE QUESTIONNAIRE ON THE ARTHRITIS FOUNDATION HANDBOOK OF RHEUMATOID ARTHRITIS

For each question, please check the answers you think are best.

1. Which one of the following statements about rheumatoid arthritis is true?
   (L) a) —— Only old people get it.
   b) —— Patients with rheumatoid arthritis never have a fever.
   (L) c) —— Rheumatoid arthritis always gets better without treatment.
   (L) d) —— Patients with rheumatoid arthritis have inflammation of the joints.
   c) —— Rheumatoid arthritis is not chronic.
   (L) f) —— Rheumatoid arthritis only attacks the joints and nothing else.

2. Which one word or phrase, in the list, is the cause of rheumatoid arthritis?
   (L) a) —— bacteria
   (L) b) —— virus
   (L) c) —— old age
   d) —— cold, damp weather
   e) —— emotional upset
   (L) f) —— no one knows yet

3. Can you pick two things that inflammation can cause in patients with rheumatoid arthritis?
   (L) a) —— swelling of joints
   b) —— enlargement of bones
   (L) c) —— pain in joints
   d) —— high blood sugar
   e) —— bending of bones
   f) —— chills

4. Can you pick two tests that help the doctor in caring for your rheumatoid arthritis?
   a) —— cholesterol
   b) —— sedimentation rate
   c) —— ECG (cardiogram)
   d) —— blood sugar
   e) —— latex test
   f) —— throat culture

5. Can you pick two complaints which patients with rheumatoid arthritis may have?
   (L) a) —— fatigue
   b) —— high blood sugar
   c) —— high blood pressure
   d) —— stroke
   e) —— lumps or nodules under the skin
   f) —— skin rash

6. Can you pick two true statements about aspirin from the following list?
   (L) a) —— The only reason for taking aspirin is to stop the pain of arthritis.
   (L) b) —— It is only necessary to take aspirin when your arthritis hurts.
   (L) c) —— Aspirin helps to stop inflammation in arthritic joints.
   (L) d) —— Aspirin is not a very powerful drug because you can get it without a prescription.
   (L) e) —— Aspirin won’t help you much unless you take it several times each day in large doses.
   (L) f) —— Aspirin really does not help arthritis much because it is such a common drug.

Booklet material reinforced by rheumatology lecture.
7. Can you pick two answers which describe how rheumatoid arthritis can act in a patient?

a) Many patients have mild symptoms.
b) It always gets worse in all patients.
c) It is a mild, unimportant disease.
d) It never does lasting harm.
e) Almost all patients will get very crippled and deformed.
f) It is typically a disease of ups and downs.

8. Can you pick two bad side effects that can be caused by using cortisone?

a) loss of hair  
b) loss of weight  
c) damage to liver  
(L) d) weakening of bones  
(L) e) cause or aggravate stomach ulcers  
f) damage to kidney

9. Can you pick two true sentences from the following list?

a) Canes or crutches should only be used if you are crippled.
b) Splints and casts are only used for broken bones.
(L) c) Canes or crutches can be used to rest joints and prevent crippling.
d) Special devices to help a patient with bathing, dressing or eating should be expensive to work well.
e) Splints or casts can be used to prevent contractions.
(L) f) Surgery is always a good way to treat rheumatoid arthritis.

10. Can you pick two true statements about exercise in the patient with arthritis?

(L) a) In rheumatoid arthritis full movement of the affected joints can be lost quickly.
(L) b) Once motion in a joint has become restricted, it is easy to improve again by proper exercises.
(L) c) Doing your exercises will get rid of arthritis.
(L) d) Exercise is not good because it makes an affected joint worse.
(L) e) Exercise is only necessary when the disease flares up.
(L) f) Moving arthritic joints through their full range of motion several times each day will help you keep normal motion in them.

11. Can you pick two true statements about treating rheumatoid arthritis from the following list?

a) Everyone with rheumatoid arthritis should be in the hospital.
b) Patients with rheumatoid arthritis always do better in a warm, dry climate.
(L) c) Warm baths should be taken for an hour or longer to be helpful.
d) The warm baths in the hospital are much better than warm baths at home for most patients.
e) Severe flare-ups of arthritis may require staying in the hospital for several weeks to rest joints.
(f) Special equipment and intensive physical therapy are best available in the hospital.
12. Can you pick two true statements about resistance exercises from the following list?

(L) a) They are needed by all arthritis patients.

(L) b) They should be painful to be useful.

(L) c) They are used to build strength in weakened muscles.

(L) d) They are the most important treatment.

(L) e) They do not have to be done if the patient does his usual daily activities.

(L) f) They are done against some kind of extra force or pressure, such as weights.