

# The Relationship Among Health Literacy, Health Knowledge, and Adherence to Treatment in Patients with Rheumatoid Arthritis

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**Abstract** *Background:* Patients with poor health literacy often lack the knowledge needed to manage their treatment. *Objective:* The aim of this cross-sectional study is to determine whether health literacy is a predictor of health knowledge and/or adherence to medication treatment in patients with rheumatoid arthritis. *Method:* The study was completed in an urban, outpatient rheumatology setting. Health literacy was measured using the Test of Functional Health Literacy in Adults. The Arthritis Knowledge Questionnaire was modified to measure medication specific health knowledge, and the Morisky Medication Adherence scale was used to measure adherence. Researchers used regression analyses to determine if health literacy was a predictor of knowledge and/or adherence. *Results:* Participants ( $N=125$ ) had high mean health literacy scores. The average medication knowledge score was 0.73. Adherence to medication regimen was 0.84. Controlling for patient covariates, health literacy was positively associated with education, race, and age. In adjusted analyses, health literacy was a significant predictor of health knowledge but not adherence. Race, neighborhood income, and confidence with contacting provider about

medications were predictors of adherence. *Conclusion:* Study findings indicate that health literacy is independently associated with medication knowledge but not medication adherence in patients with rheumatoid arthritis. These results provide useful information for planning initiatives to support individuals with disease self-management.

**Keywords** health literacy · health knowledge · adherence to treatment

## Introduction

According to the American Medical Association, poor health literacy is a stronger predictor of a person's health than age, income, employment status, education level, and race [1]. Patients with low health literacy have less knowledge about how to manage their illness compared with patients who have adequate health literacy [29, 52, 58]. In the context of medication management, lack of knowledge leaves patients unable to recognize and respond to adverse side effects [9, 47]. This is particularly important for patients with rheumatoid arthritis who manage complex drug regimens.

While the influence of health literacy and health knowledge on the process of disease management is considered important, adherence to treatment is another important factor. Research findings of studies that pertain to the relationship between health literacy and adherence have been varied, despite a theoretical association [3, 10, 19].

In studies of patients with rheumatoid arthritis, anywhere from 5% to 35% of patients have less than adequate health literacy [6, 32, 48, 53, 56]. Walker and colleagues found health literacy to be significant and positively associated with health knowledge [56]. Other investigators have found low health literacy to be significantly related to increased

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**Level of Evidence:** Level II prognostic study. See levels of evidence for a complete description.

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anxiety and social deprivation in unadjusted analysis [21]. No research has yet explored the relationship between health literacy and adherence in rheumatoid arthritis patients.

The primary aim of this study was to determine if health literacy is a predictor of health knowledge and adherence to treatment in patients with rheumatoid arthritis.

## Methods

The study was cross-sectional. Primary concepts of interest were health literacy, health knowledge, and treatment adherence. Subjects were recruited November 2008 through May 2009 at three outpatient settings in an urban, acute care facility specializing in the treatment of musculoskeletal diseases. These settings were (a) private rheumatologist office practice, (b) rheumatology clinic, and (c) ambulatory infusion therapy unit. Patients included in the study were 18 years or older, reported a visual acuity of at least 20/50, the ability to read English, hear verbal instructions, had manual dexterity to complete instruments, were mentally coherent, and took medications for the treatment of rheumatoid arthritis.

One hundred fifty-seven patients were screened by the author (P.Q.) and a research assistant (K.P) and 125 enrolled (Table 1). Nine declined participation, 13 patients were willing but unable to participate due to time constraints, and 5 patients withdrew before completion of the instruments. Eighty-three percent of the sample was female, 71% was white, and 74% was college educated. All patients had health insurance, and more than half (67%) reported having rheumatoid arthritis for five or more years. Sixty-four percent of study participants lived in a neighborhood with a median income of less than \$50,000/year.

Most patients (82%) took five or more medications to treat their rheumatoid arthritis. Approximately, half the sample

reported taking nonsteroidal anti-inflammatory drugs, yet these medications were not listed in their ambulatory records.

