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PLEASE RESPOND WITHIN 48 HOURS
Immediate access rheumatology clinic: efficiency and outcomes

Miriam Gärtner, Julia P Fabrizi, Elisabeth Koban, Martin Holbik, Lorenz P Machold, Josef S Smolen, Klaus P Machold

ABSTRACT

Objective and Methods In order to facilitate access and shorten waiting times to rheumatologist assessment, an immediate access clinic (IAC) was established.

Patients were assessed at presentation in the clinic and after 6–12 months, either in the clinic or by telephone. Data regarding diagnostic accuracy, pain levels and care were analysed.

Results From February to December 2009, 1036 patients were assessed. 223 (21.5%) patients had symptoms for 3 months or less. 660 were available for re-assessment after 6–12 months. Initial tentative diagnoses were confirmed in over 75% of patients suspected of having rheumatoid arthritis (RA), spondylarthropathy and osteoarthritis. Men suspected of having spondylarthropathy had a significantly longer symptom duration than women (median IQR 54.0 (18.0–120.0) vs 24.0 (6.0–68.0) months; p = 0.0082).

There was no significant gender difference regarding pain. At follow-up, the visual analogue scale for pain in RA patients admitted to further care in the clinic (n = 61) had significantly decreased by a median IQR of 37.5 mm (10.5–50.5), whereas this improvement was only 6 mm (∼26–33.5) in the 22 RA patients followed outside the clinic (p = 0.0083).

Conclusions The IAC resulted in considerable waiting time reduction for rheumatology assessment. A substantial minority was seen before 3 months’ symptom duration. ‘Positive predictive correctness’ of the assessing rheumatologists regarding the presence of inflammatory rheumatic conditions was over 75%. Patients with RA cared for in the clinic had substantially lower pain levels after 6–12 months’ follow-up than patients treated elsewhere.

Rheumatic diseases constitute major health and societal burdens.1 Rheumatoid arthritis (RA) with an estimated prevalence of 0.5–1% affects approximately 5–10 million individuals in industrialised countries,2 more than 150 million have osteoarthritis or any other form of arthritis, approximately 50 million have osteoporosis and more than 350 million have spine problems.3 The societal burden is underscored by the fact that after 5 years 22% of patients with RA were unable to work4 or by the significant excess mortality in patients with osteoporosis.5

RA, the most common chronic inflammatory rheumatic disease, is a destructive progressive immune-mediated disorder leading to joint erosions in 60% of patients within 1 year.6 7 Ten per cent of those presenting early (median of 8 weeks from first symptoms) have joint erosions at the first visit.8 It was postulated that early application of disease-modifying antirheumatic drugs (DMARD) improves the outcome of RA.9–11 Furthermore, it was shown that there is a ‘window of opportunity’ especially within the first 3 months.11 12

The delay from symptom onset to the first visit with a rheumatologist or start of therapy ranges from several months up to more than 1 year.12–13 This delay has several reasons: neglect or negation of rheumatic diseases in general,14 lack of information,15 16 lack of knowledge about available therapies,17 limited availability and (geographical) proximity of specialists, or a mix thereof.18 As early and easy access to rheumatologist assessment and treatment is regarded as mandatory,19 early arthritis clinics have been established in many countries such as The Netherlands, Germany, the UK, Austria and North America.18–20

As a result of the lack of rheumatologists, however, waiting times frequently exceed by far the desired and recommended period of maximally 3 months from the onset of symptoms, thus precluding the start of therapy within the ‘window of opportunity’. Therefore, we decided to establish an ‘easy access’ clinic, the so-called immediate access clinic (IAC; German: ‘Akutbegutachtungsambulanz’), in which patients are seen usually within 1 day to 2 weeks from referral by other physicians or upon patients’ self-referral, but only for a brief encounter and evaluation.21

In the present study we describe the spectrum of patients’ diagnoses and clinical characteristics at presentation and after 6–12 months. The aims of this study were: (1) to describe the characteristics of the patients evaluated in the IAC with respect to demographic data and initially suspected diagnoses; (2) to evaluate the accuracy of the initial diagnostic categorisations when compared with the ‘final’ diagnoses after 6–12 months; (3) to analyse differences between diagnostic categories with respect to disease duration, gender and pain levels; (4) to compare outcomes after 6–12 months with respect to pain levels and treatments between patients who continued to be cared for in our clinic and those cared for at other facilities.

