

The Use of Trained Patient Educators with Rheumatoid Arthritis to Teach Medical Students

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Objective. To assess whether patients with rheumatoid arthritis (RA) trained as educators can enhance the integration of clinical and basic science education among second-year medical students during their rheumatology sequence.

Methods. Twenty patients with RA and strong communication skills were extensively trained to teach students how to perform the whole-body joint examination. Each arthritis educator taught three 2-hour small group sessions and participated in a concluding 2-hour panel discussion with the entire class. Changes in student knowledge and attitudes were assessed in a pre-post evaluation design.

Results. There were statistically and educationally significant gains in knowledge, confidence, and attitudes related to psychosocial aspects of arthritis in each of the 2 years the program was implemented. One-year followup data indicated substantial retention of these gains.

Conclusions. Patients trained in arthritis education can effectively teach fundamental musculoskeletal examination skills and encourage the development of sensitivity to the impact of chronic arthritis on the daily life of other patients.

Key words. Medical education; Trained patients; Case-based teaching.

INTRODUCTION

Medical schools are currently wrestling with the limitations imposed by the traditional lecture-based format of the basic science years of the curriculum. One major limitation is the poor continuity between the clinical sciences and skills taught in the third and fourth years and the necessarily delayed time when students can begin to appreciate first-hand the impact of disease on the patient. The growing recognition that basic science teaching must be integrated with clinical training has led to several innovations in undergraduate medical education.

One such innovation has been the use of standardized patients (SPs) for teaching and evaluation purposes. SPs are normal individuals trained to play the part of a patient with a specified medical problem. Typically, students or practitioners interact with the SP as if with a real patient, gathering information through the history and physical examination in order to determine a diagnosis and make management decisions (1–5). However, because SPs have no symptoms, patients with real clinical manifestations are needed when physical examination skills are the target of instruction.

To circumvent this problem, real patients have been utilized in the past, beginning with studies by Eric Gall, MD, at the University of Arizona (6–8). Arthritis patients, generally with rheumatoid arthritis (RA), have been trained both to demonstrate abnormal physical findings and to assess physical examination skills. Similar programs have been developed at the University of Texas Southwestern Medical Center at Dallas,

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where a comprehensive training manual has been developed (9).

Recent curriculum changes at the University of Michigan Medical School enabled us to employ RA patients as arthritis educators (AEs) during the second year of the basic science curriculum. In addition to teaching the musculoskeletal examination and demonstrating pertinent physical findings, the AEs were also encouraged to talk with their students about themselves and the impact of RA on their lives, in an effort to change student awareness of and attitudes toward the disease and its effects. This interaction with the AE was facilitated both by a small-group format and by a 2-hour moderated discussion session between the entire class and all of the AEs. A questionnaire administered before and after the program assessed the impact of the program on student confidence, attitudes, and knowledge. The results are presented below.

SUBJECTS AND METHODS

Arthritis educator training. Twenty-four patients were recruited from the rheumatology clinic at the University of Michigan. Selection criteria consisted of good communication skills and the presence of physical findings typical of RA. These patients represented a variety of occupations: artist, school bus driver, nurse, lawyer, and homemaker. The patients were then given approximately 50 hours of training on 3 weekends during a 6-week period. They had an additional 50 hours of study at home through videotapes and self-study. After being introduced to the relevant vocabulary and anatomy of the joints, they were taught the full-body joint examination procedure. This was accomplished with the help of the University of Texas training manual (9) and 12 AEs from the University of Texas, including Ms. Branch, who supervised all of the sessions. After learning each skill, the AEs practiced teaching it to one another.

The AEs' progress in learning the targeted content and skills was assessed by several quizzes on terminology, anatomy, and the clinical manifestations of RA, as well as by individual demonstrations of joint examination techniques. Reinforcement and repetition was provided where necessary to enable all the participants to achieve the required standards specified in the training program. Since the present application did not require the AEs to evaluate the students, the reliability of such evaluations was not assessed. However, prior research (6) has shown that trained patient instructors can attain reliabilities of greater than 0.85 in student evaluation settings.

