Time to Treatment for New Patients with Rheumatoid Arthritis in a Major Metropolitan City

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ABSTRACT. ***Objective.*** To determine the proportion of patients with rheumatoid arthritis (RA) seen by rheumatologists and treated with disease-modifying antirheumatic drugs (DMARD) within 3 months of symptom onset, to determine where treatment delays occur, and to identify contributing factors.

Methods. A retrospective cohort study in which adult patients with RA, diagnosed between January 1, 2003, and May 31, 2006, were recruited from rheumatologists' offices to participate in a telephone survey and chart review. The percentage treated with DMARD within 3 months of symptom onset was determined, along with median times for delay. Factors contributing to the delay were explored using multivariable logistic regression.

Results. Our study included 204 patients. Within 3 months of symptoms, 22.6% (95% CI 16.8%, 28.3%) received DMARD and within 6 months, 47.6% (95% CI 40.7%, 54.4%). The median time from symptom onset to DMARD was 6.4 months [interquartile range (IQR) 3.3, 12.0] with a median time from RA diagnosis by a rheumatologist to DMARD of 0.0 months (IQR 0.0, 1.0). Higher baseline swollen joint counts resulted in earlier treatment. Age, sex, education, comorbidity, rheumatologist practice type, and years since the physician's graduation did not affect time to treatment.

Conclusion. Fewer than 25% of patients referred to rheumatologists were treated within 3 months of symptom onset. Identification of inflammatory arthritis and referral to rheumatologists are the key factors in timely care, because once patients are seen there is no delay to treatment. Future resources should be focused on development and evaluation of interventions to facilitate rapid triage, referral, and assessment by a rheumatologist. (First Release May 15 2011; J Rheumatol 2011;38:1282–8; doi:10.3899/jrheum.101315)

Key Indexing Terms:
RHEUMATOID ARTHRITIS ACCESS TO CARE HEALTH ACCESSIBILITY
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Rheumatoid arthritis (RA) is a systemic inflammatory disease in which inflammation in the joints can result in destruction, deformities, and functional disability[1,2]. Multiple studies have demonstrated that as little as a 12-week delay in initiating therapy may adversely affect disease activity, remission, functional capacity, and radiographic progression[3,4,5,6,7,8,9,10,11,12]. On this basis, there has been a shift in the therapeutic paradigm, with a consensus that disease-modifying antirheumatic drug (DMARD) therapy should be initiated as early as possible, preferably within 3 months of onset of RA[13,14,15,16,17,18,19].

Although we know that treatment should begin early, little is known about the reality of treatment initiation in clinical practice. The few reports that document time from symptom onset to initiation of DMARD demonstrate a significant delay that ranges from a median of 6 to 42 months[20,21,22,23]. This delay may be attributed to the patient (delay in presenting to family physician), to the primary care physician (PCP; lack of experience in recognizing inflammatory arthritis, delay in referral to a specialist), or to the specialist (long waiting list, delay in initiating therapy). Moreover, identification and diagnosis of RA may be difficult because of insidious presentation, widespread use of nonsteroidal antiinflammatory drugs (NSAID) that may mask symptoms, and the absence of pathognomonic features early in the disease[24]. Inappropriate referrals to other practitioners might further delay the referral process[25]. Finally, many family physicians are not comfortable prescribing DMARD[26,27], and many patients refuse treatment because of potential side effects.

Most studies looking at average time from symptoms to treatment in newly diagnosed RA cases were done prior to the change in practice toward early treatment, and have small sample sizes. Further, all published studies have been conducted at only 1 or 2 sites, leading to poor generalizability. Our primary objective was to determine the percentage of patients seen by participating rheumatologists in the greater Toronto area (GTA) and diagnosed with RA between January 1, 2003, and May 31, 2006, who were started on DMARD within 3 months of symptom onset. The secondary objectives were to determine the median time from symptoms to DMARD and components of the median time and to identify factors that lead to treatment within 3 months of symptom onset.

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MATERIALS AND METHODS

We did a retrospective cohort study of newly diagnosed patients with RA from rheumatologists' practices in the GTA (a catchment area of about 5 million people). The study was approved by the Research Ethics Boards of the University of Toronto and participating hospitals.

