The Effect of Triage Assessments on Identifying Inflammatory Arthritis and Reducing Rheumatology Wait Times in Ontario

Vandana Ahluwalia, Sydney Lineker, Raquel Sweezie, Mary J. Bell, Tetyana Kendzerska, Jessica Widdifield, Claire Bombardier, and the Allied Health Rheumatology Triage Investigators

ABSTRACT. ***Objective.*** We evaluated the influence of triage assessments by extended role practitioners (ERP) on improving timeliness of rheumatology consultations for patients with suspected inflammatory arthritis (IA) or systemic autoimmune rheumatic diseases (SARD).

Methods. Rheumatologists reviewed primary care providers' referrals and identified patients with inadequate referral information, so that a decision about priority could not be made. Patients were assessed by an ERP to identify those with IA/SARD requiring an expedited rheumatologist consult. The time from referral to the first consultation was determined comparing patients who were expedited to those who were not, and to similar patients in a usual care control group identified through retrospective chart review.

Results. Seven rheumatologists from 5 communities participated in the study. Among 177 patients who received an ERP triage assessment, 75 patients were expedited and 102 were not. Expedited patients had a significantly shorter median (interquartile range) wait time to rheumatologist consult: 37.0 (24.5–55.5) days compared to non-expedited patients [105 (71.0–135.0) days] and controls [58.0 (24.0–104.0) days]. Accuracy comparing the ERP identification of IA/SARD to that of the rheumatologists was fair (κ 0.39, 95% CI 0.25–0.53).

Conclusion. Patients triaged and expedited by ERP experienced shorter wait times compared to usual care; however, some patients with IA/SARD were missed and waited longer. Our findings suggest that ERP working in a triage role can improve access to care for those patients correctly identified with IA/SARD. Further research needs to identify an ongoing ERP educational process to ensure the success of the model. (First Release October 1 2019; J Rheumatol 2020;47:461–7; doi:10.3899/jrheum.180734)

Key Indexing Terms:
HEALTH SERVICES NEEDS AND DEMAND TRIAGE RHEUMATIC DISEASES
CONNECTIVE TISSUE DISEASE QUALITY IMPROVEMENT RHEUMATOLOGY

Early treatment of inflammatory arthritis (IA) or systemic autoimmune rheumatic disease (SARD) may lead to improved patient outcomes. However, delays can occur at several points along the continuum of care, such as from referral to rheumatologist first visit or from rheumatologist first visit to the start of a disease-modifying antirheumatic drug (DMARD)[1,2] regimen. The Canadian Rheumatology Association's benchmarks for wait time between referral and rheumatologist consult for adults range from 4 to 12 weeks depending on the type of IA[3]. In Ontario, Canada, however, the median time between referral and first rheumatologist consult significantly exceeds the recommended benchmark[2]. Addressing such discrepancies is not straightforward. Milne, *et al* (2017) suggest that "long wait times defy quick fixes" and that the solution will involve a system-wide approach[4].

Triage of patients referred to rheumatologists has been suggested as one way of addressing the wait-time issue at the system level[5]. Triage is the process of efficiently and correctly identifying the urgency of a patient's disease state, and may help prioritize patients for rheumatology consultation[6,7]. Triage processes vary greatly in the literature[8,9]. Face-to-face triage might include a short assessment of a patient's disease status, a standardized joint assessment, limited medical history, referral for laboratory testing and

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V. Ahluwalia, MD, FRCPC, William Osler Health System; S. Lineker, PhD, Arthritis Society; R. Sweezie, PhD, Arthritis Society; M.J. Bell, MD, FRCPC, Sunnybrook Health Sciences Centre; T. Kendzerska, MD, PhD, The Ottawa Hospital Research Institute, University of Ottawa; J. Widdifield, PhD, Sunnybrook Research Institute, Institute for Clinical Evaluative Sciences, Institute of Health Policy, Management and Evaluation, University of Toronto; C. Bombardier, MD, FRCPC, University of Toronto.

