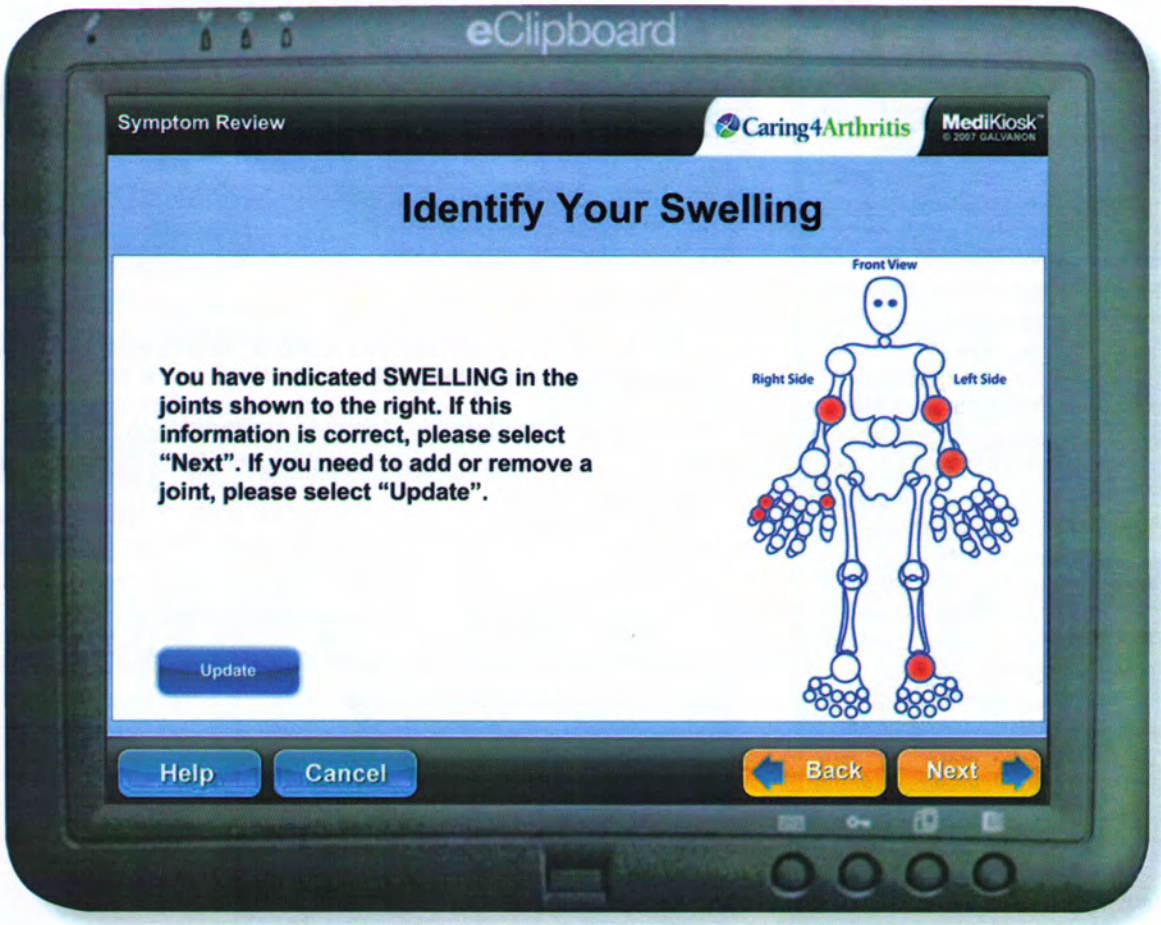
# Computer Assisted Patient Reported (PR) Versus Physician Generated (PG) Joint Count (JC) and DAS28 Scores for Rheumatoid Arthritis (RA) Patients




Gaylis, N.,[1] Scott, J.,[2] North, S.,[2] True, M.,[2] Savloff, G.,[1] Fortner, B.V.[2]
[1] Arthritis & Rheumatic Disease Specialties, [2] P4 Healthcare.

ACR/ARHP Scientific Meeting, Atlanta, GA, November 6-11, 2010

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GAYLIS, N.,[1] SCOTT, J.,[2] NORTH, S.,[2] TRUE, M.,[2] SAVLOFF, G.,[1] FORTNER, B.V


## Abstract

**Background.** JCs and the DAS scores are established clinical indicators of disease severity, treatment response, and outcome measurement for RA. The purpose of this study was to evaluate the similarity and difference between JCs and corresponding DAS scores generated by computer assisted patient self-report or through clinical interview.