PATIENTS AND METHODS

Patients for this study were first seen in the IAC of the Vienna General Hospital between February and December 2009. There are no formal restrictions regarding referral to the IAC, i.e. patients are referred by their general practitioner, by another
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Patients are informed at the time of their initial contact or upon visiting the IAC that they will receive only a brief encounter by an experienced rheumatologist who will assess their disease to decide on further diagnostic or therapeutic management. The rheumatologist takes a brief history regarding duration and clinical symptoms. In addition, a short symptom-centred physical examination is performed and a preliminary decision is made to assign the patient to one of two groups: patients in group A are referred to the regular outpatient clinic for further work-up; patients in group B are assigned to other specialist care/work-up or back to the referring physician with appropriate recommendations for further care. There are no formal decision criteria for assigning a patient to either group A or B; however, patients suspected of having inflammatory rheumatic diseases (eg, RA, spondylarthropathies, connective tissue disease (CTD), etc.) are preferentially assigned to group A, whereas patients with osteoarthritis, chronic pain syndromes and non-inflammatory (eg, soft tissue) rheumatism or presumably degenerative spine disease are usually assigned to group B. Nevertheless, under special circumstances (such as a RA patient under care by another rheumatologist referred for a ‘second opinion’ or an osteoarthritis patient qualifying for a therapeutic study or further assessment), these informal rules are modified.

Demographic data, tentative diagnoses, symptom duration and pain (assessed using a 100 mm visual analogue scale; VAS) as well as the time between the date of referral (taken from the referring physicians’ request forms) and the day of assessment were recorded at baseline (first presentation to the IAC) and entered into an electronic spreadsheet. If the duration of symptoms exceeded 10 years, ‘120 months’ was recorded. For this analysis, all patients’ suspected diagnoses were grouped into the following categories: RA, seronegative spondylarthropathies, CTD, fibromyalgia syndrome (FMS)/central sensitivity syndrome (CSS), osteoarthritis, ‘other inflammatory’ (such as reactive arthritis, viral arthritis, gout, etc.) and ‘other non-inflammatory’ diseases.

For follow-up after 6–12 months, group A patients had to be divided into two subgroups: group A1 were patients who were regularly followed in the outpatient rheumatology clinic, data regarding diagnoses (given by the treating outpatient clinic rheumatologist, mostly on clinical grounds supported by classification criteria and grouped according to the above-mentioned categories) and pain were extracted from the patients’ charts. Patients initially allocated to group A who did not return for follow-up visits within the 6–12-month timeframe (group A2) were called for a telephone interview. Group B patients were

![Figure 2](image-url)  
**Figure 2** Follow-up of the patients included in the IAC between February and December 2009. FU, follow-up; IAC, immediate access clinic.
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Table 1 Diagnoses suspected by the referring physicians and at first assessment in the IAC

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>RA</th>
<th>Spondylarthropathy</th>
<th>CTD</th>
<th>FMS/CSS</th>
<th>Osteoarthritis</th>
<th>‘Other inflammatory’</th>
<th>‘Other non-inflammatory’</th>
<th>No diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>All referral diagnoses</td>
<td>325</td>
<td>114</td>
<td>91</td>
<td>34</td>
<td>107</td>
<td>12</td>
<td>4</td>
<td>187</td>
</tr>
<tr>
<td>GP (n=493)</td>
<td>158(32%)</td>
<td>31 (6.3%)</td>
<td>32 (6.5%)</td>
<td>19 (3.9%)</td>
<td>32 (6.5%)</td>
<td>78 (15.8%)</td>
<td>47 (9.5%)</td>
<td>96 (19.5%)</td>
</tr>
<tr>
<td>Other specialist (n= 469)</td>
<td>167(35.6%)</td>
<td>82 (17.5%)</td>
<td>59 (12.6%)</td>
<td>15 (3.2%)</td>
<td>15 (3.2%)</td>
<td>58 (12.4%)</td>
<td>59 (12.6%)</td>
<td>43 (9.1%)</td>
</tr>
<tr>
<td>Self-referred (n= 74)</td>
<td>0</td>
<td>1 (1.4%)</td>
<td>0</td>
<td>0</td>
<td>1 (1.4%)</td>
<td>1 (1.4%)</td>
<td>71 (95.9%)</td>
<td></td>
</tr>
<tr>
<td>Diagnoses suspected at first assessment in the IAC</td>
<td>115 (11.1%)</td>
<td>111 (10.7%)</td>
<td>68 (6.6%)</td>
<td>51 (4.9%)</td>
<td>208 (20.1%)</td>
<td>134 (12.9%)</td>
<td>341 (32.9%)</td>
<td>8 (0.8%)</td>
</tr>
</tbody>
</table>