Two patients dropped out of the training program

and two more were unable to arrange their schedules to allow participation on the required dates. This left a subset of 20 AEs who completed the training and subsequently participated in the sequence with the medical students in 1994. There were 15 AEs available for the 1995 implementation, who were augmented by 5 AEs from the University of Texas.

Medical student program. The rheumatology sequence of the second-year curriculum took place near the end of the year, immediately prior to beginning the third-year clinical rotations. At this point in their training, the medical students had acquired a wide range of basic science information, but had relatively little exposure to clinical medicine. They had, however, learned basic medical interviewing techniques and had practiced physical examination techniques on each other.

Prior to 1993, the rheumatology sequence consisted of 10 lectures given during a 3-day period. As part of a general curriculum reform aimed in part at reducing the overall number of lectures, the rheumatology sequence was revised. The total number of lectures was reduced and computerized case simulations and AE sessions were added. For the 1993–1994 class, the lectures were reduced from 10 to 4 (joint structure and function, lupus, scleroderma, and immunosuppressive drugs). Twelve computer-based patient simulations covered the clinical presentation and pathophysiology of 4 categories of rheumatic disease: RA, osteoarthritis, crystal-associated arthritis (gout, calcium pyrophosphate dihydrate crystal deposition disease, and hydroxyapatite), and the seronegative spondylarthropathies (ankylosing spondylitis, psoriatic arthritis, and inflammatory bowel disease–related arthritis). In the 1994–1995 class, the computerized simulations were temporarily replaced by lectures pending necessary software upgrades.

For both classes, the AE sessions consisted of 1 AE and 4 medical students and were conducted in 2 adjoining amphitheaters containing 16 examination cubicles. Each session lasted 2 hours, with 48 sessions being required over 3 consecutive days to accommodate the approximately 190 students in each class. During each session, the AE taught the basic anatomy and clinical presentation of RA and demonstrated the correct form and technique of a full-body joint examination. Students participated by following the AE's instructions while actually performing the examination, and by observing others in the group doing the same. The presence of joint findings in the AE provided clear targets for the students to focus on during their examination and concretely demonstrated the signs and

symptoms the students had heard and read about in the lectures and computer-based patient simulations.

Students were also encouraged to ask the AE questions about the examination technique, the physical findings, the patient's perspective on the examination and the disease, and how the disease affected him or her. A rheumatologist faculty member (TJL) circulated among the small groups, responded to any questions that the AE might not be able to answer, and commented on particular characteristics of individual AEs. Because the small groups all took place in proximity to each other, it was sometimes possible for students from one group to compare the findings and symptoms of multiple AEs.

Immediately following the final small group session with the AEs, the entire class convened for a 2-hour general panel discussion that allowed the students to question the AEs on some of the broader aspects of living with RA. The rheumatology sequence director (TJL) moderated the discussion and helped to focus and frame questions. The students asked questions on a variety of subjects: the effects of RA on lifestyle and daily activities; coping with RA, both physically and emotionally; the patients' experiences with the health care system; their experiences with treatments and surgeries; their experience of RA over a long period of time; and the impact of RA on personal relationships. Attendance at the small group and the panel discussion sessions was very high in both years, much more so than is typical for lectures.

Program evaluation. The effect of the AE program was assessed by an evaluation questionnaire administered at the introductory session of the rheumatology sequence and again after the final full-class session (the panel discussion with the AEs). There were 79 pre-program assessments and 68 post-program assessments (response rate [RR] = 41%) in the 1993–1994 class. For the 1994–1995 class, 136 students completed the pre-program assessment and 97 completed the post-program assessment (RR = 69.7% and 49.7%, respectively). There were no statistically significant differences in performance on the pre-program assessment between students who did and did not provide a post-program assessment, which suggests that the results were not biased by missing data from the nonrespondents. A followup assessment was administered by mail to the 1993–1994 class 12 months after their second-year rheumatology sequence. The instrument used in each of the assessment periods measured areas in which changes were anticipated: knowledge, confidence, and attitudes. In regard to knowledge, students were asked to identify the correct definition of several physical manifestations of RA: swan neck deformity,

boutonniere deformity, ulnar drift, synovitis, and rheumatoid nodules. Our expectation was that the students would either observe and examine these manifestations in the AE to whom they were assigned, or would be taught the definition by the AE.