**Methods.** An electronic homunculus was created allowing RA patients to rate the severity of tenderness (TEN) and swelling (SW) for indicated joints through touch screen computer tablets. PG JCs were generated through normal clinical interview. A clinician interface allowed the same JC information to be recorded electronically by medical staff. JCs were combined with erythrocyte sedimentation rates (ESR) to calculate DAS28 scores using PR and PG data respectively using accepted scoring methodology. The clinician was not formally blinded to the PR scores and the order of completion was determined by clinical circumstance. The analysis design is an anonymous, retrospective, within subject correlational design testing the convergent validity PR JCs and PR DAS28 scores with corresponding PG scores. The primary hypothesis was that the PR JCs and DAS28 scores would be similar to and not different from PG JCs and DAS28 scores.

**Results.** At the time of this report, 51 RA patients (M[SD] age = 59.3 [11.2]; 86% female) had available PR and PG JCs and DAS28 scores on the same day. PR and PG SWJCs were significantly correlated ($R = 0.52$, $p < .001$) and were not significantly different (M[SD] PRSWJC = 3.2[6.0], M[SD] PGJC = 4.5[5.1], paired samples t-test, $t(df) = 1.1(48)$, $p > .1$). PR and PG TENJCs were significantly correlated ($R = 0.56$, $p < .001$) and trended toward being higher when PG (M[SD] PRJC = 2.8[5.2], M[SD] PGJC = 4.4[6.7], paired samples t-test, $t(df) = 1.9(48)$, p .07). PRDAS28 scores PGDAS28 scores were significantly correlated ($R = 0.75$, $p < .001$) and not significantly different (M[SD] PRDAS28 = 3.6[1.6], M[SD] PGDAS28 = 3.7[1.8], paired samples t-test, $t(df) = 0.8$ (50), $p < 0.4$). As shown in the table, PRTENJC, PRSWJC, and PRDAS28 scores were significantly correlated with RAPID3, RAPID4, and PGDAS28. An exploratory principal components factor analysis was performed on PRTENJC, PRSWJC, PGTENJC, PGSWJC, RAPID4, and ESR. Two components were extracted (Eigenvalues >1) accounting for > 73% of the variance. Component 1 (Symptomatology) was characterized by PRTENJC, PRSWJC, PGTENJC, PGSWJC, and RAPID4. Component 2 (Inflammation) was characterized by ESR PRTENJC, PRSWJC, and PGSWJC.

**Conclusions.** This study suggests that a computer assisted PR JCs are valid and may be used to produce DAS28 scores comparable to PGDAS28 scores. Initial evaluation suggests the PRJCs are related to both RA symptomatology and inflammation. Future evaluations will also compare PR JCs and DAS scores to other available RA measures, such as radiologic indices, and will examine test-retest reliability. The primary study limitations are that PR and PG JCs were blinded and the post hoc nature of the hypothesis.


## Background

- JCs and the DAS scores are established clinical indicators of disease severity, treatment response, and outcome measurement for RA.
- The purpose of this study was to evaluate the similarity and difference between JCs and corresponding DAS scores generated by computer assisted patient self-report or through clinical interview.

## Methods

- An electronic homunculus (Figure 1) was created allowing RA patients to rate the severity of tenderness (TEN) and swelling (SW) for indicated joints through touch screen computer tablets. PG JCs were generated through normal clinical interview.
- A clinician interface allowed the same JC information to be recorded electronically by medical staff.
- JCs were combined with erythrocyte sedimentation rates (ESR) to calculate DAS28 scores using PR and PG data respectively using accepted scoring methodology.
- The clinician was not formally blinded to the PR scores and the order of completion was determined by clinical circumstance.
- The analysis design was an anonymous, retrospective, within subject correlational design testing the convergent validity PR JCs and PR DAS28 scores with corresponding PG scores.
- The primary hypothesis was that the PR JCs and DAS28 scores would be similar to and not different from PG JCs and DAS28 scores.