Health literacy, health knowledge, and medication adherence were the main concepts of interest addressed in this study. Health literacy was measured using the brief version of the Test of Functional Health Literacy in Adults (TOFHLA). Health knowledge, specifically knowledge about medications, was measured using the Medication Knowledge Instrument (Appendix), adapted from the Arthritis Knowledge Questionnaire (AKQ) [12]. The Morisky Medication Adherence Scale was used to measure adherence with medication regimens [38]. Patient demographics potentially associated with the main concepts were measured including gender, time since rheumatoid arthritis diagnosis, age, race, years of education, household income, number of medications, and English as a primary language. A neighborhood resource variable was also created using median incomes listed by zip code, from the 2000 US Census Report. All other variables were obtained via a patient survey or chart review.

The brief version of the TOFHLA is a widely used instrument that measures reading comprehension (Cronbach alpha=0.97) and numeracy skills (Cronbach alpha=0.68) [42]. This version of the TOFHLA consists of 36 prose items and 4 numeracy items, each weighted to generate a continuous, cumulative score of 0–100. Categorical levels of health literacy (0–53, inadequate; 54–66, marginal; and 67–100, adequate) were also calculated consistent with TOFHLA scoring procedures.

Health knowledge was measured using a questionnaire adapted from the AKQ [12]. The original instrument was based upon the Arthritis Self-Help Book [33] and consisted of three subscales that covered the item domains of self management, general arthritis, and rheumatoid arthritis. Items were phrased at a reading level of grade 7.6 using the Flech technique [16]. The instrument is internally consistent (Cronbach alpha=0.84) and reliable ( $r=0.92$ ,  $p<0.001$ ) using parallel testing. Researchers also validated the instrument by comparing pre and post scores after a patient education intervention that demonstrated an increase in knowledge gained on the self-management ( $p<0.001$ ) and rheumatoid arthritis subscales ( $p<0.0001$ ). For this study, a panel of rheumatologists and nurse specialists modified the AKA instrument to focus on medication specific items. Items included questions about medication prescribed to treat rheumatoid arthritis relative to purpose, allergies, side effects, and management of nonprescription drugs. Two additional items specific to biologic agents were added to those abstracted from the AKA to yield a 16-item criterion based instrument. All items were reviewed for current relevance using an updated version of the Arthritis Self-Help book [34]. A total medication knowledge score was calculated as the number of correct responses proportional to the number of answers relevant to the participant's experience with the drug referenced in each question.

The Morisky Medication Adherence Scale is a four-item (yes/no) self-report instrument commonly used to measure adherence with medication regimens [38]. Researchers report that adherence varies with different methods of measurement [11, 22] and recommend more than one method be

**Table 1** Participant demographics

Participants (N=125)		Frequency	Percent
Gender	Female	104	83.2
Race/ethnicity	White	89	71.2
	Non-white	34	27.0
	Unknown	2	1.6
English	Primary language	109	87.2
	Secondary language	13	10.4
Education	No college	30	24.0
	College	54	43.2
	More than college	39	31.0
	Unknown	2	1.6
Insurance	Yes	125	100.0
Household income	<\$50,000	33	26.4
	\$50,000–100,000	28	22.4
	>\$100,000	34	27.2
	Prefer not to answer	22	17.6
	Unknown	8	6.4
Neighborhood Income	<\$50,000	80	64.0
	>\$50,000	45	36.0
Duration of Illness	<5 years	38	30.0
	>5 years	84	67.0
	Unknown	3	2.4

used. Additional methods of measurement (i.e., pill counts) were not practical for this study. The Morisky Scale was selected because it is easy to complete and demands on participant time and effort are minimal.

Two items were developed to learn more about the patient–provider relationship, a factor associated with adherence [13, 15, 30, 36, 51, 54, 55]. Items were developed by researchers and reviewed for relevancy by several rheumatologists and nurses at the study setting. The behavioral framework used to develop these questions was adapted from the National Institutes of Mental Health [4]. The first item lists varying levels of patient involvement in medication decision making, (i.e., “My doctor makes all the decisions about the medications I take” versus “I, together with my doctor, make decisions about the medications I take”). The second item required participants to rank their confidence about contacting their physician with medication related questions by marking a visual scale ranging from 0 to 100.

### Statistical Analysis

An a priori power analysis was conducted using a moderate effect size, based upon findings of a cross-sectional study ( $N=469$ ) that examined health literacy, asthma knowledge, and performance of respiratory inhaler technique [57]. Using this effect size ( $r^2=0.13$ ) as well as the recommendation of 10 subjects per predictor [41], a sample size of 125 participants was estimated for a power of 0.81 and alpha of 0.05.

