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A Prioritisation Tool for Rheumatoid Arthritis Referrals

Improves Access when Rheumatologists are Scarce

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Abstract:

Objectives: To assess whether applying the 2010 ACR/EULAR Classification Criteria for rheumatoid arthritis (RA) to primary care referrals improved triage decisions and reduced waiting times; and to determine the sensitivity and specificity of this strategy.

Methods: The 2010 ACR/EULAR Classification Criteria for RA were prospectively applied over 8 months to all new adult rheumatology referrals with possible inflammatory arthritis. If the referral contained insufficient information, a request was sent for more information. Joint count was based on GP report and definite swelling was not required. Referrals meeting triage criteria were offered an appointment within 6 weeks. Data was collected on rheumatologist diagnosis, DMARD use and waiting times.

Results: Of 457 referrals screened, 180 met inclusion and exclusion criteria, and 143 had sufficient data after requests for information. Seventy-one referrals met triage criteria, and of the 63 attending the appointment, 25 (40%) received a rheumatologist diagnosis of RA. Seventy-two referrals did not meet criteria, and 1/49 attending (2%) had RA. The characteristics of the tool for a diagnosis of RA were: sensitivity 96%, specificity 56%, positive predictive value 40%, and negative predictive value 98%. Median wait times for referrals fulfilling and not fulfilling triage tool criteria were 7.9 weeks and 45.4 weeks respectively.

Conclusion: Implementing the 2010 ACR/EULAR Classification Criteria for RA as a prioritisation tool for primary care referrals improved the yield of patients subsequently diagnosed with RA. Waiting time was reduced for RA patients. Applying this strategy in areas of rheumatologist scarcity may permit earlier DMARD treatment.

Significance and Innovations:

- This study innovatively applies the 2010 ACR/EULAR Classification Criteria for RA in a novel application - guiding triage decisions for referrals to rheumatologists.

- This triage approach has the capacity to detect new RA cases with a high sensitivity and may assist in ensuring DMARDs are started early.

The early treatment of rheumatoid arthritis (RA) with disease modifying anti-rheumatic drugs (DMARDs) leads to improved disease activity and reduced radiographic damage, [1,2] and early RA treatment should be given a high priority. In many countries there is an overall shortage and an uneven distribution of rheumatologists, which can lead to long delays in accessing specialist care[3]. For example, at a regional Australian health service in June 2011, the number of newly referred patients waiting for an appointment with the solitary rheumatologist was 1113, with waiting times of over a year for inflammatory arthritis patients categorised as urgent[4].

Best practice recommends that patients with early inflammatory arthritis be seen by a rheumatologist within 6 weeks of symptom onset[5]. Even with an adequate supply of rheumatologists, many early arthritis patients are not seen in this timeframe[6]. The problem is much worse in areas of specialist scarcity, where average waiting times can be months to years. In this setting a systematic triage approach is needed which rations care and gives priority access to patients with more severe, treatable, or time-dependent conditions.

A recent literature review[7] summarised some of the strategies that have been used to reduce delays at any of four steps (1. from symptom onset to assessment in primary care; 2. from primary care to rheumatology referral; 3. from rheumatology referral to assessment; and 4. from rheumatology assessment to DMARD commencement), and we are primarily interested in reducing the delay at point three. One study applied a rheumatology triage method used a 5 tier triage grading system (A+ to D) to triage referrals.[8] The sensitivity of this technique for detecting truly urgent cases upon rheumatology review was only 59%, and this low sensitivity was thought to be influenced by the poor quality of referral information. Another approach used a non-diagnosis dependent priority referral scoring system[9] but has not yet been tested to show if it improves waiting times. Tavares et al[10] used a patient self-administered tool to detect inflammatory arthritis amongst all patients referred to rheumatology clinic, and the final model gave a sensitivity of 85.5% and specificity of 87.3%. The predictive elements were: younger age, male sex, trouble making a fist, morning stiffness, ever told you have RA, and diagnosis of psoriasis. Barbour[11] used an 8 point score administered by a nurse, and found that a score of 3 or more gave a sensitivity of 97% and specificity of 55% for inflammatory joint disease, however this tool required the nurse to asses the patient for synovitis on the day of consultant review, and as such was not used to allocate urgency of appointments.

One difficulty in applying rheumatology triage is the lack of information provided by primary care providers.[8,12] To combat this, a rheumatology specific referral form can be used which the primary care provider completes with the initial referral. This improves the completeness of referral information[13].