Rheumatologist and patient recruitment. A list of rheumatologists practicing in the GTA was obtained from the Canadian Rheumatology Association (CRA). Those meeting inclusion criteria and not having any exclusion criteria were sequentially invited to participate in the study until 15 rheumatologists were enrolled. Rheumatologist inclusion criteria included being an active member of the CRA and having an adult rheumatology practice in the GTA; having a general rheumatology clinic at least 2 half-days per week between January 1, 2003, and May 31, 2006; use of a computerized billing system; and having English as the primary language of practice. Exclusion criteria included affiliation with an early arthritis clinic and ongoing clinical or research training after January 1, 2003.

Rheumatologists were asked to identify all patients with RA diagnosed between January 1, 2003, and May 31, 2006, in their practice. This was done using the International Classification of Disease 9th edition (ICD-9) diagnostic code for RA of 714 in the rheumatologist's billing system between January 1, 2003, and May 31, 2006, and no previous billing record with a diagnostic code of 714 from January 1, 2001, to December 31, 2002. Of those identified, 30 from each practice were randomly selected for the study. Patients who met inclusion criteria and did not have any exclusion criteria were invited to participate. Inclusion criteria for patients included age ≥ 18 years, diagnosis of RA made by a rheumatologist after January 1, 2003, ability to comply with the study protocol, and provision of voluntary informed consent. Exclusion criteria included diagnosis of chronic juvenile onset RA, inability to answer questions in English, symptom onset before January 1, 1980, and principal residence outside Canada. Identified patients received a letter from their rheumatologist inviting them to participate in the study. Patients who did not refuse were subsequently contacted for verbal consent to participate in a telephone survey followed by a chart review. The randomization process was repeated in blocks to replace patients who declined until a target of 30 patients per rheumatologist was enrolled or until the list of potential patients of that rheumatologist was exhausted.

Sample size calculation was done prior to initiating our study. From literature in the United Kingdom[20,21], we expected < 20% of patients to be treated within 3 months of symptom onset. With a 95% CI and aiming for a total width of the CI of 0.10, a sample size of 246 patients was required.

Data collection. Using computer-assisted telephone interviewing, the following data were obtained from each patient: age, sex, ethnicity, education level, comorbidity, prescription drug plan coverage, family history of RA, date of onset of symptoms that led to the diagnosis of RA, date of first visit to a healthcare professional (HCP) for RA symptoms, type of HCP initially seen, action implemented by first HCP, date of referral to rheumatologist, date of first rheumatologist appointment, time to initiation of DMARD, and DMARD currently and previously used. Data from the patient survey were entered directly into a secure Internet database. Although interviewers had a general idea of the purpose of the study, they were blinded to specific objectives and hypotheses being tested.

The rheumatologists' charts of participating patients were reviewed blinded to the results of the interviewer-administered telephone questionnaire, and the following data were collected: date of symptom onset, date of physician referral, type of physician who referred the patient, date of initial rheumatologist appointment, date of diagnosis of RA by a rheumatologist, date of first DMARD prescription, prescriber type of first DMARD, whether patient refused to take a DMARD, and baseline disease characteristics such as joint counts [tender joint count (TJC) and swollen joint count (SJC)], rheumatoid factor (RF) positivity, inflammatory markers, and radiograph results.

Data analysis. For the primary objective, the percentage of patients started on DMARD within 3 months of symptom onset was computed along with 95% CI. This was determined using the symptom onset date from the chart, and also using the symptom onset date from the patient interview. The 2 percentages were compared in a sensitivity analysis. In an exploratory analysis, the percentage of patients started on DMARD within 6 months of symptom onset was also determined.

For the secondary objectives, median times from symptom onset to DMARD initiation and from diagnosis of RA to DMARD initiation were calculated along with interquartile ranges (IQR). In exploratory analyses, median time from symptom onset to first MD visit, first MD visit to rheumatology referral, rheumatology referral to rheumatology appointment, and rheumatology appointment to RA diagnosis were determined along with IQR (Figure 1).

A multivariable logistic regression model was used to determine factors associated with timely initiation of DMARD. The outcome was initiation of DMARD within 3 months of symptoms. The variables included in the model were age (continuous), sex, education (4 categories), ethnicity (6 categories), prescription drug plan coverage, comorbidity (based on the Self-Administered Comorbidity Questionnaire; continuous)[28], family history of RA (yes/no), RF status (positive/negative), baseline TJC (continuous), baseline SJC (continuous), and time since RA diagnosis at patient interview (3 categories). Rheumatologist factors including sex, type of practice (academic/community), geography of practice (6 categories), and years since graduation (dichotomized at the median). Each variable was first assessed in a univariate model. The univariate significance level was used to select variables for the multivariable model. To minimize omitting important variables, a less stringent cutoff point was used ($p < 0.2$). Variables were entered in the multivariable model in a stepwise fashion. Age and sex were kept in the model regardless of significance in the univariate regression. Model fit was assessed using Hosmer-Lemeshow goodness-of-fit statistic and discrimination was assessed using the C-statistic. Logistic regression modeling using generalized estimating equations was done to explore whether cluster sampling resulted in correlation between patients seen by each rheumatologist.