Descriptive statistics and distributions of each variable were examined. ANOVA and chi-square tests were used to estimate differences in health literacy, health knowledge, and adherence according to patient demographics. Forward stepwise, multiple regression was used to evaluate the independent relationship between health literacy, patient factors, and health knowledge. Logistic regression was used to determine predictors of adherence.

Data were stored using in a database supported by the Cornell Translational Science Center (Grant UL11RR024996). All analyses were conducted using SPSS 17.0 for Windows (Chicago, IL, USA). The study was approved by the Hospital for Special Surgery Institutional Review Board.

### Results

Seventy-eight percent ( $n=96$ ) of the sample received information about their rheumatoid arthritis medication from doctors, 25% from pharmacists, and 19% from nurses (Table 2). Fifty-eight percent of participants reported that they obtained medication information from the Internet, 40% from brochures, and 27% from the Arthritis Foundation. Twelve percent of patients reported obtained their information from television. Five percent reported attending an education class and 5% secured their information from friends. Eighty percent of participants reported that they were 90–100% confident in their ability to contact their physicians with questions about their medications. Eighty-one percent reported making medication decisions jointly with their provider. Eighteen percent

**Table 2** Medication information sources

Information source	Percent of patient sample ( $N=125$ )
Physicians	78
Internet	58
Brochures	40
Arthritis foundation	27
Pharmacists	25
Nurses	19
Television	12
Friends	5
Education class	5

reported that their doctor made all decisions about their medications; 10% ( $n=13$ ) of these were 65 years or older.

The sample had high health literacy levels (mean=90.8,  $SD=13.8$ ). In this study, the TOHFLA was found to be internally consistent (Cronbach alpha=0.91). One hundred sixteen (93%) participants had adequate literacy (67–100). Five (4%) participants had marginal literacy (54–66), and four (3%) had inadequate literacy (0–53). Due to the small number of participants in the inadequate and marginal literacy levels, these two groups were combined into “limited literacy” for categorical analyses.

There were significant relationships between health literacy level and race ( $p=0.003$ ), education ( $p<0.001$ ), neighborhood income ( $p=0.026$ ), disease duration ( $p=0.011$ ), and recruitment location ( $p=0.035$ ) (Table 3). In the multivariable analysis, the total health literacy continuous score rather than the categorical variable was used as dependent variable as the latter was statistically impractical to use given the small number of participants in the limited literacy category. Education ( $B=0.383, p<0.001$ ) and race ( $B=0.295, p=0.001$ ) were associated with health literacy and age ( $B=-0.192, p=0.017$ ) was inversely associated with health literacy.

The mean health knowledge score was 0.73 ( $SD=0.26$ ) out of a possible score of 0–1. Instrument reliability was assessed by coefficient alpha and was internally consistent (Cronbach alpha=0.86). Percent correct responses for each knowledge item and the corresponding percent of the sample to which the item was relevant are presented in Table 4. Correct responses of 50% or less pertained to items such as the purpose of disease modifying drugs, side effects of steroids, as well as the purpose and side effects of biologic agents. There was significant group variation in health knowledge. Knowledge scores were higher for younger participants versus those 65 years old or greater ( $p=0.01$ ) as well as white versus non-white groups ( $p<0.001$ ). Higher scores were also noted in better neighborhood income levels ( $p=0.018$ ), household income levels ( $p<0.001$ ), and education levels ( $p<0.001$ ). Health knowledge was significantly different between groups that reported English as their primary language versus those who did not ( $p=0.003$ ). In multivariable analysis, four factors were independently associated with health knowledge: health literacy ( $B=0.266, p=0.002$ ), income greater than \$100,000 per year ( $B=0.218, p=0.008$ ), age ( $B=-0.233, p=0.004$ ), and graduate school education ( $B=0.258, p=0.004$ ).