In 2010, the ACR and EULAR jointly published new classification criteria[14] aiming to improve detection of early RA. These criteria showed high sensitivity for methotrexate prescription at one year in each of the three validation cohorts (namely 97%, 91% and 87%). In this study we employ these criteria in a novel application as a triage tool. We test whether using these four variables (joint count, serology, inflammatory markers and symptom duration) can successfully prioritise new arthritis referrals from a community medical practitioner to a tertiary referral rheumatology service. We describe the sensitivity and specificity of this intervention, and its impact on the waiting time for accessing specialist care for people with RA.

Methods:

For 8 months from April 2011, consecutive new referrals to the Townsville Hospital Rheumatology clinic of adults with possible inflammatory arthritis were prospectively assessed. Inclusion required that the referral was predominantly for a joint problem. Exclusion criteria were: previous diagnosis by a rheumatologist, age less than 18 years, back pain alone, and absence of joint swelling explicitly specified. Each referral was scored using the 2010 ACR/EULAR Classification Criteria for RA (Table 1), modified as follows: 'definite swelling' was not required in the referral; 'synovitis not better explained by another disease' was not required; and joint count was based on referring doctor's report of involved joints. If insufficient information for scoring was provided in the referral, a request was sent to the referring doctor to supply the additional information. This arrangement had been previously discussed with the local Division of General Practitioners. Patients were given an appointment at approximately 6 weeks if they met the criteria (scoring 6 or more), or a routine appointment if they did not. Following the initial rheumatologist consultation these data were collected for each patient: the rheumatologist's diagnosis, actual fulfilment of 2010 RA criteria, DMARD prescription, RF & CCP status and waiting times from

referral to consultation. In cases where the diagnosis was unclear at the initial appointment, the diagnosis at the second appointment was used. The Chi-Squared Test was used for comparisons of categorical data and the Mann-Whitney U test was used for comparisons of continuous non-parametric variables. Ethics approval was granted by the Townsville Health Service District Human Research Ethics Committee.

Results:

A total of 457 consecutive referrals were screened (Figure 1). Scoring was applied to 143 referrals, of which 71 (50%) met scoring criteria (Group 1), with the remaining 72 forming Group 2. The usual triage process (categorising referrals as 1, 2 or 3), was applied concurrently, and 87% of all referrals were Category 1. From Group 1, 63 (89%) attended their appointment, and 25 (40%) were diagnosed with RA. In Group 2, 49 patients (68%) attended their appointment, and 1 person (2%) was diagnosed with RA. Eighty-one referrals were sent back to the referring doctor requesting further information. Of these, 37 (46% of requests, or 21% of 180 relevant referrals) were not returned and were lost to the study. Mean ages were 56 and 49 years and female sex was 70% and 73%, in groups 1 and 2 respectively (Table 2).

Relative frequencies of rheumatologic diagnoses were differentially distributed within the two triage groups (Figure 2). RA was the most common diagnosis in Group 1, followed by osteoarthritis (OA). In Group 2, RA was rare; the most common diagnoses were osteoarthritis, psoriatic arthritis and fibromyalgia (FM). No diagnosis was able to be made in one patient from Group 1 and two patients from Group 2. DMARD use after rheumatologist assessment is shown in Table 2. The majority of DMARD use in Group 2 was for psoriatic arthritis or other inflammatory arthritides.

This triage tool was 96% sensitive for a diagnosis of RA. Specificity was 56%. Positive predictive value was 40% and negative predictive value 98%. The overall prevalence of RA in the patients assessed was 23%. Results of only applying seropositivity as a predictor of RA are shown in Table 3. Where only one of RF or CCP was available, this data was used for seropositivity; RF was missing in 5 and anti-CCP in 19.

Of the patients who were ultimately diagnosed as having RA, 96% had been offered the early appointment and one patient (4%) the usual appointment. Of those not diagnosed as having RA, 38/86 (44%) had been offered the early appointment, and 56% the usual appointment. Waiting times were significantly reduced for patients with RA (Figure 3). RA patients had a median wait time of 7.4 weeks and a third quartile wait time of 8.8 weeks, compared with 14.4 weeks and 48.3 weeks respectively for the non-RA patients.

Discussion:

We used a novel triage strategy, applying the 2010 ACR/EULAR Rheumatoid Arthritis Classification Criteria to primary care referrals. This approach proved highly sensitive (96%) for a rheumatologist diagnosis of RA, and also significantly reduced waiting times for RA patients. The high sensitivity came at the price of a moderate specificity of 56%, which is nevertheless reasonable for a screening tool. Our tool, which can be applied to referrals directly and in some cases requires a request for further information, had a sensitivity higher than that of the patient administered tool developed by Taveres[10] which was 86% sensitive. However the Taveras tool had a higher specificity of 87%. Our tool had a similar sensitivity and specificity to the nurse administered tool which requires the nurse to assess for synovitis[11], which had

a sensitivity of 97% and specificity of 55%. In our study, the triage tool was shown to be more sensitive than seropositivity alone (tool 96% sensitive vs 89% for seropositivity), although less specific (tool 56% specific vs 77% for seropositivity). Seropositivity is more specific in assessing referrals for RA, however our triage tool identifies more RA patients, which is desirable for a screening tool.