Address correspondence to Dr. V. Ahluwalia, 314-40 Finchgate Blvd., Brampton, Ontario L6T 3J1, Canada. E-mail: vandana@sympatico.ca

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imaging, plus or minus education and referral to community resources. Triage has shown good predictive value regarding diagnostic accuracy for patients with musculoskeletal conditions[10,11,12,13,14,15], and patients are generally highly satisfied with the process and the care they receive during the triage visit[8,10,11,16,17,18]. However, there is limited evidence evaluating triage processes in community rheumatology practices and their effect on system-level outcomes such as wait times.

In the context of the increasing prevalence of arthritis in Canada and the inadequate number of rheumatologists[19], it is imperative to examine models of care that can improve the efficiency of the healthcare system. In this study, we implemented a quality improvement initiative to evaluate the potential system-level effect of an extended role practitioner (ERP) working in a triage role on improving access to rheumatologists. ERP are typically health professionals who undertake postgraduate training in an area of clinical interest to work beyond their normal scope of practice, often in nontraditional roles or under medical directives. We hypothesized that patients with possible IA/SARD who were assessed and triaged by an ERP would receive more timely care than those patients who were directly seen by the rheumatologist, as measured by the number of days between primary care referral and (1) first rheumatologist consult and (2) treatment decision. We also compared the ability of ERP to identify IA/SARD with that of the rheumatologists at the first consultation visit.

MATERIALS AND METHODS

This was a multisite quality improvement initiative involving 2 prospective cohorts (expedited and non-expedited intervention groups) and a usual care control group identified through a retrospective chart review.

Rheumatologist and ERP participants. Rheumatologists were eligible to participate if they were Ontario Rheumatology Association members in Ontario, Canada, and did not have allied health professionals supporting their practice. They agreed to provide access to their patient charts and were willing to delegate laboratory and diagnostic imaging requests using medical directives.

Participating ERP were physical (PT) or occupational therapists (OT) with Advanced Clinician Practitioner in Arthritis Care (ACPAC) program training employed by the Arthritis Society in Ontario. The ACPAC program is a national post-licensure academic and clinical educational program[20] that prepares experienced therapists for extended practice roles through advanced training in the diagnosis and management of patients with arthritis. ERP and rheumatologists were paired based on geographical proximity. Prior to study commencement, the ERP and the rheumatologists attended a half-day of training to standardize joint assessment techniques, and the ERP spent time in the rheumatologist's office to become oriented to office procedures and the electronic medical records (EMR) software, and to help establish the working relationship with the rheumatologist.

Patient inclusion criteria. The patient intervention group consisted of a consecutive sample of adults, referred in the past month from a primary care physician or nurse practitioner. Rheumatologists were asked to identify those patients whose paper referral did not have enough information for the rheumatologist to establish a priority for a consult (e.g., joint pain, fatigue, positive antinuclear antibody). We defined these as "gray zone" patients and they were booked for ERP triage.

Exclusion criteria. Patients were excluded if they were clearly inflammatory or had osteoarthritis or local musculoskeletal conditions, because these patients could be booked based on the clinic's usual practice. They were also excluded if they had been seen by a rheumatologist in the past 5 years; had a preexisting diagnosis of fibromyalgia, soft tissue rheumatism, mechanical low back pain, or trauma; were currently taking a DMARD; were referred for a joint injection or second opinion; were emergent referrals; were referred from the emergency department or from another specialist; or were inpatients.

Once the study was completed in each office, we summarized the reasons for referral from the paper referral form for all patients assessed by the ERP. The usual care control group consisted of patients referred in the past year with similar reasons for referral and meeting the above inclusion/exclusion criteria, identified by a research coordinator (RS) through a retrospective chart review. We made the assumption that gray zone patients seen prior to the study would not be expedited.

Triage intervention. Rheumatologists identified gray zone patients on their waitlists to be booked with the ERP. The ERP established a clinic 1 day per week in each rheumatologist's office, where they provided assessment and triage. Patients were assessed by the ERP using standardized procedures and a data capture form that included demographic information, a chief complaint, a brief medical history, systems review, and functional status. ERP performed a full joint count (tender and swollen joints), ordered diagnostic tests (imaging or laboratory) under medical directives, provided education, and made conservative treatment recommendations that included referrals to community programs and services, as needed. ERP then made one or more differential diagnoses and a triage decision [i.e., expedited referral to the rheumatologist (within 2 weeks) or the next available appointment (routine care)]. The Alberta Central Referral and Triage in Rheumatology paper triage system was used as a guide for prioritizing referrals[21]. Referrals were expedited for the patients who had possible IA/SARD (polyarthritis with functional impairment, poorly controlled gout, polymyalgia rheumatica, connective tissue disease, temporal arteritis, or systemic vasculitis). However, given that this triage model was based on a more extensive face-to-face assessment, ERP were advised to expedite the referral if in doubt. Patients whose referrals were not expedited were advised to call if symptoms worsened.