**Table 3** Relationship between health literacy level and patient characteristics

	Total patients	Adequate	Limited	<i>p</i> value
Age	125			0.737
<65		71 (57%)	5 (4%)	
≥65		45(39%)	4 (44%)	
Gender	125			0.991
Male		20 (16%)	1 (0.8%)	
Female		96 (82%)	8 (89%)	
Race	125			0.003*
White		87 (75%)	2 (22%)	
Non-White		29 (23%)	7 (6%)	
Education	123			<0.001*
Less than college		22 (18%)	8 (7%)	
College		53 (43%)	1 (0.08%)	
More than college		39 (31%)	0	
Household income	95			0.415
<\$50,000		3 (4%)	30 (36%)	
>\$50,000		3 (4%)	59 (71%)	
Neighborhood income	125			0.026*
<\$50,000		71 (57%)	9 (7%)	
>\$50,000		45 (35%)	0	
Duration	122			0.011*
RA≥5 years		82 (66%)	2 (2%)	
RA<5 years		32 (26%)	6 (0.05%)	
Location	125			0.035*
Private practice		46 (32%)	1 (1%)	
Infusion unit		47 (38%)	3 (2%)	
Clinic		23 (18%)	5 (4%)	
Language	122			0.203
English as primary		103 (82%)	6 (5%)	
English as secondary		11 (.09%)	2 (22%)	

\**p*<0.05

The mean overall adherence score was 0.84 (SD=0.21) out of a possible score of 0–1.00. Nonadherence was most often attributed to forgetting to take medicine (Table 5). Briggs and Cheek [5] recommend inter-item reliability statistics to assess short scale instruments. Optimal correlations (0.2–0.4) were present for all items with the exception of

**Table 4** Item summary of participant health knowledge scores

Health knowledge item	% Correct	% Relevant
Rheumatoid arthritis cause	83.2	100.0
Allergies to medications	65.6	100.0
Management of non-prescription medications	73.6	100.0
Medications and fatigue	64.0	100.0
Action if medications are slow to work	88.8	100.0
Pain management	71.2	97.6
NSAIDS purpose	69.6	94.4
Aspirin and NSAID action	54.4	94.4
DMARD purpose	46.4	92.8
Methotrexate purpose	92.8	91.2
Steroids purpose	83.2	84.0
Steroid side effects	39.2	83.2
Acetaminophen purpose	79.2	82.4
Biologic drugs purpose	33.6	66.4
Biologic agent side effects	44.8	67.2
Plaquenil onset of action	17.6	36.0

*N*=125

*NSAIDS* nonsteroidal anti-inflammatory drugs, *DMARD* disease modifying anti-inflammatory drug

**Table 5** Participant responses to adherence questions

Adherence scores <i>N</i> =125	Response=No
Sometimes stop taking when feeling better	90.4% (113/125)
Sometimes stop taking when feeling worse	90.2% (114/125)
Sometimes careless about taking medicine	89.6% (112/125)
Sometimes forget to take medicine	64.8% (81/125)

“Sometimes if you feel worse when you take your medicine do stop taking it?” This item was removed from the scale for bi- and multivariate analyses. Bivariate analysis noted significant group differences in adherence for race (*p*=0.017). In multivariable analysis, three significant predictors of adherence were identified, race [OR=0.22, 95% CI (0.059–0.856); *p*=0.029], neighborhood income, [OR=0.34, 95% CI (0.128–0.887); *p*=0.028], and confidence with contacting provider [OR=1.027, 95% CI (1.000–1.055); *p*=0.051]. Health literacy (*p*=0.896) was not a significant predictor.

### Discussion

This study examines the relationship between health literacy, medication-related health knowledge, and adherence in patients with rheumatoid arthritis. The study expands upon previous work with rheumatoid arthritis patients using multivariable analysis.

This study has strengths including the use of multiple controls for patient demographics and a fairly high response rate. A limitation is the lack of diversity in the sample. The sample in this study was largely white, female, well educated, and health literate from a single urban medical center. Consequently, comparison of health knowledge and adherence by level of health literacy was not possible. An additional limitation is the use of a single adherence measure. Nevertheless, the findings are important.

The predominance of female subjects in our study sample is comparable to published prevalence specific to rheumatoid arthritis [23, 49]. The overall high level of health literacy in rheumatoid arthritis patients has also been reported by others [6, 24]. Education, race, and age were independently associated with health literacy in multivariable analyses, which is consistent with results found in the literature [2, 25, 40, 44, 45, 52]. We found an independent association between health knowledge and health literacy. This association is similar to the findings of others [2, 3, 9, 29, 40, 57, 58]. Also consistent with previous literature, health knowledge was independently associated with education, income, and age [7, 26, 37].