The sensitivity of the triage approach was assisted by an inclusive strategy, such as not requiring swelling to be definitely present in the referral. This information was often not supplied by the referring doctor, and the reliability of the detection of synovitis by non-rheumatologist doctors was likely to be low. This also helped to minimise the number of referrals being sent back, which reduces the potential for lost cases. Because swelling wasn't required, the tool may be more broadly applicable to referrals from a wider group of practitioners including nurse specialists, physician's assistants, and allied health practitioners, although this wasn't tested in this study. The tool was able to more accurately identify RA cases than the usual triage process and would be ideally suited to vetting referrals for entry into an early arthritis clinic.

An advantage of this triage tool is that expert knowledge is not required to administer it, as it could be scored by anyone trained in applying the tool. In this study the tool was applied by a rheumatology registrar, but it could be applied by a nurse or by the person who usually triages referrals at a centre. The tool is generally quick to complete, as it requires information on just four parameters (joint count, seropositivity, inflammatory markers and duration). The request for more information can be sent back to the referrer by administrative staff, without imposing a time burden on the rheumatologist.

Receiving further information from the referrer did prove useful in triaging referrals. In one example, a referral for "chronic polyarthralgia...nil significant findings" proved to be CCP-positive when additional testing was requested from the referring doctor, and the patient was subsequently diagnosed with RA by the rheumatologist. Of 180 relevant referrals, 45% did not have sufficient information, and in only 54% of these cases was more information supplied. As per the policy of the Hospital, referrals with insufficient information were not offered an appointment, such that 21% of 180 relevant referrals were lost to follow up. If this tool was applied to rheumatology practice, cases without the extra information sent back could still be offered a non-urgent appointment, helping to minimize the potential for missed cases.

Whilst this tool's sensitivity was high, one case of RA was missed. The referral for this case scored 5 on the triage tool (just below cut-off), including 2 points for joint count (wrist, knee, ankle and shoulder involved), 2 points for serology (low-titre rheumatoid factor, which subsequently became strongly positive), 1 for acute phase reactants and 0 for duration. A modification to the approach such as requesting the referring doctor to reassess all patients referred but not yet seen every 3-6 months with repeat joint assessment and serology might perhaps overcome this problem, and improve the sensitivity of the triage tool further.

The triage tool was unable to be applied to 37 referrals (21% of 180 relevant referrals) due to lack of information, despite requesting the required information from the referrer. This limits the applicability of the data. The true sensitivity and specificity of the tool may have been found to be not as high as that reported above, had it been possible to apply the triage criteria to all referrals. A further potential limitation of this study relates to incomplete attendance at the rheumatology clinic, particularly in Group 2 (68% attendance). This loss-to-follow-up of Group 2 was

presumably influenced by the much longer waiting times for an appointment in this group, and possibly the lack of severity or self-limiting nature of the problem for which they were referred. A sensitivity analysis showed that if an additional 6 patients who were not followed up in Group 2 actually had RA then the sensitivity would fall below 80%. However, we feel that this is unlikely; the next available rheumatology service was more than 4 hours drive away, meaning that any person with a persistent disease such as RA would be likely to attend the local rheumatology service once an appointment was offered. Patients permanently relocating out of the region were not able to be assessed.

This tool is aimed at identifying patients with an inflammatory arthritis and is not applicable to referrals without a primary joint problem, such as (non-articular) SLE or giant cell arteritis. This tool is intended to optimize the early diagnosis and treatment of RA and would ideally suit screening into an early inflammatory arthritis clinic. Concurrent triage processes are needed to triage for rheumatic diseases outside of inflammatory and non-inflammatory arthritis. A risk of using this tool in isolation is that other potentially life threatening rheumatic diseases could be missed or there might be delays in referral. In this study, of 457 referrals screened, 277 did not meet inclusion/exclusion criteria and were triaged through a standard three-tier category system (Categories 1/2/3). Any referrals deemed to be very urgent (such as possible sight-threatening giant cell arteritis or systemic sclerosis with digital ischemia) were seen in an emergency rheumatology clinic.