Patients were referred to the IAC by their GP, by any other intramural or extramural specialist or they were self-referred. Specialists tended to refer more patients suspected at CT than GPs, whereas GPs suspected more osteoarthritis. It was remarkable that 19.5% of the patients referred to by a GP had no suspected diagnoses, even 3% of patients referred by other specialists were referred without provision of a specific suspected diagnosis. Substantially fewer patients were suspected of having RA by the rheumatologist compared with other specialists or GPs.

CSS, central sensitivity syndrome; CTD, connective tissue disease; FMS, fibromyalgia syndrome; GP, general practitioner; IAC, immediate access clinic; RA, rheumatoid arthritis.

Table 2 Diagnoses suspected by the rheumatologist at baseline and percentage of confirmed diagnoses by chart review for patients of group A1 (follow-up visit in our clinic)

<table>
<thead>
<tr>
<th>Diagnosis (n=213)</th>
<th>Suspected at baseline (in %)*</th>
<th>Confirmed by chart review (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>61 (28.6)</td>
<td>47 (77.0)</td>
</tr>
<tr>
<td>Spondylarthropathy</td>
<td>51 (23.9)</td>
<td>41 (80.4)</td>
</tr>
<tr>
<td>CTD</td>
<td>43 (20.2)</td>
<td>36 (83.7)</td>
</tr>
<tr>
<td>FMS/CSS</td>
<td>1 (0.5)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>16 (7.5)</td>
<td>13 (81.3)</td>
</tr>
<tr>
<td>‘Other inflammatory’</td>
<td>14 (6.6)</td>
<td>9 (64.3)</td>
</tr>
<tr>
<td>‘Other non-inflammatory’</td>
<td>27 (12.7)</td>
<td>10 (37.0)</td>
</tr>
</tbody>
</table>

*Percentage of total population in columns.

Statistical analysis

Data were analysed using GraphPad 5. T-tests were performed for continuous data, analyses of variance were conducted for multiple group comparisons and Pearson’s r2 tests were used to analyse categorical variables. For analysis of the suspected diagnoses’ accuracy descriptive statistics were performed. p Values less than 0.05 were regarded as statistically significant, for multiple comparisons Bonferroni’s correction was applied.

RESULTS

Patients

Between February and December 2009, 1036 patients were seen in the IAC during 112 clinic days. A median (IQR) of 10 (7–12) patients was examined per day. The median (IQR) lag time between referral and consultation at the IAC was 8.0 (4.0–13.25) calendar days. Groups A1, A2, and B did not differ significantly with regard to referral delay. The mean (SD) age of the patients was 50.3 years (15.9), median (IQR) duration of symptoms was 24 months (5–72), median (IQR) pain rating on a 100 mm VAS was 54 mm (54–73.5). Seven hundred and thirty-nine (71% of the patients) were women, there were no significant gender differences regarding age, disease duration and VAS for pain (data not shown); 223 (21.5%) patients had a symptom duration of 3 months or less (figure 1). Within the timeframe of 6–12 months after initial assessment, patients in IQR 120 months and B were re-assessed. The patient disposition with regard to follow-up is shown in figure 2.

Suspected diagnoses

Frequencies of diagnoses suspected by the referring physicians are given in table 1. Approximately one third of the patients was referred because of suspected RA; however, in only 80 of them (7.7%) this diagnosis was also considered by the assessing rheumatologist. The majority of these patients were then referred for further outpatient clinic care (group A).

