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Original article

Work disability and state benefit claims in early rheumatoid arthritis: the ERAN cohort

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Abstract

Objective. RA is an important cause of work disability. This study aimed to identify predictive factors for work disability and state benefit claims in a cohort with early RA.

Methods. The Early RA Network (ERAN) inception cohort recruited from 22 centres. At baseline, and during each annual visit, participants ($n = 1235$) reported employment status and benefits claims and how both were influenced by RA. Survival analysis derived adjusted hazard ratios (aHRs) and 95% CIs to predict associations between baseline factors and time until loss of employment due to RA or a state benefits claim due to RA.

Results. At baseline, 47% of participants were employed and 17% reported claiming benefits due to RA. During follow-up, loss of employment due to RA was reported by 10% (49/475) of the participants and 20% (179/905) began to claim benefits. Independent predictors of earlier work disability were bodily pain (aHR 2.45, 95% CI 1.47, 4.08, $P = 0.001$) and low vitality (aHR 1.84, 95% CI 1.18, 2.85, $P = 0.007$). Disability (aHR 1.28, 95% CI 1.02, 1.61, $P = 0.033$), DAS28 (aHR 1.48, 95% CI 1.05, 2.09, $P = 0.026$) and extra-articular disease (aHR 1.77, 95% CI 1.17, 2.70, $P = 0.007$) predicted earlier benefits claims.

Conclusion. Work disability and benefits claims due to RA were predicted by different baseline factors. Pain and low vitality predicted work disability. Baseline disability, extra-articular disease manifestations and disease activity predicted new benefits claims due to RA. Future research on interventions targeting these factors could investigate job retention and financial independence.

Key words: rheumatoid arthritis, employment, social security, work disability.

CLINICAL SCIENCE

Introduction

The prevalence of RA in the general population is between 0.5 and 1% with 55% of cases diagnosed at working age [1, 2]. Working ability is multifactorial; it depends on a combination of professional skills and physiological and psychological characteristics in relation to work requirements [3]. Work disability is a term used widely in the literature incorporating reduced work capacity, cessation of working life and applications for benefits and job loss has a significant economic burden. Previous studies have shown that people with RA are more likely to stop work in comparison to the general population, with one study reporting a 32-fold increase [4]. In the UK in 2007, the National RA Society found that 28% of people with RA in the UK gave up work due to their condition within 12 months [5], and a similar high number was reported in a subsequent survey in Scotland [6]. Mean annual loss of productivity due to sick leave in people with RA in Germany was estimated to be 14–17 days [7]. Work disability rates vary, depending on different cohorts, nationalities and definitions used; on average 20–40% of previously employed RA patients become permanently work disabled within 2 years of diagnosis, with this increasing to 40–80% within 5–20 years [8]. In the UK in 2003, 80% of people of working age who received state incapacity benefits did not return to work [9]. In 2009 the UK government reported that 4.5 million people were claiming disability benefits at some level

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[10]. Interventions targeted at factors that predispose to work disability have the potential to ameliorate these social impacts in early RA.

Within the UK, the most frequent benefits claimed by patients with RA are the disability living allowance (DLA) and the employment and support allowance (ESA), previously known as the incapacity benefit. The DLA is not means tested or dependent on employment status and applicants are eligible if problems with mobility or care have persisted for a minimum of 3 months. The ESA is means tested; applicants must be <65 years of age, have finished their statutory sick pay (28 weeks) and must be self-employed or unemployed with an illness that affects their ability to work [11, 12]. Additionally, state benefits may be claimed in the UK for low income, unemployment and other reasons [13]. Although people with RA may claim some of these additional benefits, they are often not considered to be due to RA directly.

Previous reviews have shown that greater disability as measured by the HAQ and older age is associated with future work disability in people with RA [7, 14]. However, only a few studies have tried to identify factors within early RA [14]. This study aimed to identify potential predictive factors for job loss and social security benefits claims in an inception cohort of early RA.