At the end of the study (6 mos following primary care referral for each patient), the dates of primary care referrals and rheumatologists' consults, differential diagnoses, and treatment decisions were extracted from the EMR or chart by the research coordinator using a standardized data extraction form.

System-level outcomes. The primary outcome was wait time to rheumatologist consult in days, calculated from the date of primary care referral noted on the chart to the date of the rheumatologist's first visit. The secondary outcome measure was time from referral to treatment decision. A treatment decision could include prescription for nonsteroidal antiinflammatory drugs, corticosteroids, DMARD or other medications, no treatment at all, or no change to the treatment the patient was already receiving (as prescribed by the primary care physician).

Analyses. The patient, ERP, and rheumatologist characteristics were described using proportions, means (SD), or medians (interquartile range; IQR), as appropriate. We compared the ERP identification of IA/SARD with that of the rheumatologists at the first consult, based on those patients who received both an ERP and a rheumatologist assessment during the study time frame and calculated using positive and negative predictive values (PPV and NPV, respectively).

Primary and secondary outcomes were described using medians (IQR) and were compared between groups using the independent Wilcoxon rank-sum test with continuity correction.

A multilevel mixed-effects linear regression model was used to investigate an effect of intervention (3-level variables: expedited intervention group, non-expedited intervention group, and control group) on waiting time from referral to rheumatology consult, controlling for sex and age, and clustered by rheumatologist (site).

Sample size justification. Sample size was based on a continuous response variable (waiting time in no. days) comparing the independent control group and the experimental expedited intervention group. In previous studies, mean

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(SD) waiting times in controls ranged from 50 (63) days to 110 (57) days[15,21,22]. Because of expected skewed distribution of the mean waiting times, mean log and the SD of the log were used for the sample size calculation with the assumption that the log SD is the same for both groups. If the true difference in the experimental and control waiting time means is 10 days, we needed to study from 87 to 286 participants per group to be able to detect a difference between the experimental and control groups with probability (power) 0.8. The type I error probability associated with this test was 0.05.

Ethics approval for our study was obtained from the University Health Network (#15-9130-AE) and local institutional review boards.

RESULTS

Recruitment of rheumatologists was staggered over a 9-month period (April–December 2015). Thirty-five rheumatologists were invited to participate in the study, and 7 rheumatologists (3 hospital-based, 4 community-based) from 5 cities met inclusion criteria and agreed to participate (57% female; 57% community-based). Of those excluded, 11 already had health professional support in their office (38%), 5 (18%) were not located in an area served by an Arthritis Society ERP, 4 (14%) had wait times shorter than 2 months, 1 (4%) did not have space, 1 (4%) could not attend the training, 1 (4%) was retiring, and 5 (18%) could not be contacted. Five Arthritis Society ACPAC-trained ERP, each with over 10 years of experience in rheumatology, were involved in the study (100% female; PT: 57%; OT: 43%). Two ERP were recent graduates in 2014. One ERP graduated in 2011 and 2 ERP graduated in 2009.

Figure 1 outlines the study design, results of patient recruitment, and the 3 phases of evaluation: (1) Phase 1 examining agreement between the ERP and the rheumatologists regarding the identification of IA/SARD; (2) Phase 2 comparing wait times between patients expedited by the ERP and those not expedited; and (3) Phase 3 comparing wait times for the expedited and non-expedited patients to a usual care control group.

