
Proceedings Paper:
Hensor, EMA orcid.org/0000-0002-5245-4755, Tennant, A, Conaghan, PG et al. (3 more authors) (2018) The Optimal Joint Set for Ultrasound Assessment of Synovitis in RA: Results from the Rasch Measurement Model. In: Arthritis and Rheumatology. 2018 ACR/ARHP Annual Meeting, 19-24 Oct 2018, Chicago, Illinois. Wiley .

Background/Purpose:

The recently introduced composite OMERACT-EULAR power Doppler (PD)/grey scale (GS) ultrasound (PDUS) scoring system for RA with a proposed 18 joint set was developed without reference to modern psychometric analysis. We aimed to assess the scoring system and joint selection using the Rasch measurement model, which sets out criteria for measurement of an underlying 'latent' quantity, and to propose a refined tool.

Methods:

We included biologic-naïve patients with ACR 1987 RA diagnosis, disease duration <6 months who received abatacept and methotrexate for 24 weeks in a clinical trial[1]. US was performed at weeks 0, 1, 2, 4, 6, 8, 12, 16, 20 & 24. Bilateral MCPs 1–5, PIPs 1–5, wrist, elbow, shoulder (glenohumeral), knee, ankle (tibiotalar), hind foot (talonavicular and calcaneocuboidal) and metatarsophalangeal joints (MTPs) 1–5 (44 total) were scored 0-3 for GS, PD & PDUS. The scoring system and joint set were assessed for fit to the Rasch model and acceptable reliability (person separation index (PSI) >=0.7). Standardised response mean at 24 weeks was calculated.

Results:

We included 96 patients (mean age 56.5, disease duration <=2 years 43%, 2-10+ years 57%; 83% female). Analysis of the composite score showed that the probability of a joint being assigned a higher score did not consistently increase with the underlying latent quantity i.e. level of inflammation, indicating that assessors were not completely able to distinguish the categories. Shifting the point of transition between a score of 1 and 2, and reserving 3 for GS=3 PD=3 resulted in ordered thresholds. We also found residual correlation between some joints within the proposed 18 joint set, indicating that their scores were not independent. Joints that were only likely to score >0 at high levels of inflammation, beyond the observed range, were prioritised for exclusion. Using revised scoring in a set of 15 joints (bilateral MCPs 1-5, right side wrist, PIPs 2&5, MTPs 2&5) yielded fit to the Rasch model (item-trait interaction Chi-square p=0.647) and acceptable reliability (PSI=0.77; Cronbach's alpha=0.81). Using linear-scaled (transformed) estimates from the Rasch model for the revised scoring in the 15 joint set showed significantly greater sensitivity to change than using original scoring in either the 44 joint set (mean difference (bootstrapped 95% CI)= -0.33 (-0.59, -0.06), p=0.016) or 18 joint set (-0.42 (-0.71, -0.13), p=0.004) in 74 patients with 24 week data available (Table 1).

Conclusion:

Refining both the scoring system and the joint set using the Rasch model resulted in enhanced sensitivity to change. Future work will validate these findings in external data in order to confirm that the proposed changes further improve the sensitivity and reliability of US in clinical trials.

1. D'Agostino et al. Ann Rheum Dis 75:1763-9

Table 1: Standardised response means calculated using various joint sets and original or revised PDUS scoring

	Standardised response mean at 26 weeks (n=74)	
Joints included	Original PDUS scoring	Revised PDUS scoring
44 (22 paired)	-1.05	-1.11
18 (9 paired)	-0.96	-0.98
15 (5 paired, 5 single) – raw score	-1.20	-1.40
15 (5 paired, 5 single) – Rasch-transformed	N/A	-1.38