RESULTS

Rheumatologist and patient characteristics. Thirty-four rheumatologists were sequentially invited to participate in our study. Of these, 14 declined and 5 did not meet inclusion/exclusion criteria, resulting in 15 included rheumatologists. Reasons given for declining participation in the study included busy practices (n = 6), lack of resources (time and space; n = 5), and lack of interest in the project (n = 3). Of the 5 rheumatologists who consented to participate but were excluded, 2 did not have electronic billing systems, 1 was associated with an early arthritis clinic, 1 did not have 2 general rheumatology clinics per week, and 1 had a practice of patients who did not speak English (Table 1).

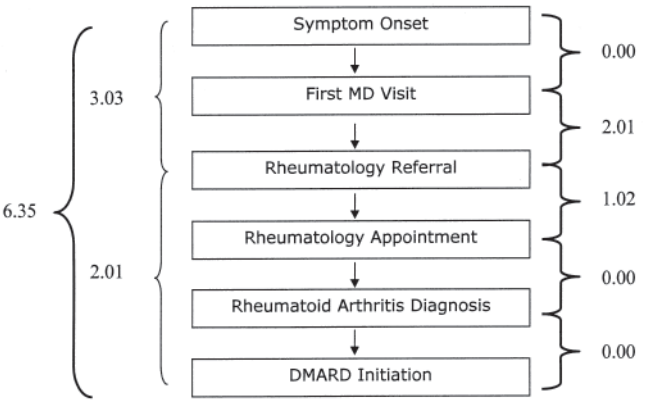

Figure 1. Median times to treatment (months). DMARD: disease-modifying antirheumatic drug.

Table 1. Characteristics of participating and nonparticipating rheumatologists.

Characteristic	Included	Not Included	
		Refused	Agreed to Participate But Did Not Meet Inclusion Criteria
Number	15	14	5
Female sex, n (%)	6 (40)	3 (21)	3 (60)
Academic practice, n (%)*	6 (40)	1 (7)	0 (0)
Years since graduation, median**	26	26	37

* Academic means tenure appointment with the department of medicine at a Canadian university. ** Calculated by subtracting from 2006 the year of graduation from medical school according to the 2006 Canadian Medical Directory.

A total of 399 patients were identified and invited to participate. Of these, 47 declined, 50 were excluded for not fulfilling inclusion/exclusion criteria, and 34 could not be contacted. Telephone interviews were completed with 268 patients. Reasons given by patients for refusing to participate in the study included lack of interest (n = 22), lack of time (n = 17), lack of financial compensation (n = 4), and other (n = 3). The most common reasons for exclusion included diagnosis of RA prior to January 1, 2003 (n = 27), inability to answer questions in English (n = 13), and diagnosis other than RA (n = 10). Chart reviews were conducted after completion of telephone interviews and a further 64 patients were excluded. Patients excluded at this stage had a diagnosis of RA prior to January 1, 2003 (n = 50), had a diagnosis other than RA listed in the chart (n = 10), or were treated outside the GTA (n = 4). In total, 204 patients from 15 rheumatologists were included in the final analysis. Of the 204 included patients, 199 had presented first to a physician and 5 to another healthcare professional (e.g., a physical therapist, chiropractor, etc.). Baseline patient characteristics are displayed in Table 2 and initial patient treatment patterns are shown in Table 3.

Treatment within 3 and 6 months. Of the 204 patients, symptom onset data were available for 203 patients, of whom 46 (22.6%; 95% CI 16.8%–28.3%) were treated with DMARD within 3 months of symptom onset and 97 (47.6%; 95% CI 40.7%–54.4%) were treated with DMARD within 6 months of symptom onset. When using the patient-reported symptom onset date from the telephone interview (instead of the date recorded during the chart review), 41 (20.1%; 95% CI 14.6%–25.6%) were treated within 3 months of symptom onset.

Times to treatment. The median time from symptom onset to DMARD initiation was 6.35 months (IQR 3.29–12.01) and the median time from RA diagnosis by a rheumatologist to DMARD initiation was 0 months (IQR 0.00–0.99). The median time from symptom onset to rheumatologist referral was 3.03 months (IQR 1.02–8.04) and the median time from rheumatologist referral to DMARD was 2.01 months (IQR 1.02–4.01; Table 4, Figure 1).