In this sample, adherence was high, which is typical of rheumatoid arthritis patients [11]. We did not find health literacy to be a predictor of adherence. This relationship has been inconsistent in patients with other chronic diseases [17, 18, 31, 39, 46]. Reasons may include varying beliefs about the role or effect of medication that are different in each disease context [14, 51, 54]. For patients in this study, physiologic effects of

medication on symptoms of pain and deformity may have influenced adherent behavior apart from health literacy, but symptoms were not included as study variables. An additional factor that could explain the lack of association between health literacy and adherence is that patients can carry out medication directions without understanding the purpose, action, or side effects of drugs [45]. Compliance without understanding, however, can compromise patient safety because patients need to recognize and act upon side effects.

Confidence in contacting providers, neighborhood income and race were significant predictors of adherence. Patient–provider relationships and communication are known to be associated with adherence [13, 15, 55]. The significance of neighborhood income suggests that adherence also depends upon access to resources. This notion was supported in results from a cross-sectional study of 200 rheumatoid arthritis patients wherein financial status was associated with higher levels of adherence [36].

Research findings pertaining to an association between race and adherence in patients with rheumatoid arthritis is mixed [20, 28, 43]. In a recent, cross-sectional study ( $N=450$ ) of Medicare enrollees, researchers found that African-American seniors were more than twice as likely (AOR=2.49; 95% CI 1.07–5.80) not to follow medication instructions than white seniors. These researchers used a short, three-item, self-report subscale. They found no differences by race with respect to forgetting to take (COR=0.90; 95% CI 0.61–1.31) or running out of medication (AOR=1.60; 95% CI 0.74–3.42) [20]. In a second study of diabetic patients ( $N=398$ ), researchers used path analyses to find that African-American race was associated ( $r=-0.10$ ,  $p<0.05$ ) with adherence and that health literacy reduced the race effect ( $r=0.09$ ,  $p=0.14$ ) [43].

Health care implications related to the results of the medication knowledge findings include a need for better patient understanding of medication allergies and side effects. Patients should be instructed about the purpose of these drugs as part of their personal plan of care. Self-care teaching should include interactive coaching with respect to medication management. Techniques such as return demonstration of medication self-administration or “teach back,” a method that requires patients to repeat medication instructions in their own words, can serve to improve patient understanding. Intensified medication education, self-management, and coaching should include patient safety instruction. Fifty percent of patients in this study reported taking aspirin, NSAIDs, or acetaminophen, yet these drugs were not listed in their respective medical records. Perhaps, patients did not report these drugs as they are nonprescription; however, these drugs have concomitant effects with other medication as well as side effects and it is important that providers be informed about their patients taking them. Efforts to document complete medication histories that include over the counter drugs should be encouraged in the primary care setting.

In their Cochrane overview of systematic reviews, Ryan and colleagues [50] describe consumer-oriented interventions to influence medication use. They found that studies that employ multimodal strategies to improve knowledge and adherence to be most effective. Multimodal strategies include provision of medication information combined with supported self-management, skills training, simplified dosing, and/or direct involvement by pharmacists. Only 25% of participants in our study obtained their drug information from pharmacists. Ryan’s review of the literature suggests a greater role for pharmacists in patient education and coaching. Additional, less studied but promising strategies were financial incentives and supportive coaching strategies using lay health workers.

The National Center for Chronic Disease Prevention and Health Promotion [8] has called for an increase in arthritis self-care programs. The Arthritis Self-Management Program is an example of a model that focuses on using information, communication skills, and behavioral change through peer support [35]. Although the program has published success, the influence on medication use has been minimal. A program that uses a behavior approach to instruction with an added emphasis on medication management may serve as a useful strategy to foster adherence. Inclusion of a pharmacist in the program development and implementation may also be beneficial. Based upon the study findings, these programs should also be targeted toward lower income neighborhoods that include minorities.

Patient–provider communication is an important factor towards improving health literacy and safe, self-care [27]. The patients in this study reported easy access to their providers. Many patients in the study noted that they communicated with their physicians via e-mail. This may make it easier for patients to ask questions without being rushed, provided patients are literate enough to use this means of communication. While the use of e-mail was not systematically assessed, exploration of this communication method may be an area for future research.

In conclusion, health literacy is one among multiple factors that may influence the ability of patients to build self-care knowledge. Therefore, it is important that teaching strategies include sensitivity to this component of patient learning. The majority of patients in this study were white and educated. Further studies of rheumatoid arthritis populations who are non-White and less educated are needed. Factors that make up good patient provider communication bear additional study to develop ways to enhance these relationships. In addition, future studies should consider other variables associated with adherence such as health beliefs, behavioral concepts, as well as pain and disability as these variables were not measured. Severity of disease measured by radiographs might also be considered. Experimental studies that measure the comprehension and adherence effects of best practice interventions in socioeconomic groups, which include the elderly; culturally diverse and minimally educated are also recommended.