Triage decisions were overall improved with this tool. The usual triage process resulted in 87% of referrals being in Category 1 (urgent), which captured all eventual diagnoses of RA in the patients who attended. The novel triage process resulted in 50% of referrals being categorised in Group 1, which captured all but one of the RA

patients who attended. This resulted in far fewer patients needing the most urgent appointment, whilst still maintaining an excellent pick-up rate for RA. This triage tool identified the vast majority of RA patients and offered them an early appointment, while the majority of non-RA patients were offered the usual appointment. This triage approach achieved better targeted identification of RA patients, and was able to produce much improved wait times, as three quarters of RA patients were seen by 8.8 weeks, whereas three quarters of non-RA patients were seen by just under a year (48 weeks).

This triage tool facilitates awareness of the 2010 ACR/EULAR RA criteria amongst primary care providers, general physicians or other referrers. The newer criteria shift the focus away from markers of long-standing disease or damage (such as erosions and rheumatoid nodules, present in the 1987 ACR criteria), towards an earlier classification of RA, at the time of presentation with swollen joints. In locations with scarce rheumatologist resources, this triage tool offers the potential to increase the early introduction of DMARDs in the RA population, and presumably to prevent a future population burden of disability.

Conclusion:

The systematic application of the 2010 ACR/EULAR Rheumatoid Arthritis Classification Criteria as a prioritization tool for new primary care referrals was 96% sensitive and 56% specific for a rheumatologist diagnosis of RA. The positive and negative predictive values were 40% and 98% respectively. Waiting time was significantly reduced for RA patients. In areas of rheumatologist scarcity, this tool offers the potential to decrease the future burden of RA disease.

Acknowledgement:

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Table 1: Triage Scoring System
from 2010 ACR/EULAR RA Criteria

	Points
A. Joint Count	
1 large joint	0
2-10 large joints	1
1-3 small joints* (with or without large joints)	2
4-10 small joints* (with or without large joints)	3
>10 joints including at least one small joint*	5
B. Serology	
Negative RF and CCP	0
Low +ve RF or CCP (≤3x ULN)	2
High +ve RF or CCP (>3x ULN)	3
C. Acute Phase Reactant	
Normal CRP and ESR	0
Abnormal CRP or ESR	1
D. Duration	
<6 weeks	0
≥6 weeks	1

Add totals for sections A-D. ≥ 6 meets criteria; <6 does not

*wrist is considered a small joint

Table 2: Patient Characteristics and Diagnosis

	Group 1 (meeting criteria) n=63	Group 2 (not meeting criteria) n=49	Sig Difference
Age (mean, in years)	56	49	
Female sex	44 (70%)	36 (73%)	Not sig
Indigenous	3 (5%)	3 (6%)	Not sig
Seropositive	39 (62%)	4 (8%)	p<0.001 (Chi-square)
Rheumatologist diagnosis of RA	25 (40%)	1 (2%)	p<0.001 (Chi-square)
Actually meeting 2010 RA criteria	25 (40%)	1 (2%)	p<0.001 (Chi-square)
MTX use	17 (27%)	7 (14%)	Not sig
DMARD use	26 (41%)	11 (22%)	
DMARD or prednisone use	28 (44%)	18 (37%)	
Waiting time (median)	7.9 weeks	45.4 weeks	p<0.001 (Mann-Whitney U test)

Table 3: Predictive Utility of Triage Criteria and of Seropositivity for Diagnosis of RA

	Triage Criteria (n=112)	Seropositivity (RF or CCP positive)*	Anti-CCP Positivity (n=93)
Sensitivity	96.2%	88.5%	70.8%
Specificity	55.8%	76.7%	100%
PPV	39.7%	53.5%	100%
NPV	98.0%	95.7%	90.8%

*n=112, in 5 cases only anti-CCP was available; in 19 cases only RF was available

