# Using Patient Reported Outcome Measures to Classify Disease Activity States in Rheumatoid Arthritis: A Comparison of Patient-Derived Versions of Clinical Disease Activity Index (CDAI), Simplified Disease Activity Index (SDAI) and Disease Activity Score 28 (DAS28)

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## Background & Objective

**Background**: In Rheumatoid Arthritis (RA) the target for treatment is clinical remission or minimal disease activity. Patient self-monitoring of disease activity may enhance treatment by providing early warnings when targets are not met, indicating the need for a physician visit to re-evaluate treatment.
**Objective:** To compare agreement between patient and rheumatologist (MD) derived disease activity states across 3 disease activity measures: Clinical Disease Activity Index (CDAI), Simplified Disease Activity Index (SDAI) and Disease Activity Score 28 (DAS28).

## Methods

**Study Design:** Cross sectional study.

**Study Sample:** All RA patients presenting for a follow-up visit to 7 participating rheumatology practices were invited to participate.

**Inclusion criteria:**

- 18 years of age or older;
- Have a diagnosis of rheumatoid arthritis;
- Under the ongoing care of a rheumatologist;
- Able to read and write English without a translator.

**Data Collection:**

Consenting patients completed a questionnaire and performed a self-report joint count before their visit. MD joint count and lab values were obtained from charts.

**Disease Activity Indices:**

Disease activity was evaluated using patient and MD versions of CDAI, SDAI and DAS28. In patient versions, patient joint counts were used and MD global assessments were replaced with patient global assessments (for CDAI and SDAI). Disease states were categorized into remission, low, moderate or high, according to published cut points. Because change in treatment is recommended with moderate or high disease activity, we also compared instruments using two categories: “remission or low “vs. “moderate or high”.

**Statistical Analysis:**

- Agreement between patient and MD derived disease states were evaluated using Agreement Coefficient 1 (AC1) for two category comparisons and Agreement Coefficient 2 (AC2), weighted with quadratic weights to take into account how close the agreement is to perfect agreement, for four category comparisons. AC values > 0.62 were considered good agreement.
- Z tests were used to evaluate the statistical significance of the difference between pairs of ACs to compare agreement across measures, where agreement between the patient-derived and MD-derived disease activity states for each measure was compared. All p values were 2 tailed.

## Results

**Table 1.** Agreement between patient and MD derived indices measured across four and two disease activity categories.

| A | COMPARISON ACROSS FOUR CATEGORIES (REMISSION VS. LOW VS. MODERATE VS. HIGH) | | |
|---|---|---|---|
| **Patient Measures** | **Rheumatologist Measures** | | |
| | **CDAI-MD** | **SDAI-MD** | **DAS28-MD** |
| | **AC2 [95% CI]** | **AC2 [95% CI]** | **AC2 [95% CI]** |
| **CDAI-Pt** | * **0.67 [0.55, 0.79]** | **0.67 [0.54, 0.79]** | 0.43 [0.29, 0.58] |
| **SDAI-Pt** | **0.62 [0.49, 0.75]** | **0.68 [0.56, 0.81]** | 0.39 [0.24, 0.55] |
| **DAS28-Pt** | 0.55 [0.42, 0.69] | 0.50 [0.35, 0.64] | **0.58 [0.45, 0.71]** |
| **B** | **COMPARISON ACROSS TWO CATEGORIES (REMISSION OR LOW VS. MODERATE OR HIGH)** | | |
| **Patient Measures** | **Rheumatologist Measures** | | |
| | **CDAI-MD** | **SDAI-MD** | **DAS28-MD** |
| | **AC1 [95% CI]** | **AC1 [95% CI]** | **AC1 [95% CI]** |
| **CDAI-Pt** | * **0.80 [0.75, 0.85]** | **0.80 [0.75, 0.86]** | 0.43 [0.29, 0.57] |
| **SDAI-Pt** | **0.77 [0.72, 0.82]** | **0.79 [0.74, 0.85]** | 0.38 [0.24, 0.53] |
| **DAS28-Pt** | **0.71 [0.64, 0.79]** | **0.67 [0.58, 0.75]** | **0.79 [0.72, 0.86]** |

AC1 = agreement coefficient 1; AC2 = quadratic weighted agreement coefficient 2

All AC values have 2 tailed p-values of $p < 0.001$

Bolded values (AC > 0.62) are considered good agreement

* There was no significant difference in the agreement between the patient and MD versions of the three measures when using four categories [CDAI vs. SDAI AC2: p = 0.480; CDAI vs. DAS28 AC2: p = 0.633; SDAI vs. DAS28 AC2: p = 0.915] or two categories [CDAI vs. SDAI AC1: p = 0.580; CDAI vs. DAS28 AC1: p = 0.052; SDAI vs. DAS28 AC1: p = 0.062].

**CDAI (Clinical Disease Activity Index) =** Tender Joint Count, Swollen Joint Count, MD global, patient global

**SDAI (Simplified Disease Activity Index) =** Tender Joint Count, Swollen Joint Count, MD global, patient global, CRP

**DAS-28: Disease Activity Scale with 28 joint count =** Tender Joint Count, Swollen Joint Count, CRP, patient global

## Conclusion

- Our results suggest that patients can self-monitor disease activity using patient derived CDAI, SDAI or DAS28 measures.
- Good agreement was found between the disease activity states derived from patient data and MD data from the corresponding measure, except for DAS28 when using four categories.
- There was no statistically significant difference in the agreement across measures.

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