Three hundred and ninety grey zone patients were identified by the rheumatologists from their waitlists; 218 (56%) met inclusion criteria and received an ERP triage assessment visit (mean visit length: 42 min). Of these, 67% (n = 146) were female, mean age (SD) 52.7 (13.7) years. The ERP referred 168 patients (77%) for laboratory work and 120 (55%) for imaging. ERP also provided education (22%) and made referrals to community agencies (16%). No adverse events related to the ERP assessments were reported during the study time frame. The ERP suspected IA/SARD in 114 patients (52%) and of those, 94 (82%) were expedited for a rheumatology consult.

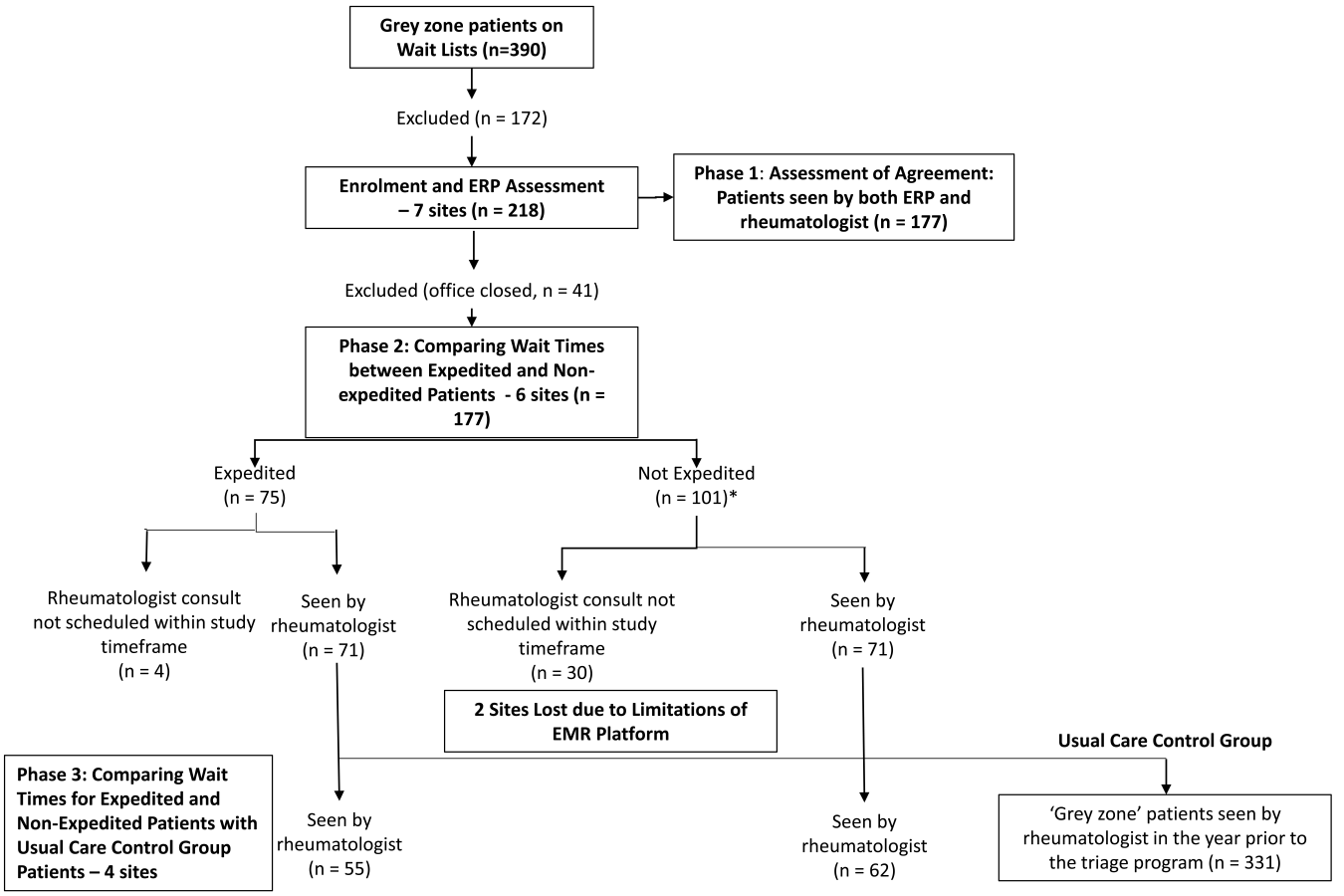

Figure 1. Study design, patient recruitment, and evaluation phases. ERP: extended role practitioner. * 1 missing.