The AE sessions were also expected to augment student confidence in their own knowledge. Therefore, students were asked to rate their own ability to recognize the basic physical findings of RA, their ability to perform a complete joint examination, and their understanding of the pathophysiology of arthritis, its clinical presentation, and its impact on the daily activities of patients. In addition to knowledge and confidence, the questionnaire examined several attitudinal dimensions related to psychosocial aspects of arthritis, such as the importance of understanding how the impact of arthritis symptoms on the patient's life affects providing care for that patient, and how the impact of arthritis on the patient's life compares with other chronic diseases (e.g., diabetes, hypertension). The impact of the experience on students' interest in caring for patients with arthritis was also measured.

McNemar tests were used to evaluate the changes in the knowledge items, which were scored as correct/incorrect, and paired *t*-tests were used to assess changes in the attitude and evaluation items. Effect sizes of the differences between means in the paired *t*-tests are reported as a "practical" assessment of the magnitude of the difference. Generally, these effect sizes can be interpreted according to the following guidelines: 0.20 is considered a small effect, 0.50 is a medium effect, and anything greater than 0.80 is a large effect (10).

RESULTS

Knowledge. Prior to the rheumatology sequence, students had difficulty correctly answering most of the knowledge items (between 21.8% and 50.0% correct), with the exception of synovitis (89.7% and 94.5%, in the 1993–1994 class and 1994–1995 class, respectively) and rheumatoid nodules in the 1994–1995 class (83.5%) (Table 1). McNemar tests of change indicated a statistically significant degree of improvement over the course in all the concepts except ulnar drift, which apparently was not well addressed, and synovitis, which the students knew well before the course. The magnitudes of change were quite similar between the two classes, with the exception of knowledge about rheumatoid nodules. After 12 months, students' knowledge of boutonniere deformity, rheumatoid nodules, and swan neck deformity was still significantly higher than their pre-course knowledge, although it had de-

Table 1. Mean percentages of knowledge items correct in a pre/post/followup evaluation of second-year medical students taught by trained patient educators

Definition of the following terms	Class*	Pre	Post	12-month follow-up
Boutonniere deformity	1993–1994	21.8†	82.1‡	54.5
	1994–1995	30.8§	82.4	–
Rheumatoid nodules	1993–1994	50.0†	95.5	90.9
	1994–1995	83.5§	95.6	–
Swan neck deformity	1993–1994	45.8†	89.6‡	72.7
	1994–1995	37.4§	89.0	–
Synovitis	1993–1994	89.7	98.5	97.7
	1994–1995	94.5	94.5	–
Ulnar drift	1993–1994	38.5	46.3	45.5
	1994–1995	49.5	48.4	–

* n = 41 (1993–1994 class) and n = 90 (1994–1995 class).
 † Statistically significant difference between pre- and followup evaluations, and between pre- and post-evaluations (McNemar test).
 ‡ Statistically significant difference between post- and followup evaluations (McNemar test).
 § Statistically significant difference between pre- and post-evaluations (McNemar test).

clined from post-course performance on the boutonniere and swan neck deformity items.

Confidence. The educational program had a major impact on students' confidence in their ability to recognize the basic physical findings of rheumatoid arthritis (item 1, increase in means from 1.5 to 3.8 in the

1993–1994 class, and 1.9 to 3.9 in the 1994–1995 class) and to perform an appropriate joint examination (item 2, increase from 1.7 to 3.7 in 1993–1994, and 1.9 to 3.6 in 1994–1995) (Table 2). These changes were not only highly statistically significant, but also educationally significant, with effect sizes of 3.29 on item 1 and 2.67 on item 2 for the 1993–1994 class. The followup assessment indicated that even after 1 year, the students retained much of their increased confidence in these skills over the pre-course level (effect sizes of 2.26 and 1.71 for items 1 and 2, respectively, for the 1993–1994 class). There was a modest decline from the post-course to followup assessment (effect sizes 0.47 and 1.81 for items 1 and 2, respectively, for the 1993–1994 class).