Methods

Patients and recruitment

The Early RA Network (ERAN) inception cohort study began recruitment in April 2002 and currently recruits from 22 outpatient centres in the UK and Ireland [15]. By the end of February 2012, 1235 patients had been recruited following a clinician diagnosis of RA. Data were collected at baseline, between 3 and 6 months and then annually from baseline. ERAN centres manage patients according to local practice. The ERAN study was approved by the Trent Research Ethics Committee (reference 01/4/047) and all participants gave signed, informed consent in accordance with the Declaration of Helsinki.

Data collection

Data collected at baseline and until the most recent follow-up was used in this study. A clinical interview and examination was performed at each visit and participants continued to receive standard care from their rheumatologists throughout the study. At baseline, clinicians recorded standard demographics (age, sex, height and weight), known extra-articular disease manifestations [16] and co-morbidities [17]. The presence of erosions at baseline was identified from radiographs of the hands and feet. Patients completed the 36-item Short Form (SF-36) Health Survey for patient-based assessment of quality of life [18, 19] and the HAQ [20]. At baseline, and during each annual study visit, patients were asked to report employment, job loss (including whether they believed the job loss was due to RA), retirement and whether they were claiming benefits due to RA (including, but not restricted to, disability benefits claims). ESR and RF were obtained from clinical records. Negative or weakly positive results for RF according to local reference ranges were classified as seronegative. Using data from the ERAN database, the 28-joint DAS (DAS28)–ESR score was derived and the patient-derived DAS28 (DAS28-P) was calculated for those with active disease [21]. The DAS28-P is calculated as the proportion of the DAS28 score that is derived from the patient-reported components, namely tender joint counts and patient global health assessments. The DAS28-P is proposed to be associated with non-inflammatory pain mechanisms and central sensitization. The DAS28-P may represent a component of the pain phenotype related to fibromyalgianess that is distinct from current pain severity [21]. After data collection it was determined whether four or more of the 1987 ACR RA diagnostic criteria were met [22]. The type of employment at baseline was recorded in the text at the study visit and coded using the International Standard Classification of Occupations 2008 (ISCO-08) and classified as heavy work or non-heavy work (semi-manual or less) according to a previously published methodology [23]. Current postcodes were used to estimate the socioeconomic deprivation derived from the UK government's 2007 rankings [Index of Multiple Deprivation (IMD) 2007 rankings].

Work disability due to RA

At baseline, participants reported whether they were working or not. At baseline, participants of working age were compared with those that reported active employment. Work disability was defined as the loss of employment due to RA, and this was specifically reported by each participant. For the analysis of job loss due to RA during follow-up, only participants who were working at baseline were included. At each visit participants indicated if they were still working, stopped temporarily, were not currently employed or retired. Each participant also reported whether the loss of employment was due to RA or not. The time until the first job loss due to RA (including concurrent job loss due to RA and first retirement) was derived from these data. Temporary sick leave was not included as a loss of employment, although it was recorded during data collection. After 2 years of being classified as temporary sick leave, we included these people as losing employment. No additional checks were made by investigators into the claims that RA was the cause of loss of employment or whether there were multiple contributing factors.

Benefit claims due to RA

At baseline, participants reported whether they were claiming benefits due to RA or not. For the analysis of time until benefits claims, only those participants who were not claiming at baseline were included. At each visit participants indicated if they were claiming benefits due to RA, and the time until the first benefits claim was derived from these data. The specific benefits being claimed due to RA were not recorded, and each participant self-reported the data.