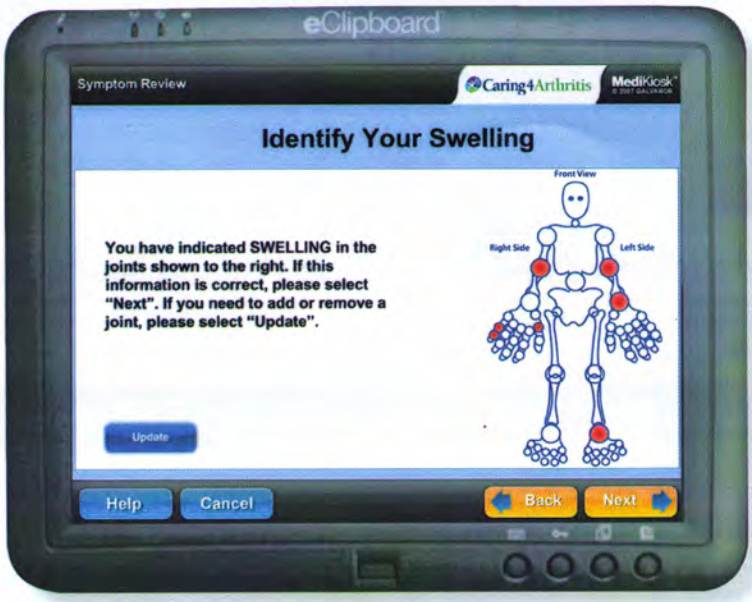


**Figure 1. Electronic, Touch Screen Homunculus.**

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## Results

- 51 RA patients (M[SD] age = 59.3 [11.2]; 86% female) had available PR and PG JCs and DAS28 scores on the same day.

**Table 1. Patient Reported Joint Counts and DAS Scores are Significantly Correlated and not Different than Physician Generated Scores**

| | PR-PG (r*, p.) | PR M[SD] - PG M[SD] | PR vs. PG t**(df), p |
|---|---|---|---|
| Swollen-JCs | 0.52, < .001 | 3.2[6.0] - 4.5[5.1] | 1.1(48), p <.10 |
| Tender-JCs | 0.56, < .001 | 2.8[5.2] - 4.4[6.7] | 1.9(48), p <.07 |
| DAS28 | 0.75, < .001 | 3.6[1.6] - 3.7[1.8] | 0.8 (50), p <.40 |

Note. * Pearson correlation. ** Paired samples t-test.

- As can be seen above, PR and PG JC and Das scores vary with one another (i.e. column 1). In other words, if the physician rating was higher the patient rating tended to be higher and if the physician rating was lower the patient rating tended to be lower. The insignificant tests (i.e. column 3) of the mean values (i.e. column 2) suggest that the magnitude of the scores were not on average different from one another, meaning that a score represented as a particular value by the patient rating was on average not different than the score generated by the physician rating.

**Table 2. Patient Generated JCs and DAS28 are Correlated to Accepted Measures of RA Status.**

| | PR-Tender-JCs | PR-Swollen-JCs | PRDAS28 |
|---|---|---|---|
| Rapid3 | .35 | .34 | **.57** |
| Rapid4 | .50 | .44 | **.66** |
| PGDAS28 | .40 | .51 | **.75** |

Note. Pearson correlation. All p<.01.

- As can be seen above in Table 2, patient generated JCs and DAS scores are related to other accepted measures of RA status (RAPID 3 and 4 and PGDAS28). The pattern of correlations may suggest that while related, patient reported JC's may be less correlated with RAPID 3 and 4 scores and with physician generated DAS28 (i.e. column 2 and 3) scores than when they are combined with ESR to form the patient generated DAS28 score (i.e. column 3 highlighted).
- To further assess the relationship amongst the symptom objective measures we performed an exploratory principal components factor analysis on PRTENJC, PRSWJC, PGTENJC, PGSWJC, RAPID4, and ESR. Two components were extracted (Eigenvalues >1) accounting for > 73% of the variance. Component 1 (Symptomatology) was characterized by PRTENJC, PRSWJC, PGTENJC, PGSWJC, and RAPID4. Component 2 (Inflammation) was characterized by ESR PRTENJC, PRSWJC, and PGSWJC.

## Conclusions

- This study suggests that a computer assisted PR JCs are valid and may be used to produce DAS28 scores comparable to PGDAS28 scores.
- Initial evaluation may suggest that PRJCs are related to both general RA symptomatology and inflammation while RAPID scores are primarily related to general RA symptomatology.
- Future evaluations will also compare PR JCs and DAS scores to other available RA measures, such as radiologic indices, and will examine test-retest reliability.
- The primary study limitations are that PR and PG JCs were blinded and the post hoc nature of the hypothesis.

**References:**

1. Alison E. Heald, Edward J. Fudman, Pervin Anklesaria and Philip J. Mease, on behalf of the 13G01 Study Team Single-joint Outcome Measures: Preliminary Validation of Patient-reported Outcomes and Physical Examination. *J Rheumatol* May 2010 37(5):1042-1048.
2. Edward C. Keystone, Arthur F. Kavanaugh, John T. Sharp, Hyman Tannenbaum, Ye Hua, Leah S. Teoh, Steven A. Fischkoff, and Elliot K. Chartash. *Arthritis & Rheumatism* Vol. 50, No. 5, May 2004, pp 1400–1411.
3. Jacob Cohen(1988). *Statistical Power Analysis for the Behavioral Sciences* (seconded.). Lawrence Erlbaum Associates.