Students' estimates of their own knowledge also increased considerably over the course of the program. Their mean rated understanding of the pathophysiology of arthritis (item 3) rose from 1.6 to 3.4 and from 2.7 to 3.6 for the 1993–1994 and 1994–1995 classes, respectively. Their knowledge of the clinical presentations of rheumatologic conditions (item 4) increased by a similar margin, from 1.7 to 3.8 for the 1993–1994 class and from 2.5 to 3.9 for the 1994–1995 class. Knowledge of the impact of arthritis on the daily activities of patients (item 5) increased from 2.3 to 4.1 for the 1993–1994 class and from 2.8 to 4.2 for the 1994–1995 class, after the program. All of these changes were positive, and both statistically and educationally significant (effect sizes between 1.21 and

Table 2. Means for confidence and attitude items in a pre/post/followup evaluation of second-year medical students taught by trained patient educators

	Class	Mean (SD)*			Pre–post effect size	Pre–fol- lowup effect size	Post–fol- lowup effect size
		Pre	Post	12-month followup			
1. Confidence in ability to recognize the basic physical findings of rheumatoid arthritis	1993–1994	1.5 (0.7)	3.8 (0.7)	3.3 (0.9)	3.29	2.26	0.47
	1994–1995	1.9 (0.8)	3.9 (0.7)	–	2.61	–	–
2. Confidence in ability to perform an appropriate joint examination	1993–1994	1.7 (0.8)	3.7 (0.7)	3.1 (0.9)	2.67	1.71	0.81
	1994–1995	1.9 (0.8)	3.6 (0.7)	–	2.34	–	–
3. Understanding the pathophysiology of arthritis	1993–1994	1.6 (0.7)	3.4 (0.7)	3.2 (0.8)	2.57	2.00	0.31
	1994–1995	2.7 (0.8)	3.6 (0.7)	–	1.21	–	–
4. Knowledge of clinical presentation of rheumatologic conditions	1993–1994	1.7 (0.7)	3.8 (0.6)	3.2 (0.9)	3.23	1.56	0.70
	1994–1995	2.5 (0.8)	3.9 (0.7)	–	1.94	–	–
5. Knowledge of the impact of arthritis on daily activities	1993–1994	2.3 (0.8)	4.1 (0.6)	3.6 (0.6)	2.57	1.66	0.69
	1994–1995	2.8 (0.8)	4.2 (0.6)	–	1.85	–	–
6. Understanding how arthritis affects a patient's life is most important in caring for that patient	1993–1994	4.2 (0.7)	4.6 (0.6)	4.2 (0.7)	0.62	0.07	0.59
	1994–1995	4.4 (0.7)	4.5 (0.6)	–	0.25	–	–
7. Impact of arthritis on activities of daily life is greater than other chronic medical illnesses	1993–1994	3.3 (0.6)	3.8 (0.7)	3.7 (0.6)	0.77	0.65	0.04
	1994–1995	3.5 (0.8)	3.8 (0.8)	–	0.33	–	–
8. Possess interest in caring for people with arthritis	1993–1994	3.2 (0.7)	3.5 (0.7)	3.1 (1.1)	0.29	0.02	0.58
	1994–1995	3.6 (0.8)	3.6 (0.7)	–	0.05	–	–

* 5-point scale in which 1 is either "not at all confident" or "strongly disagree," and 5 is either "very confident" or "strongly agree"; n = 41 (1993–1994 class) and n = 90 (1994–1995 class).

3.23). Again, each of these knowledge areas was a target of the AE component of the program and was not covered to any appreciable extent by the other course components. As with students' ratings of confidence in their skills, their ratings of their knowledge 12 months later stayed significantly higher than their pre-course ratings (effect sizes from 1.56 to 2.00), but moderately lower than their post-course ratings (effect sizes 0.31 to 0.70).