Analyses of differences in age, VAS for pain and duration of symptoms between patients’ tentative diagnostic categories demonstrated significant differences between these categories: osteoarthritis patients tended to be significantly older than patients with spondylarthropathy, CTD, FMS/CSS and ‘other inflammatory’/‘non-inflammatory’ diseases; FMS/CSS patients reported the longest symptom duration and the highest degree of pain (significantly different from all other categories). RA patients had significantly shorter symptom duration (median (IQR) 9 months (2–45) than spondylarthropathy (median (IQR) 21 months (8.5–114)). FMS/CSS (median (IQR) 120 months (21–360)) and osteoarthritis (median (IQR) 24 months (12–120)). Detailed results are given in supplementary table S1, available online only.

Gender distribution patterns within the diagnostic categories were in line with established epidemiological data. Solely among patients suspected of having spondylarthropathy, men had a significantly longer duration of symptoms (median (IQR) 5.4 months (15.0–120.) than women (median (IQR) 24.0 months (6.0–66.0); p=0.002). Details can be found in supplementary table S2, available online only.

Patient follow-up after 6–12 months

Group A (referred to further care in clinic)

Suspected diagnoses in patients allocated to group A who had a follow-up visit after 6–12 months (group A1) are shown in table 2. The diagnosis in patients classified initially as RA, spondylarthropathy, CTD or osteoarthritis was confirmed in over 75% of cases. The median VAS for pain (IQR) of this subgroup was 60 (41–75) at baseline and 51 (7.25–90) (p<0.0001) at follow-up.

Analysis of baseline diagnosis distribution in groups A1 and A2 revealed that significantly fewer patients in group A2 (stopped clinic attendance) had initially been categorised as ‘inflammatory rheumatic disease’, such as RA, spondylarthropathy and CTD (table 3). With regard to the ‘type’ of referral, no differences in


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Table 3  Diagnosis suspected at baseline for patients with (group A1) or without (group A2) follow-up visit in our clinic

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>RA (n=83)</th>
<th>Spondylarthropathy (n=74)</th>
<th>CTD (n=52)</th>
<th>FMS/CSS (n=2)</th>
<th>Osteoarthritis (n=25)</th>
<th>‘Other inflammatory’ (n=32)</th>
<th>‘Other non-inflammatory’ (n=61)</th>
<th>No diagnosis (n=1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A1 (in %) (follow-up in the clinic)</td>
<td>61 (28.8)</td>
<td>51 (23.9)</td>
<td>43 (20.2)</td>
<td>1 (0.5)</td>
<td>16 (7.5)</td>
<td>14 (6.6)</td>
<td>27 (12.7)</td>
<td>0</td>
</tr>
<tr>
<td>Group A2 (in %) (stopped clinic attendance)</td>
<td>22 (18.6)</td>
<td>23 (19.5)</td>
<td>9 (7.6)</td>
<td>1 (0.8)</td>
<td>10 (8.5)</td>
<td>18 (15.3)</td>
<td>34 (28.8)</td>
<td>1 (0.8)</td>
</tr>
</tbody>
</table>

In the patients initially assigned to follow-up in the outpatient clinic (group A), and who were followed for 6–12 months, distribution of diagnoses suspected at baseline differed significantly between groups A1 and A2 (p<0.0001; χ² test).

4.4% of the patients initially assigned to follow-up in the outpatient clinic (group A), and who were followed for 6–12 months, distribution of diagnoses suspected at baseline differed significantly between groups A1 and A2 (p<0.0001; χ² test).

We evaluated why group A2 patients did not return to our clinic. Among the 118 patients (51.8%, see figure 2) who were evaluable, 32 (27.1%) regularly visited specialists, including rheumatologists, for their rheumatic disease and 22 (18.4%) saw other specialists or their general practitioner because of other non-rheumatic diseases. Forty-four (37.3%) indicated that their problems had resolved and therefore did not require further care. Only four (3.4%) of the patients indicated dissatisfaction with the treatment at our outpatient clinic and the remaining 16 (13.6%) patients gave no reason why they did not attend follow-up visits at our clinic.