Predictors of timely treatment. Variables included in the multivariable regression model were patient age, sex, education, comorbidity score, and baseline SJC, and rheumatologist practice type and years since graduation (Table 5). Of these, only baseline SJC was found to significantly predict treatment with DMARD within 3 months of symptom onset, with an OR of 1.07 (95% CI 1.02, 1.12). The C-statistic of the final model was 0.68, and the Hosmer-Lemeshow test suggested good fit (p = 0.27), suggesting good model calibration and discrimination. When analysis was done considering cluster sampling, there was no clustering of results within individual rheumatologist practices (data not shown).

Table 2. Patient characteristics at first appointment with participating rheumatologist (n = 204).

Characteristics	n	%
Female sex	163	80
White	135	66
Postsecondary education	121	59
Prescription drug plan	168	82
Positive family history of RA††	51	25
Rheumatoid factor-positive	125	61
Baseline elevated CRP (n = 95)	33	35
Baseline elevated ESR (n = 194)	57	29
Started DMARD before seeing participating rheumatologist	17	8
Seen previously by another rheumatologist	25	12
Refused DMARD treatment	10	5
Age, yrs, mean* ± SD	55 ± 15.5	
Baseline tender joint count, median (IQR)	11 (5–20)	
Baseline swollen joint count, median (IQR)	5 (2–10)	
Comorbidity score**, mean (range)	5.5 (1–18)	
Modified comorbidity score†, mean (range)	1.61 (0–7)	
Time since symptom onset, yrs, median* (IQR)	2.65 (1.8–3.6)	
Time since diagnosis of RA, yrs, median* (IQR)	1.88 (1.2–2.6)	

* Taken at time of interview. ** Based on Self-Administered Comorbidity Questionnaire (range 1–36)[29]. † Based on Self-Administered Comorbidity Questionnaire (range 1–12) but including only diseases and excluding RA. †† Family history in first-degree relative based on patient interview. RA: rheumatoid arthritis; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; DMARD: disease-modifying antirheumatic drug.

DISCUSSION

In this cohort of patients with early RA in the GTA, 23% were

started on DMARD within 3 months and 48% within 6 months of symptom onset. The median time from symptom onset to initiation of DMARD was 6.4 months. The major lag occurs in the period between first healthcare professional visit and first rheumatology visit, corresponding to the time for the referring physician to initiate a rheumatology referral and the time waiting for a rheumatology appointment. Once seen by the rheumatologist, there is no delay to initiation of treatment. Baseline SJC was the only factor that was predictive of initiation of treatment within 3 months.

Our study population was similar to other cohorts of patients with early RA[29]. Our results were considerably better than those found by Potter, *et al* from the United Kingdom[20], in which only 6.5% of patients were treated with DMARD within 3 months of symptom onset. Van der Linden, *et al* found that 31.1% of patients referred to the Leiden (The Netherlands) Early Arthritis Clinic were assessed within 12 weeks of symptom onset[11]. These results might be better than ours, as they come from an early arthritis clinic that was specifically designed for rapid assessment.

A number of international studies have evaluated median times from symptom onset to DMARD initiation, with varying results. Similar to our study, most of these found the primary delay occurred in the time to specialist referral. Our findings of a median of 6.4 months from symptom onset are comparable to those of Sokka and Pincus[30] in the United States (median 5 months), Gray and Nuki[21] in Scotland (> 8 months), Reed, *et al*[31] in Australia (6 months in the private sector), and van der Linden, *et al* in The Netherlands (18.4 weeks)[11]. Other investigators have found much higher median times to treatment, including Jeyaratnam, *et al*[22] in the United States and United Kingdom (9–11 months); Chan, *et al*[32] in the United States (9 months to diagnosis); Hernandez-Garcia, *et al*[33] in Spain (19 months); and Cho, *et al*[34] in Korea (42 months). These differences can be partly attributed to differences in the underlying medical system (e.g., in Korea, the delay was attributed to first-line use of alternative therapy for joint symptoms) and differences in study design and conduct, such as number of sites included and dates of study. Many of these studies were done in the time before widespread acceptance of early, aggressive treatment for RA.