Attitudes. The final 3 items in Table 2 reflect attitudes related to the psychosocial impact of arthritis and the care of patients with arthritis. The program increased students' perceptions of the importance of spending time understanding the impact of arthritis on patients' lives. The size of this increase, although statistically reliable and of a moderate effect size, may have been limited by ceiling effects, given that the pre-program rating of this item was already quite high (means 4.2 and 4.4 for the 1993–1994 and 1994–1995 classes, respectively).

Students also changed their perceptions of the impact of arthritis on daily life in comparison with the impact of other chronic diseases (item 7). Before the program, the mean rating fell near the mid-point of the scale (3.3 and 3.5 for the 1993–1994 and 1994–1995 classes, respectively), indicating that the students considered it to be approximately equal in impact with other chronic diseases. After the educational program, they considered arthritis to have a somewhat greater impact than other chronic diseases (mean 3.8 for both classes). This increase was, again, statistically significant, and constituted a moderately large effect size (0.77 and 0.33 for the 1993–1994 and 1994–1995 classes, respectively).

The program appeared to have relatively little impact on students' interest in caring for people with arthritis. Although the change in mean rating over the course of the program was positive and statistically reliable, the effect size was small (0.29 and 0.05 for the 1993–1994 and 1994–1995 classes, respectively). Interest in treating arthritis was near the mid-point of the rating scale both before (mean 3.2 for the 1993–1994 class and 3.6 for the 1994–1995 class) and after (mean 3.5 for the 1993–1994 class and 3.6 for the 1994–1995 class) the course sequence.

The 12-month followup evaluation showed that students' ratings on understanding how arthritis affects a patient's life and their interest in caring for people with arthritis reverted to their pre-course levels, whereas their ratings of the impact of arthritis remained at post-course levels.

Student comments. Students were given the opportunity to provide written comments on the post-sequence evaluation form. Not surprisingly, most of the students enjoyed the opportunity to actually see and appreciate the manifestations of RA in a "real" patient, as well as to touch and manipulate affected joints. They praised the AEs for their ability to explain the physical manifestations and teach the joint examination procedure. The students also said they reached a much better understanding of the impact of RA on patients' lives and how they as physicians can and should help them deal with their disease.

The weaknesses that the students identified in the AE sessions largely reflected their desire to expand the program. Some students wished for the opportunity to see and talk with patients with other rheumatic diseases as well as those with RA, particularly osteoarthritis and gout. Many also wanted to interact with more than one educator within a given disease in order to achieve a better understanding of the possible variations in clinical presentation. The only other point cited by a reasonable number of students was a desire for a handout describing the joint examination prior to the AE session.

Arthritis educator perceptions. The AEs, though not polled systematically, were unanimous in their praise and enthusiasm for the project. They greatly enjoyed working with students and felt that they were able to utilize their disease to teach valuable information and impressions to a group of future physicians. Anecdotal support for the strength of the AEs' convictions that their efforts were well spent can be derived from the fact that the AE group subsequently began publishing its own newsletter, and nearly all have indicated their willingness to participate in the University of Michigan program in future years.

DISCUSSION

Historically, the use of standardized patients in teaching and evaluating knowledge and clinical skills in rheumatology has been relatively limited, compared with their use in general (i.e., non-disease-specific) areas of clinical competence, such as history taking and physician-patient communication. Previous efforts to use real patients as SPs with medical students have focused on assessment of clinical skills (information gathering, diagnosis, treatment planning) in a relatively small sample of students (11). A more comprehensive effort used real patients as SPs to teach and evaluate the quality of rheumatologic care delivered by medical students, house staff, and primary care physicians (6,7).

These studies showed that real patients trained as SPs can be reliable assessors of competence and knowledge, if appropriately trained.