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Phase 1: examining agreement between the ERP and the rheumatologists. In Phase 1, we examined the ability of the ERP to correctly identify patients with IA/SARD. Agreement was based on 177/218 patients who received assessments from both an ERP and a rheumatologist during the study time frame, regardless of whether they were expedited. For patients suspected by the ERP of having IA/SARD (n = 106), the ERP and the rheumatologist concurred in 84 patients (PPV = 0.79; Table 1). For those patients for whom the ERP did not suspect IA/SARD (n = 71), there was agreement in 42 patients (NPV = 0.59). The κ statistic was 0.39 (95% CI 0.25–0.53), indicating fair agreement. Sensitivity of the ERP triage assessment was 0.74 and specificity was 0.66.

Phase 2: comparing wait times between expedited and non-expedited patients. After the ERP assessments were completed, 1 office site closed (rheumatologist moved out of province), leaving 177 patients from 6 sites for the comparison of wait times between patients who were expedited (n = 75) and those who were not (n = 102). During the study time frame, 142 patients (80.2%) were seen by the rheumatologist (71 patients per group). Controlling for rheumatologist site, sex, and age, there was a significant difference in time to rheumatologist consult between the expedited and non-expedited groups (median of 37 days, IQR 24.5-55.0; and 105 days, IQR 71.0–135.0 respectively, $p < 0.01$; Figure 2). Time to a treatment decision also favored the expedited group: 36 days (IQR 23.0–44.0) versus 99 days (IQR 66.0–128.0) for the non-expedited group ($p \leq 0.01$).

Phase 3: comparing expedited and non-expedited patients to a usual care control group. Two rheumatologists from the 6 sites were unable to identify usual care control group patients through their EMR; therefore, 4 rheumatologists (1 hospital and 3 community-based sites) participated in Phase 3. A retrospective chart review identified 331 control group patients meeting inclusion/exclusion criteria. They had similar characteristics to the intervention group [72% female; mean age (SD) 53.6 (16.4) yrs)].

We compared the 331 control group patients to 55 patients expedited by the ERP and the 62 non-expedited patients (see Figure 1, Phase 3). The median wait time for a rheumatologist consult for expedited patients was 35 days (IQR 23.5–52.5), which was significantly less than the wait times for the non-expedited and the usual care control groups, which were 97 days, (IQR 67–127) and 58 days (IQR 24.0–104.0), respectively ($p < 0.01$; Figure 3). Time to a treatment decision favored the expedited group: 32 days (IQR 21.0–44.0) versus 97 days (IQR 65–126) for the non-expedited group and 56 days (IQR 24.0–100.8) for the controls ($p < 0.01$).

DISCUSSION

This study demonstrated that a PT or an OT with advanced arthritis training could improve access to rheumatology care for those patients with IA/SARD correctly identified and expedited through the physical triage process. Given that the project involved several independent rheumatologists from both community and hospital settings, we anticipate that these results will be generalizable, provided that an ERP with similar experience and training is in place. Our study found that, in addition to triage, the ERP initiated nonpharmacological interventions such as education and referrals to community resources. Qualitative interviews conducted with both expedited and non-expedited patients following the intervention confirmed that both groups valued the education they received, felt reassured and supported, and began to use self-management strategies while waiting to see the rheumatologist.

Compared to usual care, this model of care decreased rheumatology wait times for the expedited group by 40% and approached the benchmarks recommended by the Canadian Wait Time Alliance (4 weeks for RA)[3]. As expected, the non-expedited group waited longer than the usual care control group, making it important to correctly identify those patients with IA/SARD during the triage process.

Agreement between the ERP and the rheumatologists' differential diagnoses of IA/SARD was only fair. This is worrisome given that those patients with IA/SARD who were incorrectly identified would wait longer, in this case, 29 patients. This could be due to the lag time between the ERP and rheumatologists' assessments (i.e., a patient's clinical condition could evolve or resolve over time). For instance, patients could flare by the time they saw the rheumatologist or improve based on treatment previously initiated by a family physician. Widdifield, *et al* have shown that the majority of patients with SARD have received antiinflammatory medications prior to rheumatology referral[2].