International studies have identified factors predictive of initiation of timely treatment. Hernandez-Garcia, *et al* found older age, higher education, home support, and higher baseline joint counts predictive of earlier referral to a rheumatologist[33]. In our study, although increased age and higher education showed trends toward predicting timely treatment, these were not statistically significant. Studies of referral patterns of PCP have reported mixed findings[32,35,36,37]. Some have shown that male sex and RF positivity lead to earlier refer-

Table 3. Treatment patterns by participating rheumatologists (n = 204).

Pattern	N	%
Any DMARD + glucocorticoid	55	27
DMARD only (no glucocorticoid)	143	70
Glucocorticoid only (no DMARD)	3	1.5
Biologics	0	0
Synovectomy	1	0.5
No treatment	2	1
Any glucocorticoid treatment	58	28
Oral prednisone	38	18.6
Intramuscular or intraarticular methylprednisolone acetate or triamcinolone acetonide	21	10.3
Any DMARD treatment	198	97.1
MTX monotherapy	81	39.7
HCQ monotherapy	73	35.8
SSZ monotherapy	20	9.8
LEF monotherapy	1	0.5
Other monotherapy (minocycline)	1	0.5
DMARD combinations	22	10.8
MTX + HCQ	13	6.4
MTX + SSZ	0	0
MTX + LEF	0	0
MTX, HCQ, SSZ	9	4.4

DMARD: disease-modifying antirheumatic drug; MTX: methotrexate; HCQ: hydroxychloroquine; SSZ: sulfasalazine; LEF: leflunomide.

Table 4. Time intervals to various stages from symptom onset to DMARD initiation (months).

Variable	Mean	Median	Maximum Value	Minimum Value	SD	IQR
Symptoms to DMARD	13.33	6.35	120	0	19.19	8.72
Symptoms to first MD visit	1.93	0.00	63	–9	8.13	2.01
First MD visit to rheumatology referral	6.56	2.01	119	0	13.36	7.01
Rheumatology referral to rheumatology appointment	1.64	1.02	14	0	2.10	1.84
Rheumatology appointment to RA diagnosis	1.38	0.00	30	0	4.31	0.99
RA diagnosis to DMARD	0.73	0.00	31	–5*	2.91	0.99
Symptoms to DMARD (data from patient interview)	15.00	7.01	281	0	26.81	11.09
Symptoms to first MD visit (data from patient interview)	3.39	0.00	277	–1	20.95	1.97

* Two patients were started on DMARD by general practitioner, before diagnosis of RA by a rheumatologist.
IQR: interquartile range; DMARD: disease-modifying antirheumatic drug; RA: rheumatoid arthritis.

Table 5. Traditional logistic regression to identify predictors of timely treatment (outcome = treatment within 3 months of symptoms).

Variable	Variable Type Reference	Univariate Model OR (95% CI)	p	Multivariable Model OR (95% CI)
Patient factors				
Age	Continuous	1.02 (1.00, 1.04)	0.12	1.00 (0.97, 1.03)
Sex	Women vs men	1.04 (0.46, 2.38)	0.92	0.79 (0.32, 1.96)
Education[1]	1 vs 4	1.90 (0.58, 6.17)	0.19	1.65 (0.45, 6.14)
	2 vs 4	1.63 (0.71, 3.72)		1.17 (0.47, 2.95)
	3 vs 4	2.65 (1.09, 6.47)		2.36 (0.91, 6.11)
Ethnicity[2]	1 vs 6	2.28 (0.64, 8.11)	0.27	
	2 vs 6	7.33 (0.99, 54.40)		
	3 vs 6	1.28 (0.26, 6.36)		
	4 vs 6	< 0.001 (< 0.001, > 999.9)		
	5 vs 6	4.89 (0.85, 28.08)		
Prescription drug plan	No vs yes	0.64 (0.25, 1.65)	0.36	
Comorbidity	Continuous (/39)	1.07 (0.97, 1.19)	0.17	1.06 (0.94, 1.19)
Family history of RA	No vs yes	1.08 (0.50, 2.32)	0.85	
Rheumatoid factor positivity	No vs yes	1.21 (0.62, 2.37)	0.58	
Baseline TJC	Continuous	1.04 (1.01, 1.07)	0.02	* *
Baseline SJC	Continuous	1.06 (1.02, 1.11)	0.01	1.07 (1.02, 1.12)
Time since RA diagnosis[3]	1 vs 3	0.60 (0.21, 1.74)	0.29	
	2 vs 3	0.50 (0.21, 1.19)		
Rheumatologist factors				
Women	No vs yes	0.71 (0.37, 1.37)	0.31	
Academic	No vs yes	1.96 (0.88, 4.37)	0.10	1.62 (0.67, 3.89)
Practice location[4]	1 vs 6	0.31 (0.09, 1.01)	0.32	
	2 vs 6	0.77 (0.24, 2.44)		
	3 vs 6	0.16 (0.46, 2.88)		
	4 vs 6	0.51 (0.17, 1.54)		
	5 vs 6	0.94 (0.29, 3.03)		
Years since graduation	< 26 vs ≥ 26	1.66 (0.85, 3.21)	0.14	0.81 (0.38, 1.70)