Statistical analysis

Univariate data analyses were performed using Mann–Whitney *U*-tests, and log-rank or χ^2 tests were used for categorical data, to compare baseline factors between participants with different work and benefit statuses. Correlations of categorical data were performed using Spearman's coefficient. DAS28 scores were classified into European League Against Rheumatism (EULAR) disease activity groups (0–3.19, 3.2–5.19, $\geqslant$5.2) [24] and EULAR response groups comparing baseline and 1-year follow-up [16], and BMI was classified into World Health Organization (WHO) groups (<25, 25–29.9, $\geqslant$30) [25]. For each SF-36 questionnaire subscale (Bodily Pain, Mental Health, Vitality and Physical Function), the raw scores between 0 and 100 were used and not normed for age and gender [19] because these were included as covariates in the analyses. The eligible populations for the analyses of loss of employment due to RA and RA benefit claims were derived and continuous variables were split into quartiles of increasing severity or magnitude within each group. Up until Year 2, follow-up times were calculated as the number of days until an event of interest or right censorship. This was performed to produce accurate estimates of the influence of short follow-up times. Beyond 2 years, the year of each annual visit was used. Survival analysis was performed and Cox regression was used to calculate hazard ratios (HRs), adjusted HRs (aHRs) and 95% CIs to examine independent associations of baseline factors with shorter time until loss of employment due to RA or a new benefits claim due to RA. Variables included in multivariable Cox regression models were age, gender and DAS28, plus any that had an unadjusted *P*-value $\leqslant$0.100 (only one variable describing smoking, work demand or disability was included per model). Sensitivity analyses were performed *post hoc* to examine the impact of early loss to follow-up, the inclusion of people from Ireland and different extra-articular manifestations on our main analyses. From baseline to 1 year, EULAR response categories [26] were calculated from people with DAS28 >3.2, the minimum disease activity required to obtain a good assessment. SPSS version 16 (IBM, Armonk, NY, USA) was used to perform the analyses and $P < 0.05$ was statistically significant.

Results

At baseline, participants ($n = 1235$, 68% female) had a median [interquartile range (IQR)] age of 58 (47–98) years. Forty-seven per cent reported that they were employed at baseline. Also 17% of patients (210/1206) reported claiming benefits due to RA (Table 1). The initial DMARD treatments were MTX monotherapy in 46% (522/1134), SSZ monotherapy in 31% (351/1134) and medication in ERAN has been described in more detail elsewhere [27].

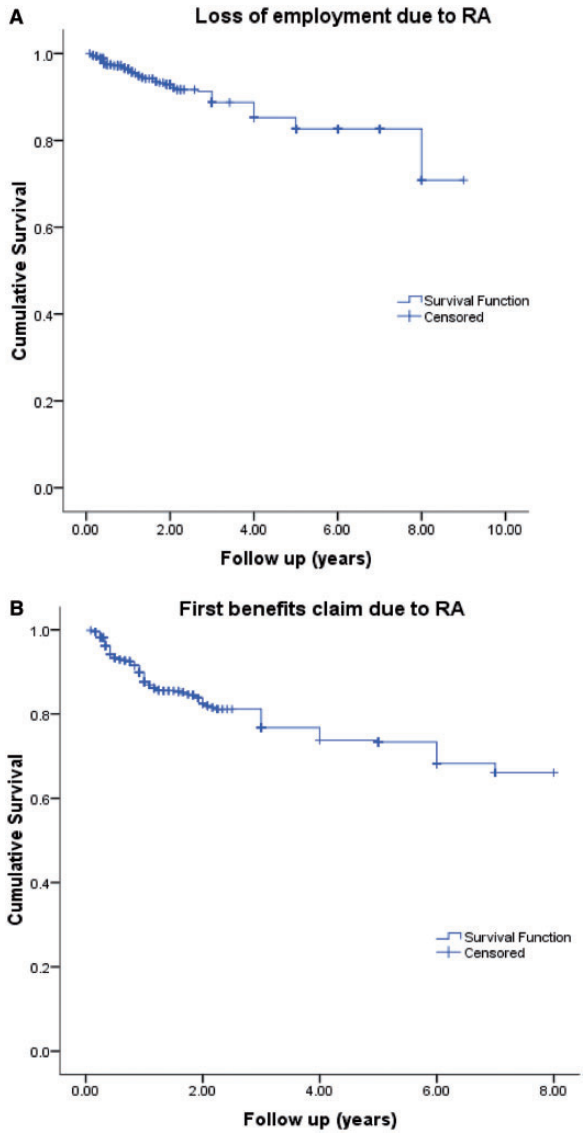
Univariate analyses of baseline characteristics (Table 1) indicated that non-workers of working age were older and exhibited more co-morbidities and higher disease activity, pain and disability as well as lower physical function, vitality and mental health than workers. Non-workers were also more likely to have a history of smoking, but not to be current smokers (workers 29% *vs* non-workers 32%, $P = 0.484$). Heterogeneity was seen between benefit claimants and non-claimants, with regard to age,