We found only 1 other recently published study evaluating

Table 1. Agreement between the extended role practitioners (ERP) and rheumatologists' identification of inflammatory arthritis (IA) or systemic autoimmune rheumatic diseases (SARD).

	Rheumatologist			
ERP	IA/SARD = Yes, n	IA/SARD = No, n	Total n	
IA/SARD = Yes	84	22	106	PPV = 0.79
IA/SARD = No	29	42	71	NPV = 0.59
Total	113	64	177	
	Sensitivity = 0.74	Specificity = 0.66		

PPV: positive predictive value; NPV: negative predictive value.

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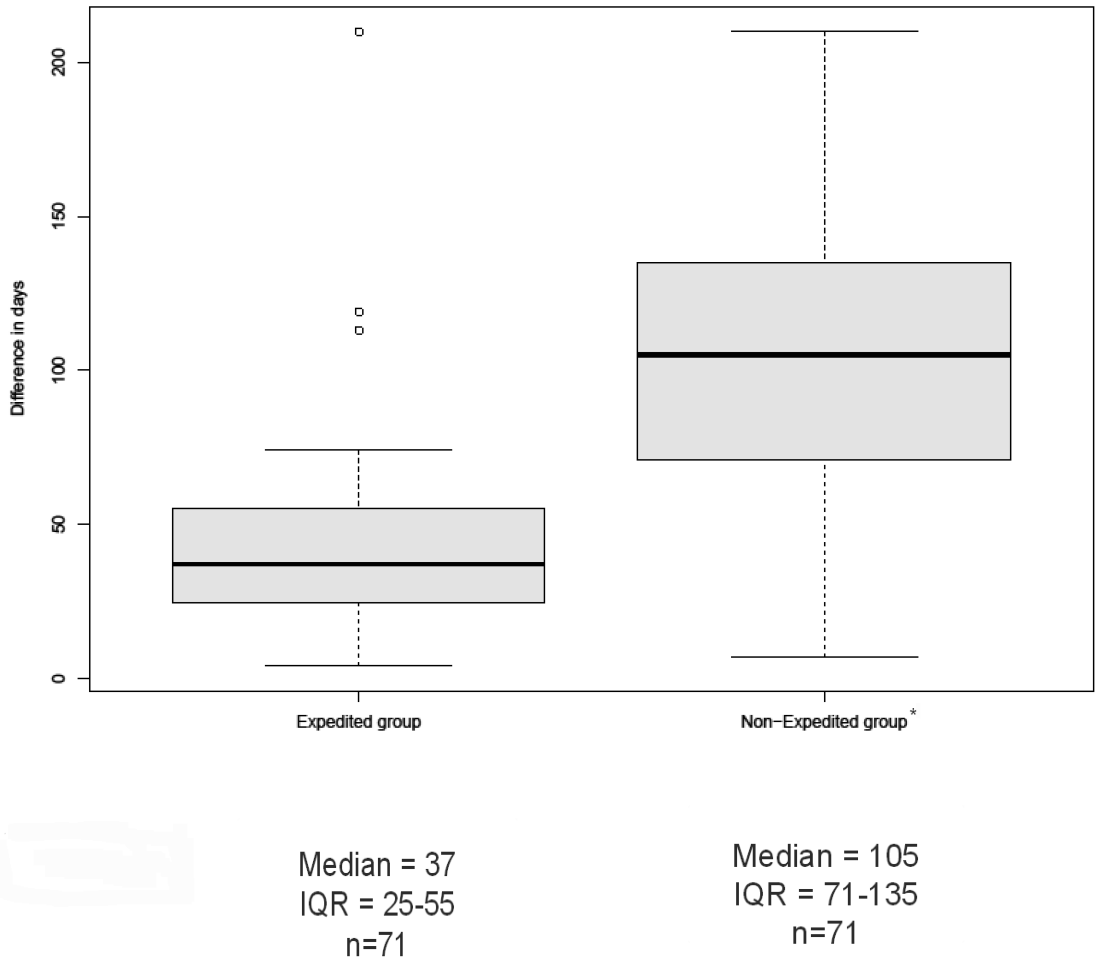

Figure 2. Median time between referral date and rheumatologist consult (difference in days) for expedited and non-expedited patients. * 1 missing. IQR: interquartile range.

a therapist with advanced practice training in a face-to-face triage role in a community rheumatology practice[23]. The authors (not participants in our study) reported excellent agreement between a single community-based rheumatologist and an ACPAC-trained ERP (κ = 0.92). In contrast to our study, the ERP and the rheumatologist had over 7 years of experience working together.

