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A Clinical Risk Score to Predict Functional Disability at 1 Year in an Early Rheumatoid Arthritis Inception Cohort

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Background/Purpose: When diagnosed with rheumatoid arthritis (RA), patients are especially concerned by the prospect of disability. Predictors of future disability may inform early decision making. Previous studies have sought to identify such predictors, but have been limited to the evaluation of traditional biomedical measures within historical cohorts. This study aimed to evaluate both psychosocial and biomedical factors, within a contemporary RA cohort, in order to identify baseline predictors of significant disability at 1 year. Subsequently, we aimed to develop a clinically useful tool which may support early patient education and decision making.

Methods: Analysis used data from the Scottish Early Rheumatoid Arthritis (SERA) inception cohort, an ongoing prospective multicentre study which began recruitment in September 2011. A forward stepwise multivariable logistic regression model was developed. Exposures were putative psychosocial (e.g. work ability, depression, and anxiety) and biomedical (e.g. DAS28-CRP score, neutrophil count and morning stiffness) baseline predictor variables. The outcome was high functional disability (defined as a Health Assessment Questionnaire [HAQ] score >1) at 1 year. The ability of the model to correctly discriminate between patients at low and high risk of the outcome was assessed using the c-statistic. Finally, a clinical prediction score was created based on the coefficients of the predictors determined by the logistic regression model. Each score was translated into a probability of reporting a high HAQ score at 1 year. As a method of external validation, the score was tested using SERA patient data which had been newly acquired since the initial analysis.

Results: Of 578 participants (64.5% female), 80.6% (466/578) fulfilled the 2010 ACR/EULAR classification criteria and 36.7% (212) exhibited high functional disability at 1 year with a HAQ >1. Independent predictors were baseline high HAQ score (OR 2.67; 95%CI 1.98 – 3.59), depression (2.52; 1.18 – 5.37), anxiety (2.37; 1.33 – 4.21), being in paid employment with absenteeism during the last seven days (1.19; 0.63 – 2.23), not in paid employment (2.36; 1.38 – 4.03) and obesity (1.61; 1.04 – 2.50). The good discriminative performance of the model was evidenced by a c-statistic of 0.78. The clinical prediction score (Table 1) ranged from 0 – 26 and had a good discriminative performance in both the original (c-statistic 0.78) and validation data sets (c-statistic 0.78).

Conclusion: In the context of modern treatment paradigms, predictors of 1 year disability appear to be dominated by psychosocial rather than more traditional biomedical measures. Such information may aid both patients and physicians during initial management planning and alludes to the potential benefit of early non-pharmacological interventions targeting key psychosocial factors such as mental health and work disability.

Table 1 Clinical Risk Score for estimation of functional disability (HAQ-DI score >=1) at one year in RA:

Predictors	Categories and corresponding score					Score
HAQ[1]	<1	>=1	>=1.5	>=2	>=2.5	
	0	**4**	**6**	**9**	**11**	
HADS[2] depression score	Low <11	High >=11				
	0	**5**				
HADS[2] anxiety score	Low <11	High >=11				
	0	**4**				
Employment & Absenteeism	In paid employment without absenteeism during the last seven days	In paid employment with absenteeism during the last seven days	Not in paid employment			
	0	**1**	**4**			
BMI	High <25 kg/m^2	High >=25 kg/m^2				
	0	**2**				
					Total score	

[1]HAQ: Health Assessment Questionnaire. [2]HADS: Hospital anxiety and depression scale.
Score ranges between 0 and 26 points.

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