Table 1 Demographics of the ERAN cohort and subgroups

Baseline variable	Whole cohort	Working	Not working	Benefits	No benefits
n	1235	567	227	210	974
Age, years	58 (47–98)	**50 (42–57)****	**55 (45–59)**	**60 (50–69)***	**57 (47–67)**
BMI, kg/m^2	26.8 (23.9–30.4)	26.9 (24.0–30.3)	26.8 (24.4–31.8)	26.8 (24.2–31.4)	26.8 (23.8–30.2)
Female gender, %	68	66	70	69	68
Smoking history, %	61	**58****	**70**	**71****	**59**
ACR criteria, %	53	49	55	56	53
Seropositive, %	61	63	61	**54***	**62**
Extra-articular disease, %	15	14	18	17	15
Erosions, %	29	27	29	**35***	**28**
Co-morbidity, %	44	**39****	**49**	**52****	**42**
DAS28	4.8 (3.6–5.8)	**4.4 (3.3–5.5)****	**5.2 (4.0–6.3)**	**5.17 (4.27–6.28)****	**4.68 (3.52–5.75)**
Symptom duration, months	6 (3–12)	6 (4–12)	6 (4–13)	7 (3–13)	6 (3–12)
HAQ	1.0 (0.5–1.63)	**0.9 (0.3–1.4)****	**1.4 (0.8–1.9)**	**1.63 (1–2.13)****	**1.0 (0.38–1.5)**
SF-36 Bodily Pain	41 (22–62)	**41 (31–62)****	**31 (22–51)**	**31 (22–42)****	**41 (31–62)**
SF-36 Physical Function	50 (30–75)	**60 (40–80)****	**35 (15–65)**	**30 (11–55)****	**50 (32–75)**
SF-36 Vitality	44 (25–56)	**44 (25–56)****	**44 (25–56)**	**38 (19–50)****	**44 (25–56)**
SF-36 Mental Health	68 (52–80)	**70 (55–80)****	**60 (45–80)**	**60 (48–76)****	**70 (55–84)**

The demographics of the ERAN cohort are shown with univariate comparisons between each of the subgroups. Values are the percentage, median (interquartile range) or the number in each subgroup. ACR: 1987 American College of Rheumatology criteria for RA. Univariate Mann–Whitney *U* or χ^2 tests $^{**}P < 0.01$ and $^{*}P < 0.05$, comparing working with not-working participants (of working age) or those claiming benefits compared with those not on benefits (all ages). Significant differences between subgroups are highlighted in bold.

FIG. 1 Kaplan–Meier plots for times until work disability and first benefits claims due to RA.



Kaplan–Meier survival plots of (**A**) RA work disability and (**B**) new benefits claims due to RA. Exact follow-up times were calculated until Year 2, after which data were collated yearly.

radiographic erosions, co-morbidities, smoking, disease activity, disability, mental health, pain and vitality.