[1] Education: 1 = no high school, 2 = high school diploma, 3 = some postsecondary, 4 = completed postsecondary. [2] Ethnicity: 1 = White, 2 = Oriental/East Asian, 3 = South Asian, 4 = Aboriginal, 5 = African Canadian/Black, 6 = Other. [3] Time since RA diagnosis: 1 = ≤ 1 year, 2 = 1–3 years, 3 = ≥ 3 years. [4] MD practice location: 1 = University Health Network (Toronto), 2 = St. Michael's Hospital (Toronto), 3 = Mississauga, 4 = West of Toronto, 5 = East of Toronto, 6 = Toronto central. * Not included due to collinearity with SJC. RA: rheumatoid arthritis; TJC: tender joint count; SJC: swollen joint count.

ral[35,36,37]. In our study, these factors were not found to predict treatment initiation within 3 months. Our study suggests that baseline disease activity (based on SJC) rather than patient demographics is an important determinant of timely treatment.

Rheumatologist factors (type and years of practice) have not been evaluated in other studies. In our study, there was a suggestion of earlier treatment initiation by nonacademic rheumatologists, although this was not statistically significant. Possible explanations include more aggressive care by community rheumatologists, greater complexity of patients seen by academic rheumatologists leading to more difficulty and increased time to diagnosis, a higher number of second referrals in academic centers, and longer waiting lists.

There are a number of limitations with our study. It is a retrospective cohort study and chart review, with all the limitations of this study design including sampling, selection, recall, and measurement biases. As the study is focused on the GTA, results may not be generalizable to the rest of Canada (especially rural areas) or internationally. Our study is focused on English-speaking patients and results may not be generalizable to recent immigrants who do not speak English. These individuals may have other barriers to care that have not been addressed. Finally, this study reflects patterns of treatment initiation only for patients who are in the care of a rheumatologist, and does not consider patients treated by other physicians. Although we were unable to recruit the target sample size of 246 patients, we came close, with 204 patients. The lack of newly diagnosed patients with RA across 15 sites was surprising and may have been influenced by large numbers of followup but fewer new patients in participating rheumatology practices, and proximity to early arthritis clinics, where many of these patients are referred. The addition of 42 patients would have been unlikely to change results significantly.

Ours is the first published study to include multiple rheumatologists in different practice settings and their patients to determine access to treatment for RA. By randomly selecting both rheumatologists and patients, we tried to minimize

selection bias and enhance generalizability. By collecting both patient interview and chart data, we were able to accumulate information on patients, referring physicians, and rheumatologist components of the delay in treatment and perform a sensitivity analysis on the quality of data obtained from both sources, thereby minimizing measurement and recall bias. Although we recorded details of DMARD initiation (type and dose), this was not the focus of our study. Further research is needed to evaluate response to treatment and tight control of disease.

There are many steps to ensure timely initiation of therapy for patients with RA. Each step has its own inherent challenges. Although our results are better than those of most studies reported internationally, we found that over 75% of patients are not being treated within the recommended 3 months of symptom onset. To improve access, we need to implement programs at multiple levels. The major barrier in the timeline to treatment was found at the level of the family physician. To reduce this barrier, continuing education of family physicians is required, with screening tools to facilitate timely referral. Public education to demand earlier referral may also be useful. Alternatively, novel models of care using other healthcare professionals in extended roles, telehealth, and other strategies may also be necessary. These would function to assist primary care physicians. The other barrier to timely treatment was the wait for a rheumatologist appointment. This component of the delay may be improved with a comprehensive referral letter and more effective communication between family physicians and rheumatologists. Early arthritis clinics may also have some utility. In the future there may be further challenges if the number of practicing rheumatologists in North America continues to decline. It is clear from our research that once patients are seen by a rheumatologist, there is no delay to diagnosis and treatment. Future resources should therefore be focused on interventions to facilitate rapid triage, referral, and assessment by a rheumatologist. These should then be further assessed and evaluated using randomized controlled trials where possible.

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