The median (IQR) VAS for pain in group A2 at baseline was 57 (55.5–72.22) and 30 (0–60) at follow-up by telephone interview. Forty-four patients indicated that they had no further problems. Therefore, we calculated the VAS for pain separately for the 74 patients who answered that they still had rheumatological complaints. This subgroup had a median VAS (IQR) of base (17 (5–71.25) at follow-up, significantly higher than group A1 (p=0.0042). Because the distribution of diagnoses in groups A1 and A2 was different, we analysed pain improvement in patients with a diagnosis of RA separately: RA patients’ pain VAS in group A1 (n=61) improved by a median (IQR) of 37.5 mm (10.5–50.5), whereas this improvement was only 6 mm (–26 to 33.5) in RA patients followed elsewhere (group A2, n=22; p=0.0085).

Group B (referred to further care outside the rheumatology clinic)

After 6–12 months, telephone follow-up was possible in 329 (55%) of the 594 patients (see figure 2). One hundred and ninety-nine (60.5%) indicated that their medical problems had fully resolved. Details regarding the suspected diagnoses at baseline and reported at follow-up can be found in supplementary table S5, available online only. Because of the notorious inaccuracy of self-reported diagnoses, further analyses were not performed.

Therapy

A total of 192 (90.1%) group A1 patients received further treatment: depending on diagnosis, 25–75% were treated with DMARD, 0–25% with biological agents, 4.8–56% with glucocorticoids and 1.7–17.4% with physiotherapy. Supplementary table S4 (available online only) gives details of treatment according to diagnosis.

Of the 118 group A2 patients who had no follow-up visit in our outpatient clinic but were interviewed by telephone, 45 (58.1%) received further therapy at the time of interview. Non-steroidal anti-inflammatory drugs (NSAID) were the most common treatment (42.2% of patients), biological agents were used in 15.6%, synthetic DMARD and physiotherapy each in 13.8% and glucocorticoids in 4.4%.

In group B, 137 (41.6%) of the 329 patients who could be reached for follow-up indicated that they had been under further medical treatment: 29 (8.8%) by a general practitioner and 108 (32.8%) by a specialist; 52.3% of the treated patients received physiotherapy, 30.5% NSAID. Synthetic DMARD were used in 1.2%, 4.9% were under treatment with glucocorticoids, biological agents were used in 1.2%, and 7.9% were treated with a combination of these therapies.

DISCUSSION

Rheumatologist assessment as early as possible has been recommended in several guidelines for managing arthritis patients. The aim of the IAC is to facilitate early access to an experienced rheumatologist. In 2007, at the time the IAC was established, wait time for a (first) appointment frequently exceeded 4 months, ie, in January 2007, ‘new referrals’ received appointments in June and so on. This constituted a substantial barrier to early referral, which had been encouraged at the department previously through administrative changes, but still met considerable, mostly logistic, obstacles. The reasons for delayed presentation of patients with rheumatic complaints were recently shown to be hesitance of both patients and referrers, frequently rooted in uncertainty about diagnostic recommendations and treatment of rheumatologists. The latter also holds true for the Austrian healthcare system, in which only very few rheumatologists are working in private practice and most rheumatological care is centre/hospital based. Through the IAC waiting times were substantially shortened, rarely exceeding a few days. However, only a minority of patients (21.5%) presented with symptoms of less than 5 months.

Some aspects of this analysis of a population of unselected rheumatology referrals merit mention. First, at follow-up, over 75% of the diagnoses of inflammatory rheumatic diseases initially suspected at the IAC proved to be correct. This indicates high reliability of these initial categorizations by an experienced rheumatologist, which often have to be made within only a few minutes, compared with a later and mostly ‘criteria-based’ classification.

Second, although patients suspected of having RA presented earlier than others, a median symptom duration of 9 months (only 41 of the 115 suspected RA patients had a duration of symptoms of ≤3 months) by far exceeds the postulated ‘window of opportunity’. Although some of these RA patients came for a ‘second opinion’ and had been treated appropriately with DMARD, the majority had not been treated except with NSAID and thus are likely to have experienced avoidable/unnecessary damage.

Third, gender analysis showed that in line with common epidemiological knowledge men were more often categorised as spondylarthropy, whereas the majority of patients categorised as osteoarthritis or FMS/CSS were women. Interestingly, men with spondylarthropy had a significantly longer symptom duration than women; this observation contrasts with a...
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Recent report that did not find such differences, but may be in line with the observation of more severe symptoms in women than in men. It may be speculated that male patients might more frequently misinterpret spondylarthropathy as non-specific lower back pain.