The median (IQR) follow-up period was 3 (1–4) years. A Kaplan–Meier plot of incident work disability is presented in Fig. 1A. Ten per cent (49/475) of participants who had been employed at baseline reported losing their employment due to RA before their most recent follow-up, and of these, 53% (26/49) reported losing their job due to RA within the first 2 years after baseline assessment. Eighty-four per cent (41/49) of these participants retired when they lost their job. Of these 49 people, only 5 reported a later return to work during the time captured during follow-up.

A Kaplan–Meier plot of incident benefit claims due to RA is presented in Fig. 1B. Twenty per cent (179/905) of participants who were not claiming benefits at baseline began to claim benefits due to RA during follow-up, and 28% (50/179) began within 2 years of baseline. Twenty-nine participants reported both job loss due to RA and new benefit claims. Fourteen participants reported job loss due to RA without benefit claims, and six people reported job loss but had missing benefits data. The major DMARDs initiated first (monotherapies of HCQ, SSZ, MTX or combination therapies including MTX) were not associated with times until work disability ($\chi^2 = 3.3$, df = 3, $P = 0.354$) or benefits claims due to RA ($\chi^2 = 1.1$, df = 3, $P = 0.775$)

Table 2 displays survival analysis using Cox regression analyses for baseline factors associated with earlier time until work disability (job loss due to RA). Unadjusted HRs showed that increased disease activity, disability (HAQ), bodily pain, smoking, low vitality and poorer mental health were associated with earlier work disability. Additionally, univariate log-rank tests stratified by the ERAN study centre did not find significant heterogeneity between sites ($\chi^2 = 11.1$, df = 15, $P = 0.748$). After adjustment, independent predictors for earlier work disability were worse bodily pain and low vitality. Sensitivity analyses that excluded people with a short ($\leqslant 1$ year) follow-up or that excluded people from Ireland ($n = 28$) did not remove the statistical significance of bodily pain or vitality (data not shown).

The survival analysis presented in Table 3 shows the associations between baseline factors and earlier benefit claims due to RA. HAQ disability, disease activity, extra-articular disease, lower vitality, worse bodily pain, poorer mental health and meeting 1987 ACR criteria were associated with earlier benefit claims. Additionally, univariate log-rank tests stratified by the ERAN study centre did not find significant heterogeneity between sites ($\chi^2 = 22$, df = 15, $P = 0.102$). After adjustments, independent predictors of earlier benefits claims were DAS28, HAQ disability and extra-articular disease. The most common extra-articular disease manifestations [nodules ($n = 65$), Sjögren's syndrome ($n = 17$) and Raynaud's disease ($n = 36$)] were each analysed separately. Reported nodules at baseline were significantly associated with the first RA benefits claim before (HR 1.74, 95% CI 1.12, 2.73, $P = 0.015$) and after adjustment for the same confounders (aHR 1.92, 95% CI 1.13, 3.26, $P = 0.016$). Sjögren's syndrome and Raynaud's disease did not show significant associations with benefits claims due to RA at either level (data not shown). None of these three extra-articular manifestations were significantly associated with RA job loss (data not shown). Additionally, excluding people from Ireland did not remove the statistical significance of the DAS28, HAQ and extra-articular manifestations (data not shown).

Patients with a baseline DAS28 >3.2 (the lowest DAS28 value where a good EULAR response was possible) were

