The impact of Inflammatory Arthritis on Work

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Background
There are many types of rheumatological conditions, affecting people from childhood to old age, e.g.:

- Juvenile Idiopathic Arthritis (JIA)
- Rheumatoid arthritis (RA)
- Psoriatic arthritis (PsA)
Background – Burden of RMDs

- Rheumatic and Musculoskeletal Disorders (RMDs) are the most prevalent diseases in the European working population.

- Musculoskeletal problems account for the greatest number of days lost in the UK: 30.6 million per year.

- 35% of days lost are due to work-related ill-health, and these are due to RMDs.


Background – Rheumatoid Arthritis

- RA prevalence\(^1\): 1% UK adult population

- RA Incidence\(^2\):
  - Women: 54/100,000
  - Men: 25/100,000

Absenteeism and Presenteeism
### Background – Worker Productivity loss

<table>
<thead>
<tr>
<th>Component</th>
<th>Outcome state</th>
<th>Cost indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absenteeism</td>
<td>No. Days/Hours off work, work disability</td>
<td>Cost of time away from job</td>
</tr>
<tr>
<td>Presenteeism</td>
<td>Difficulties at work, at-work productivity loss due to ill health</td>
<td>Worker productivity loss expressed in hours translated into costs</td>
</tr>
</tbody>
</table>

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The Journal of Rheumatology

Measuring Worker Productivity: Frameworks and Measures

DORCAS BEATON, CLAIRE BOMBARDIER, REUBEN ESCORPIZO, WEI ZHANG, DIANE LACAILLE, ANNELIES BOONEN, RICHARD H. OSBORNE, ASLAM H. ANIS, C. VIBEKE STRAND and PETER S. TUGWELL

J Rheumatol 2009;36:2100-2109
Absenteeism and Presenteeism

No health problems

Health status

Major health problems

No productivity loss

At-work productivity loss

Absent from work

Tang et al, J Rheumatol, 2011;38:1776-80; Verstappen, Best Pract Res Clin Rheumatol, 2015, 496-511
Days on sick leave and disability pension in relation to RA diagnosis (patients diagnosed 1999–2007; n=3029). General population comparators matched 5:1 on age (±1 year), sex, education level and county.

Adapted from Neovius et al. ARD 2011;70:1010-1015
Work Disability

Cross-sectional studies

Longitudinal studies

Studies from the USA

Studies from European countries

Adapted from Verstappen et al. Arthritis Rheum 2004;51:488-97
Sick Leave

Mean number of days on sick leave per month

Adapted from Lensinck et al. ARD 2013;72:493-505
## Indirect costs (absenteeism)

<table>
<thead>
<tr>
<th></th>
<th>Men (n=159)</th>
<th>Women (n=417)</th>
<th>Total study population (n=576)</th>
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<tbody>
<tr>
<td><strong>Paid productivity costs:</strong></td>
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<tr>
<td>FC method</td>
<td>473 (2182)</td>
<td>203 (1237)</td>
<td>278 (1559)</td>
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<td>[0 to 14223]</td>
<td>[0 to 12455]</td>
<td>[0 to 14113]</td>
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<tr>
<td>HC method</td>
<td>7750 (15131)</td>
<td>3170 (6654)</td>
<td>4434 (9957)</td>
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<td>[0 to 42020]</td>
<td>[0 to 18683]</td>
<td>[0 to 42020]</td>
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<td><strong>Household productivity costs:</strong></td>
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<tr>
<td>Formal Help</td>
<td>153 (1101)</td>
<td>619 (1306)</td>
<td>491 (1269)</td>
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<td>Informal help</td>
<td>1250 (4109)</td>
<td>1670 (3338)</td>
<td>1554 (3569)</td>
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<tr>
<td>Total</td>
<td>1403 (4499)</td>
<td>2289 (3595)</td>
<td>2045 (3882)</td>
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</table>

Values are mean (SD) [range] costs in Euros per patient per year. The gross national wage was used to value loss of paid productivity in FC and HC methods. FC=friction cost method, HC=human capital method.
Rheumatologic condition had no effect on my work
total score range: 0-10

Patient's score at T1

PASS & MID

Patient's score at T2

0 = low pain

10 = high pain

Important change (i.e. exceeds MID)

No important change

0-4 = low

5-7 = moderate

8-10 = high

Worker Productivity

Related skills / abilities
- Work experience
- Coping skills
- Self-efficacy

Personal appraisals
- Job satisfaction
- Career choices
- Values
- Beliefs

Health
- Fatigue / energy
- Self-perception
- Physical function

Demographics
- Age and gender
- Socioeconomic status
- Education

Economic need
- To qualify for benefits or pension
- Income needs

Work-life balance
- Work/life balance
- Relationships

Organizational policies / practices
- Team dynamics at work
- Compensation of work absences (e.g., by replacement worker)

Economic climate / labor regulations
- Employment opportunities
- Labour and employment laws

Nature of work
- Work demands
- Self-employment
- Job autonomy

Work accommodations
- Adapted devices
- Equipment
- Flexibility of work schedule
- Reduced hours, modified duties