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Each author certifies that his or her institution has approved the reporting of these cases, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participating in the study was obtained

## Appendix

### Selection 2: Medication Knowledge Questionnaire

The following are questions about rheumatoid arthritis and medications you may be familiar with. Read the questions carefully and circle the letter next to what you think is the **best** answer:

1. Rheumatoid arthritis is the result of:
  - a. Wear and tear on the body
  - b. The aging process
  - c. Too much or too little of some kinds of foods
  - d. A disorder of the body’s immune system
  - e. Don’t know
2. Pain is one of the biggest problems in arthritis. This can:
  - a. Never completely be controlled
  - b. Only can be controlled with some medication
  - c. Can be controlled by very few people using a combination of medication and other methods
  - d. Can be controlled by most people using a combination of medications and other methods
  - e. Don’t know
3. Steroids such as Prednisone or Medrol are used in arthritis to:
  - a. Help reduce the symptoms of arthritis
  - b. Increase the progress of arthritis
  - c. Cure arthritis
  - d. Make arthritis worse
  - e. Don’t know
4. Side effects of Prednisone:
  - a. Can include cataracts, brittle bones, muscle wasting and increased blood sugar
  - b. Can be reduced by keeping the dose low
  - c. Are most common with long-term use (more than a month)
  - d. All of the above
  - e. Don’t know
5. Disease modifying drugs often called DMARDs:
  - a. Modify the disease process
  - b. Work to prevent bone and joint deformities
  - c. Are not available without prescription
  - d. All of the above
  - e. Don’t know
6. Methotrexate is a/an:
  - a. Medication to treat blood sugar
  - b. Medication to decrease blood pressure
  - c. Multivitamin
  - d. Medication to reduce inflammation
  - e. Don’t know
7. Plaquenil usually begins to act:
  - a. Right away
  - b. Within the second or third dose
  - c. After about 6 weeks
  - d. In about 3–6 months
  - e. Don’t know
8. Allergies to medications:
  - a. Are very common
  - b. Will happen to anyone who takes too much of a medication
  - c. Are the same things as side effects
  - d. Are rare reactions that mean you should not use that drug again
  - e. Don’t know.
9. Non-steroidal anti-inflammatory drugs such as Advil or Motrin:
  - a. Reduce pain and swelling
  - b. Should not be relied on as the only treatment for rheumatoid arthritis
  - c. Can sometime cause stomach problems
  - d. All of the above
  - e. Don’t know
10. Two to four tablets of aspirin or non steroidal anti-inflammatory drugs:
  - a. Only reduce mild pain
  - b. Reduce inflammation
  - c. Fight infection
  - d. Help both pain and inflammation
  - e. Don’t know
11. Acetaminophen (Tylenol):
  - a. Helps reduce inflammation in arthritis
  - b. Only provides temporary relief of mild pain
  - c. Cannot be taken along with your other arthritis medication
  - d. Helps stop joint damage
  - e. Don’t know
12. Medications that you buy without a prescription:
  - a. Can sometimes interact with other medicines you may be taking
  - b. Should be mentioned to your doctor
  - c. Can sometimes be taken with prescribed medications
  - d. All of the above
  - e. Don’t know
13. If you are often tired because of your arthritis, you should:
  - a. Force yourself to carry on in spite of it
  - b. Recognize your limitations and talk about your problem with others
  - c. Alter your medications because they can be the cause of tiredness
  - d. Stay in bed until you feel better
  - e. Don’t know
14. If an arthritis medication does not work within a few days, you should:
  - a. Keep taking the prescription as it says and call your doctor
  - b. Probably be taking more of it

- c. Probably be taking something else with it
  - d. Consider exercising to speed up your system
  - e. Don't know
15. There are new drugs called 'biologics' available to treat rheumatoid arthritis. These drugs:
- a. Can be administered early in the disease
  - b. Are usually given by injection
  - c. Are expensive
  - d. All of the above
  - e. Don't know
16. The newer drugs have side effects that:
- a. Do not affect men
  - b. Destroy tooth enamel
  - c. Can result in getting an infection
  - d. Are not important
  - e. Don't know

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