Table 2 Predictors for loss of employment due to RA

Baseline variable		Unadjusted		Adjusted	
		HR (95% CI)	*P*-value	aHR (95% CI)	*P*-value
Age	Quartiles	1.30 (0.98, 1.71)	0.067	1.25 (0.88, 1.76)	0.209
Gender	Female	0.86 (0.53, 1.71)	0.860	1.21 (0.53, 2.75)	0.647
BMI	WHO groups	1.31 (0.90, 1.90)	0.161	Not used	
High deprivation	Top quartile	1.21 (0.50, 2.89)	0.673	Not used	
Manual work	Y/N	1.83 (1.01, 3.31)*	0.046	Not used	
Heavy work	Y/N	1.97 (1.07, 3.62)*	0.030	1.27 (0.57, 2.84)	0.559
Ever smoked?	Y/N	2.36 (1.25, 4.46)*	0.008	1.91 (0.89, 5.76)	0.096
Current smoker	Y/N	1.42 (0.77, 2.61)	0.264	Not used	
DAS28	EULAR groups	1.82 (1.17, 2.85)*	0.008	0.96 (0.53, 1.74)	0.901
1987 ACR criteria	Y/N	1.30 (0.73, 2.31)	0.373	Not used	
Seropositive	Y/N	0.61 (0.33, 1.12)	0.113	Not used	
Symptom duration	Quartiles	0.81 (0.61, 1.08)	0.147	Not used	
Extra-articular disease	Y/N	1.60 (0.80, 3.23)	0.187	Not used	
Disability (HAQ)	Quartiles	1.69 (1.25, 2.28)*	0.001	0.93 (0.60, 1.44)	0.744
SF-36 Bodily Pain	Quartiles	2.63 (1.76, 3.92)*	<0.001	2.45 (1.47, 4.08)*	0.001
SF-36 Vitality	Quartiles	1.84 (1.34, 2.53)*	<0.001	1.84 (1.18, 2.85)*	0.007
SF-36 Mental Health	Quartiles	1.34 (1.00, 1.79)*	0.050	0.80 (0.53, 1.19)	0.266
Co-morbidities	Y/N	1.24 (0.69, 2.23)	0.464	Not used	
DAS28-P	Quartiles	1.03 (0.77, 1.39)	0.842	Not used	

Cox regression analyses for baseline variables associated with shorter times until loss of employment due to RA. Unadjusted analyses were performed for each variable. Important demographics, age, gender, DAS28 and others that were close to significance were selected for the multivariable cox regression. HRs and aHRs are presented with 95% CIs and *P*-values. ACR: 1987 American College of Rheumatology criteria for RA. *Significant results.

Table 3 Predictors for new benefits claims due to RA

Baseline variable		Unadjusted		Adjusted	
		HR (95% CI)	*P*-value	aHR (95% CI)	*P*-value
Age	Quartiles	1.03 (0.90, 1.18)	0.628	1.00 (0.83, 1.19)	0.966
Gender	Female	1.30 (0.93, 1.80)	0.126	1.30 (0.85, 2.00)	0.233
BMI	WHO groups	1.21 (0.99, 1.47)	0.057	1.08 (0.84, 1.37)	0.631
High deprivation	Top quartile	1.07 (0.55, 2.09)	0.835	Not used	
Heavy work	Y/N	1.63 (1.03, 2.58)*	0.039	0.97 (0.56, 1.68)	0.912
Ever smoked?	Y/N	1.30 (0.96, 1.78)	0.091	1.28 (0.87, 1.89)	0.204
Current smoker	Y/N	1.24 (0.79, 1.96)	0.347	Not used	
DAS28	EULAR groups	1.38 (1.24, 1.53)*	<0.001	1.48 (1.05, 2.09)*	0.026
1987 ACR criteria	Y/N	1.76 (1.29, 2.41)*	<0.001	1.20 (0.78, 1.85)	0.398
Seropositive	Y/N	1.12 (0.80, 1.55)	0.518	Not used	
Symptom duration	Quartiles	0.93 (0.81, 1.07)	0.328	Not used	
Extra-articular disease	Y/N	1.53 (1.07, 2.20)*	0.020	1.77 (1.17, 2.70)*	0.007
Disability (HAQ)	Quartiles	1.66 (1.43, 1.94)*	<0.001	1.28 (1.02, 1.61)*	0.033
SF-36 Bodily Pain	Quartiles	1.60 (1.36, 1.89)*	<0.001	1.08 (0.84, 1.37)	0.564
SF-36 Vitality	Quartiles	1.38 (1.19, 1.59)*	<0.001	1.07 (0.87, 1.31)	0.514
SF-36 Mental Health	Quartiles	1.33 (1.15, 1.53)*	<0.001	1.08 (0.88, 1.33)	0.480
Co-morbidities	Y/N	1.34 (1.00, 1.81)	0.052	1.19 (0.81, 1.74)	0.385
DAS28-P	Quartiles	1.13 (0.95, 1.34)	0.164	Not used	