Fourth, no difference in the frequency of final diagnosis of an inflammatory rheumatic disease between physician and self-referred individuals was apparent. While this finding has to be interpreted with caution due to the low number of self-referrals, physicians did not appear to be more accurate in differentiating inflammatory rheumatic disease (which rightly should be referred to a tertiary care centre) from other rheumatic diseases or complaints. No specific advertisements were made to the public; however, through several local meetings with possible referers, the existence of the IAC and the recommended peripheral work-up as well as contact details were made available (mostly in the context of educational talks on diagnostic and therapeutic possibilities and in disease). Therefore, it might have been expected that the physicians’ referral accuracy should have been higher, which was not the case.

Finally, among the RA patients in group A1 (followed at our clinic) VAS for pain was substantially reduced, whereas RA patients treated elsewhere only had a marginal reduction.

Whereas the question as to whether care within the framework of a highly specialised centre is ‘better’ than ‘routine’ care would be a randomised trial of care, this finding indicates that centres with a higher standard of care such as a university hospital/clinic are significantly better suited for more complex cases and reduce their burden of disease accordingly.

One of the limitations of our study is the potential inaccuracy of telephone interview data. Therefore, we did not analyse data further with respect to diagnoses. However, 27.1% of the patients in group A lost to follow-up (group A2), were still treated by rheumatology specialists outside our clinic. The main reasons for the patients to seek treatment elsewhere were geographical proximity and shorter waiting times for follow-up visits. In group A2 37.3% of the patients indicated they had no further problems at all. This finding is in line with the higher level of ‘other inflammatory’ and thus mostly self-limiting diseases such as reactive arthritis in this group. Conversely, patients in group A2 who indicated they still had problems had a surprisingly high median VAS for pain of 50 mm.

Another limitation with regard to the interpretation of the follow-up data is the percentage of patients lost to follow-up (approximately 36%). There is, however, no indication to believe that these individuals differed substantially from the patients for whom follow-up data were available. For most, symptom disappearance may have been the main reason for not returning; in addition, technical obstacles, such as change of telephone numbers may have precluded more complete follow-up.

Our initiative may serve as a model in similar settings: lack of practising rheumatologists, concentration of experts in large centres, high diagnostic and therapeutic insecurity on the part of primary physicians or non-rheumatology specialists (exemplified by the extremely high proportion of ‘suspected RA’ compared with the categorisation by the expert). In addition, our setting constitutes an opportunity to see and treat truly early RA patients rather than RA patients whose referral had already been delayed and whose wait time for an appointment, previously being several months, precludes them from more timely diagnosis and therapy. For different circumstances, for example in areas with many practising rheumatologists overwhelmed by primarily degenerative or pain problems, the role of the ‘expert rheumatologist’ quickly categorising or assigning patients might be filled by the rheumatologists taking turns. In a different approach, an expert rheumatology nurse or other health professional might, with appropriate training, be able to fulfil certain roles as ‘gatekeeper’ or counsel in order to provide at least basic information, for example, regarding diagnostic tests needed by primary physicians or practising specialists as well as patients seeking advice.

Another interesting aspect was our finding that despite the short time of interaction between patient and rheumatologist at the time of the visit to the IAC, complaints about insufficient attention were very rare. Apparently, patients appreciated the fact that they had an immediate opportunity to discuss their problems with a specialist, albeit for a short time, and to receive an initial diagnostic assessment and therapeutic recommendation.

In summary, this analysis shows that an IAC allows for a substantial reduction of waiting times for individuals with musculoskeletal problems with a ‘positive predictive correctness’ of the initial diagnosis by an experienced rheumatologist regarding the presence of inflammatory rheumatic conditions amounting to over 75%. The IAC presented here may thus serve as a model for other institutions to reduce overall waiting times for appointments and at the same time allow early recognition and timely appropriate therapy for patients in need of a rapid intervention, such as RA or CTD.

Contributors MI: data collection, entry, cleaning, analysis, manuscript writing. JP and EX: data collection, entry, cleaning, analysis. MH: data analysis, statistics. LPM: data collection, entry. JSS: data review, manuscript writing. KPF: project management, data collection, manuscript writing.

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REFERENCES


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