The training of the arthritis patients was a critical component of the success of the present study. It drew heavily on the training program first developed by Eric Gall, MD, at the University of Arizona (6–8). After participating in a limited program of this type at Northwestern Medical School, one of the authors (VKB) moved to Texas and subsequently helped institute an AE-based teaching program at the University of Texas Southwestern Medical Center at Dallas, in conjunction with Peter Lipsky, MD. The format and focus of this program differed somewhat from our program, i.e., strict attention to all elements of a complete musculoskeletal examination and one-to-one AE–student ratios, using a small number of AEs to slowly rotate through the class during the first semester of the second year. Nonetheless, the students at the University of Texas have consistently voted that sequence as among the best in the pre-clinical phase. By utilizing a concentrated (both temporally and spatially) small-group format, we were also able to achieve a high level of enthusiasm on the part of both AEs and students. While enthusiasm does not automatically lead to educational efficacy, it will likely increase the impact of the experience and may be reflected in the observed shifts in student attitudes and confidence as well as in their open-ended comments.

The present study extends previous research efforts by emphasizing the integration of arthritis patients into the standard educational program of all second-year students. We show that the use of arthritis patients as educators is highly effective in changing student knowledge and attitudes and demonstrates the feasibility of instituting such a program on a large scale within a fairly limited period of curricular time. Many of these effects appear to persist at an educationally important level at the end of the third year of medical school.

However, the magnitude of the task (providing small group sessions for approximately 200 students over a 3-day period) imposed limitations on the complexity of the evaluation design and assessment methods. These limitations prevented the measurement of some important outcomes, such as the actual performance of the joint examination as well as more sophisticated knowledge dimensions. The relatively modest response rate in the student evaluation may also have limited the generalizability of the results and might have introduced biases if the respondents were more favorably disposed to the program than nonrespondents. However, the high degree of correspondence among pre-program respondents who either did or did

not provide post-program responses would suggest that this effect may not be marked. Finally, the evaluation instruments, while focused on the goals and objectives of the arthritis educator sessions, may have been influenced by some of the effects of the contiguous lectures, although the removal of the computerized case simulations in the second class does not appear to have altered the results between the two samples. Similarly, the relatively good performance in the 1-year followup assessment may reflect learning from other sources, particularly clinical experiences, in the intervening time period in addition to the long-term benefits of the AE program. Unfortunately, similar data were not collected prior to the institution of the AE program in order to provide a historical control group, nor was it feasible to build a nonintervention control group into the current curriculum. The lack of a control or comparison group clearly hinders the ease with which these results can be generalized.

In summary, this study suggests that patients with RA can be trained to effectively teach medical students the techniques of the full-body joint examination and, in the process, illustrate the clinical manifestations of RA in such a way as to significantly increase students' knowledge about RA, their confidence in performing the joint examination, their ability to identify the clinical signs of RA, and their awareness of and interest in the psychosocial aspects of the disease and its impact on people. These educational benefits also appear to persist. Although the training of the AEs is a significant undertaking, and the logistics of implementing such a program in a large medical school can be challenging, the educational benefits appear to be considerable. The further expression of the impact of this program on the students awaits further investigation, but the present results suggest that it exceeds that of traditional lectures. Indeed, as medical education curricula change to address policy demands and health personnel needs, particularly those related to increased ambulatory care, innovations such as the present use of patient educators to demonstrate the clinical manifestations of common illnesses may have added utility.

The benefits of such programs clearly need not be limited to the education of medical students. Potentially, AEs can be used in a variety of settings, for both educational and evaluation purposes. They can work with individual physicians, in small groups, or in relatively larger groups, although some of the educational benefits may diminish as the group size increases. Arthritis educators are also capable of combining an important remediation component with targeted evaluation activities because they are able to demonstrate and teach correct examination techniques to physicians or students who fail to meet a given evaluation criterion.

The fact that the AEs are symptomatic patients provides opportunities to use them in situations where actors are not feasible. For example, we have used a subset of these AEs to evaluate the performance of residents by inserting them unannounced into outpatient clinic appointments. The AEs were able to gather information on the residents' data-gathering skills and were not detected by the residents as being anything other than "real" patients. These uses and the nature and quality of the data collected by the AEs make them valuable tools whose use should be considered in a wide range of educational and evaluation activities in a variety of content domains.

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