Cox regression analyses for baseline variables associated with shorter times until first RA benefits claims. Unadjusted analyses were performed for each variable. Important demographics, age, gender, DAS28 and others that were close to significance were selected for the multivariable cox regression. HRs and aHRs are presented with 95% CIs and *P*-values. *Significant results.

categorized into good, moderate and no response according to EULAR response criteria at 1 year [26]. New work disability was found in 9% (7/74) of good, 18% (9/51) of moderate and 13% (10/76) of no response participants at 1 year ($\chi^2 = 1.8$, $P = 0.406$). The trend for EULAR response to predict work disability was not significant ($r = 0.05$, $P = 0.510$). New benefits claims due to RA were found in 17% (20/121) of good, 27% (33/121) of moderate and 31% (49/157) of no response participants at 1 year ($\chi^2 = 8.1$, $P = 0.018$). Better EULAR response was associated with a lower probability of new benefits claims ($r = 0.14$, $P = 0.007$).

Discussion

We found that baseline factors that most strongly predicted work disability due to RA were bodily pain and vitality. These are symptoms that may respond poorly to traditional medical treatments that focus on disease activity, and additional symptom-focused treatments may have the potential to facilitate job retention. We have previously shown that reported pain remains high during follow-up of people with early RA in the ERAN cohort [28], and factors such as central sensitization in addition to inflammatory disease activity may contribute to poor pain outcomes [21]. Other studies have also demonstrated an increased risk of work disability due to increased bodily pain [29] and that the SF-36 Bodily Pain subscale predicted continuous 1-year sick leave in people with musculoskeletal pain [30]. Low vitality may be related to greater fatigue and less desire to continue working [31], and pain and fatigue contribute substantially to physical disability in RA [32], providing plausible explanations for associations with work disability. Often work disability can occur within the early years from diagnosis [33] and people who lose their jobs are unlikely to return to work [34]. We found that 53% (26/49) of people that reported work disability due to RA did so within 2 years. Greater attention to the alleviation of pain and fatigue in the management of early RA may facilitate job retention.

An association between the SF-36 Mental Health subscale and work disability was demonstrated in one study of RA [35], but we and another study [36] found that any such association was not independent of other covariates. Older age [37], HAQ disability [4, 23, 34] and physically demanding employment [8, 23, 34] have each been reported to be associated with work disability in previous studies [38]. Greater self-reported disability may be expected to make continuing employment more difficult, either because of physically demanding jobs, difficult commutes [5, 6, 39] or lack of support [5, 6]. However, in the ERAN cohort, adjustments for other confounders removed the statistical significance from these factors in our survival analysis, implying a lesser risk from them than from pain and low vitality. Geographical influences may account for differences in work disability across studies, as rates can vary between countries [40], and most of the literature regarding work disability in RA comes from countries other than the UK. It is worth noting that loss of employment due to RA does not always correspond with a new benefits claim. Some benefits may be claimed by those in work (due to disability or low-income employment); also some people leaving work due to RA might not consider their subsequent benefits claims as being due to RA. Benefits for supplementing income might not be reported to ERAN investigators as due to RA, or may not be claimed by all eligible participants.