Other studies have typically assessed diagnostic accuracy using assessments that occur on the same day, understandably resulting in similar or higher levels of agreement[14,23]. Lack of agreement could also be due to the inexperience of the ERP (some were in a triage role for the first time), the new relationship between the ERP and the rheumatologist, or because training to standardize assessment techniques was minimal (3 h). Gormley, *et al* (2003) compared agreement between rheumatologists and general practitioners and nurses in an early arthritis clinic[14] and reported that agreement was good (κ = 0.77 and 0.79, respectively). However, training consisted of 4 half-days. Given these findings and the known variability in joint counts between assessors and over time[24] and decision-making patterns among rheumatologists[25], it might be interesting to explore whether agreement would improve with additional ERP training, either formal or through experience in a clinic. As well, the ERP only had laboratory and imaging results, if any, that accompanied the referral to aid them in making a diagnosis, while the rheumatologists had access to test results ordered by the ERP when they saw patients in consultation. This might favor the rheumatologist when confirming a diagnosis.

Various process issues affected study implementation and wait times. Scheduling issues included time taken by the rheumatologist to review and refer a patient to the ERP (paper triage), and time taken by clinic staff to schedule a patient's appointments with the ERP and the rheumatologists following triage. Wait times might be improved further if referrals were paper triaged and scheduled on the day they arrived, especially if this was done by the ERP themselves. Additionally, wait time realities included accommodating patients' schedules and cancellations and time off for the ERP and rheumatologists' illnesses, vacations, and professional development activities.

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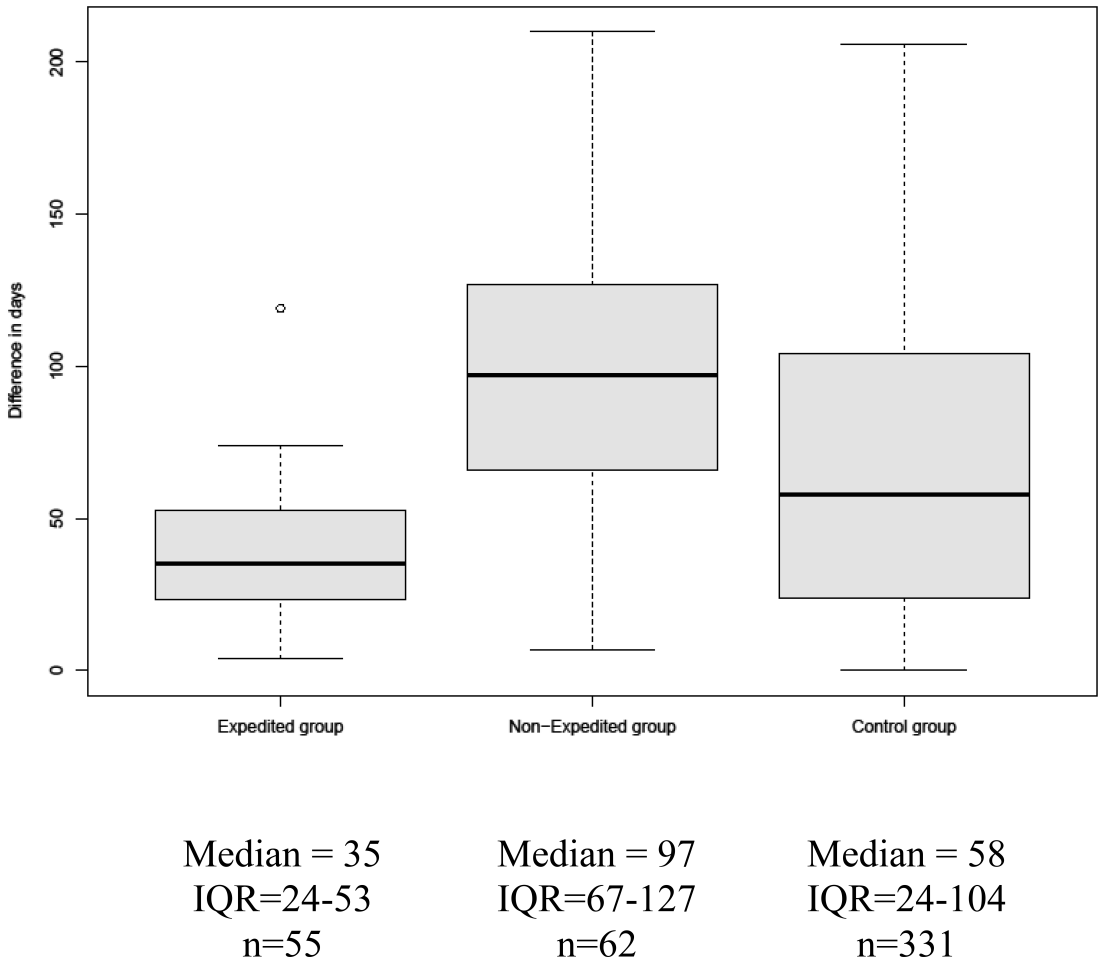