Figure 1: Referral Inclusion, Attendance and RA Diagnosis

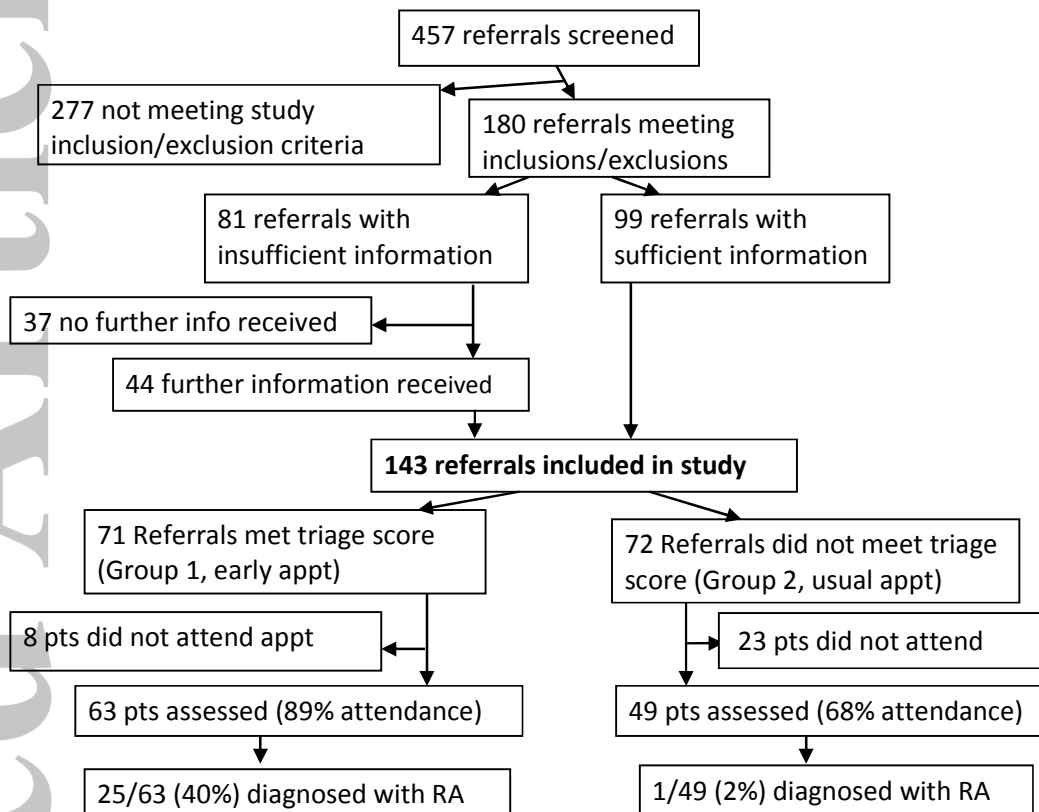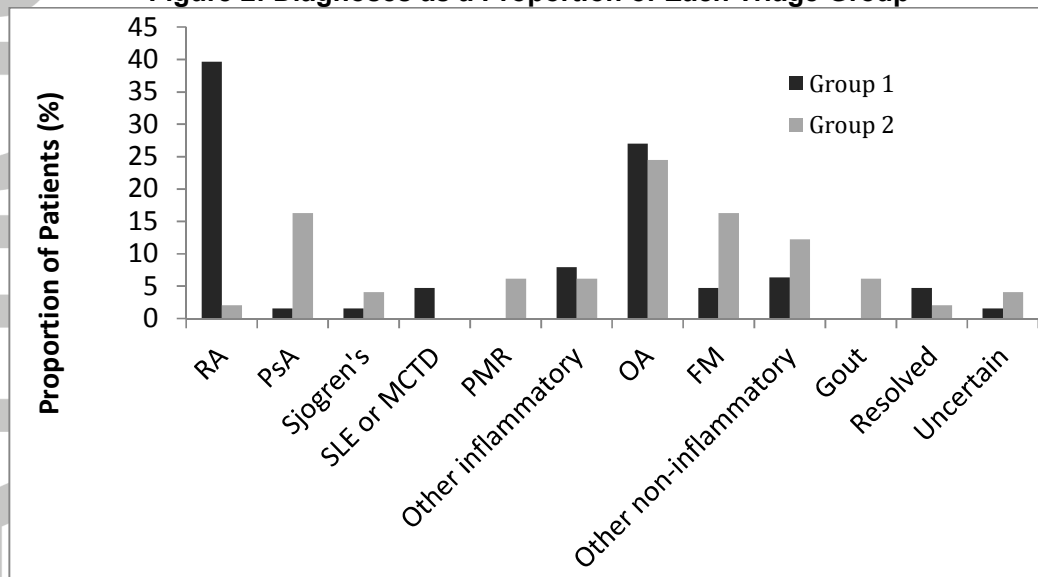457 referrals screened

277 not meeting study inclusion/exclusion criteria

180 referrals meeting inclusions/exclusions

81 referrals with insufficient information

99 referrals with sufficient information

37 no further info received

44 further information received

143 referrals included in study

71 Referrals met triage score (Group 1, early appt)

72 Referrals did not meet triage score (Group 2, usual appt)

8 pts did not attend appt

23 pts did not attend

63 pts assessed (89% attendance)

49 pts assessed (68% attendance)

25/63 (40%) diagnosed with RA

1/49 (2%) diagnosed with RA

Figure 2: Diagnoses as a Proportion of Each Triage Group

Figure 3: Wait Times By Diagnosis