Baseline factors that most strongly predicted benefits claims due to RA were disease activity, greater disability and the presence of extra-articular disease. The association of benefit claims with baseline extra-articular disease was not explained by greater disability, nor by higher disease activity scores, as it persisted despite adjustment for other factors. Further research is required to determine whether extra-articular disease influences the likelihood that people with RA will apply for benefits or whether it has an influence on the likelihood that benefits will be awarded. When rheumatoid nodules, Sjögren's syndrome and Raynaud's disease were modelled separately, only nodules continued to show a significant association with benefits claims due to RA. However, nodules were the most frequently noted extra-articular features, and our study may not have had sufficient power to detect associations with less common manifestations. Other studies have reported associations between functional capacity and disability payments [4, 14, 41]. The association with baseline HAQ may be expected, as benefits are dependent on the extent of reported disability.

Our data provide some evidence that achieving better EULAR response improves the likelihood that people with RA will not subsequently claim benefits. Interpretation of the lack of observed statistical association between EULAR response and job loss is limited by the small number of participants that could be included in the analysis. Previous studies have demonstrated that treatments that improve inflammatory disease activity in RA can reduce time away from work [42], and further research is necessary to determine the extent to which improved disease-modifying strategies could further reduce work disability compared with the contemporary practice represented by the ERAN cohort.

We present evidence that different baseline factors predict job loss and benefit claims. In particular, both in unadjusted and adjusted analyses, bodily pain predicted loss of employment more strongly than it predicted new benefits claims. Loss of employment and new benefits claims represent distinct aspects of work disability and different strategies may need to be adopted to reduce their impact. Attention to the pain experienced by people with early RA may have a particular impact on job retention.

Data on education level are not available for the ERAN cohort, but may contribute to success in benefits claims. For example, the ability to complete forms or to appeal adverse benefits decisions may influence the success of benefits claims. Education level may also affect job loss and benefits claims by determining employment type and flexibility or contributing to social deprivation. However, we found that high socioeconomic deprivation and

manual work were not specifically associated with loss of employment or new benefits claims due to RA. ERAN recruited from diverse regions of the UK and also from Ireland. However, we did not find evidence that regional variations influenced our findings. No significant heterogeneity was detected between ERAN centres at the univariate level for time until job loss due to RA and benefits claims due to RA, and exclusion of Ireland in our sensitivity analyses did not affect our results. One strength of the ERAN study was that participants were specifically asked to assign a reason for loss of employment, which allowed us to determine work disability due to RA rather than job loss. The predictors of work disability and benefits claims in this study are all readily measured in ordinary clinical settings and could be used routinely. Limitations of this study include the relatively short follow-up and that self-reported information was not verified independently. The UK benefits system requires access to information contained within medical records to validate the process of benefit award, and responses to self-report questionnaires may be influenced by a desire to facilitate potential claims. The data do not identify the type of benefit claimed and our research relied on participants' self-reported relationship between benefits claims and RA. Further research is required to fully explore the possibly complex interactions between RA and other factors that may mediate job loss and benefits claims and would ideally include both qualitative and quantitative methodologies and data from a variety of sources. A proportion of participants may not have applied for social security benefits because of financial security, lack of information or because of negative perceptions of benefit claims. Factors that influence benefit claims in the UK (and Ireland) may not be generalizable to other populations. A greater proportion of people with RA claim benefits in European *vs* North American studies, possibly due to greater accessibility to welfare facilities within Europe and different insurance systems [40, 43, 44].

In conclusion, work disability is a major issue for people with early RA, as manifested by high job loss and benefits claims. Work disability and benefits claims are common in people with newly diagnosed RA. Different baseline factors predict job loss or benefits claims, with pain being a major predictor of subsequent job loss. Greater attention to work disability during the initial assessment of people with RA could lead to interventions that reduce its impact in later disease. Attention to factors such as pain, vitality and reported disability, as well as inflammatory disease activity, has the potential to reduce subsequent work disability in people presenting with early RA.

Rheumatology key messages

- More pain and less vitality at baseline predicted job loss due to RA.
- Disability, higher DAS28 and extra-articular manifestations predicted new state benefits claims due to RA.

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