Figure 3. Primary outcome: wait times comparing expedited and non-expedited intervention groups with usual care control group. Median time is shown from referral to rheumatologist consult (days) for 4 sites only. IQR: interquartile range.

Study implementation was affected by events beyond our control, such as an office closure resulting in a rheumatologist moving out of province and limitations of different EMR platforms in the rheumatology clinics.

About half of the grey zone patients assessed in our study (48%) were not suspected by the ERP of having IA/SARD. Other studies have shown that a high proportion of people referred to a rheumatologist do not have an inflammatory condition[2,14,15,21]. This supports initiatives like ours to ensure that individuals with IA/SARD who are on waitlists are identified and seen promptly, and that resources are used effectively.

Limitations of our study include other confounders that might influence wait times (e.g., decreased volume of referrals or increased staffing such as medical residents during the study period). We tried to control for such factors by using a control group that included patients referred during the same time frame in the previous year.

Our study intervention was not implemented as per protocol in all cases; 20 patients suspected by the ERP of having IA/SARD were not expedited for reasons such as mild symptoms or patient preference (a type III error). Although we used the Alberta Central Referral and Triage in Rheumatology paper triage categories[21] as a guide, this was not a paper triage model. ERP were allowed to use clinical judgment in their decisions to expedite.

This study was limited to referrals from family physicians or nurse practitioners. Acceptance of referrals from other specialists, emergency departments, inpatients, and second opinions in future studies would broaden the generalizability of the model. Also, we did not examine disease-specific wait times or time to DMARD specifically in this study, given the small number of patients. These are possible topics to explore in future research.

The ERP triage assessment was long (average 42 min), possibly because of the educational component provided in addition to the triage assessment. We have no information from this sample of rheumatologists on their average time for assessing a new patient for comparison. There may be shorter and more efficient triage processes; however, the

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educational component of the intervention may then be lost.

While this research demonstrates the promise of this model of care, the model depends on the skill set and availability of ERP to fill these advanced practice roles. In addition, there may be other potentially less expensive ways to improve access to care for patients with IA such as the use of validated self-screening tools[24] and improving the quality of information on referrals[21,25].

There was good uptake of this triage method with 7 rheumatologists participating from a variety of community and hospital settings. ERP correctly identified a high number of patients with suspected IA/SARD for an expedited consult and access to care was accelerated for this group. Wait times to see a rheumatologist were improved for expedited patients compared to usual practice controls, with resulting improvements in time to treatment decision. However, some patients with IA/SARD were incorrectly identified and consequently waited longer for care. This suggests that the success of this model depends on ensuring that the ERP can correctly identify patients with IA/SARD. Adding a new team member such as an ERP requires an iterative educational process and the development of an effective working relationship. Further research is needed to explore this issue and to identify ways to improve upon this promising new model of care.

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