Workplace support
- Task assistance by colleagues
- Co-worker and employer attitudes
- Social support (colleagues)

Non-workplace support
- Task assistance at home
- Attendance

Contextual Factors

Global Measures

Rheumatologic condition completely prevented me from working

Multi-Item Measures
Presenteeism

Adapted from Zhang et al. J Rheumatol 2010;37:1805-14
Indirect costs (presenteeism)

Presenteeism measures

Zhang et al. J Rheumatol 2010;37:1805-14
Indirect costs (presenteeism)

Rheumatologic condition had no effect on my work

0 1 2 3 4 5 6 7 8 9 10

Rheumatologic condition completely prevented me from working

..% reduction

**Indirect costs due to presenteeism** = number of days affected * number of hours working per day * percentage impairment * hourly wage

**Correct costs:**
- Societal perspective?
- Employer’s perspective?
- Patient’s perspective?
Indirect costs (presenteeism)

Direct and indirect burden of illness, by condition and service area (using average impairment and prevalence rates for presenteeism component and $23.15/hour wage estimate)

- **Presenteeism**
- **Absence**
- **Direct costs**

Adapted from Goetzel et al, J Occup Environ Med, 2004 46; 398-412
EULAR-PRO study

• Qualitative research:
  – Content validity

• Test-Retest study

• N=7 countries (n=10 patients per country)

Global measures:

• Work Productivity and Activity Impairment questionnaire (WPAI) *(Reilly et al, Pharmacoeconomics, 1993)*

• Work Productivity Scale – RA (WPS-RA) *(Osterhaus et al, Arthritis Res Ther, 2009)*

• Work Ability Index (WAI) *(Tuomi et al, 1998)*

• Quality and Quantity questionnaire (Q&Q) *(Brouwer et al, Health Policy, 1999)*

• WHO Health and Work Performance Questionnaire (HPQ) *(Kessler et al, J Occup Environ Med, 2003)*
During the past seven days, how much did your rheumatic condition affect your productivity while you were working?

How much did your rheumatic condition affect your **productivity** while you were working?

Rheumatologic condition had no effect on my work

Rheumatologic condition completely prevented me from working

Leggett et al. Rheumatology, 2016; 55:1364-73
# Phase I - Results

<table>
<thead>
<tr>
<th>WPAI - Productivity</th>
<th>QQ - Quality &amp; Quantity</th>
<th>WAI - Work ability</th>
<th>HPQ - Performance</th>
<th>WPS-RA - Interference</th>
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</thead>
<tbody>
<tr>
<td>• Efficacy (UK)</td>
<td>• Accuracy (Sweden)</td>
<td>• Fulfill (Canada)</td>
<td>• Competing sports (Romania / Sweden)</td>
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<tr>
<td>• Output (Romania)</td>
<td>• Amount (The Netherlands)</td>
<td>• Performance (France)</td>
<td>• Effective (Canada)</td>
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<td>• Interrupt (Italy)</td>
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<td>• Impact (UK)</td>
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</table>

![Graph showing recall period and percentage of representative and not-representative responses over time](image-url)

*Leggett et al. Rheumatology, 2016;55:1364-73*
## EULAR-PRO – Phase II

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<tr>
<th></th>
<th>United Kingdom N=76</th>
<th>France N=45</th>
<th>The Netherlands N=96</th>
<th>Estonia N=81</th>
<th>Sweden N=66</th>
<th>Romania N=62</th>
<th>Italy N=31</th>
<th>Canada N=46</th>
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<tr>
<td>Age, years</td>
<td>48 (8)</td>
<td>46 (10)</td>
<td>49 (11)</td>
<td>46 (11)</td>
<td>49 (9)</td>
<td>42 (9)</td>
<td>47 (9)</td>
<td>51 (9)</td>
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<tr>
<td>Gender, female</td>
<td>53%</td>
<td>60%</td>
<td>54%</td>
<td>62%</td>
<td>73%</td>
<td>55%</td>
<td>84%</td>
<td>83%</td>
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<td>General job demands:</td>
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<td>slightly demanding</td>
<td>12%</td>
<td>11%</td>
<td>34%</td>
<td>66%</td>
<td>12%</td>
<td>16%</td>
<td>7%</td>
<td>20%</td>
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<td>demanding</td>
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<td>40%</td>
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<td>30%</td>
<td>41%</td>
<td>54%</td>
<td>50%</td>
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<td>very demanding</td>
<td>47%</td>
<td>49%</td>
<td>26%</td>
<td>4%</td>
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<td>30%</td>
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<td>Job satisfaction:</td>
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<td>satisfied</td>
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<td>78%</td>
<td>84%</td>
<td>81%</td>
<td>66%</td>
<td>74%</td>
<td>73%</td>
<td>71%</td>
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<td>neutral</td>
<td>19%</td>
<td>11%</td>
<td>11%</td>
<td>13%</td>
<td>17%</td>
<td>21%</td>
<td>17%</td>
<td>11%</td>
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<tr>
<td>unsatisfied</td>
<td>24%</td>
<td>11%</td>
<td>4%</td>
<td>6%</td>
<td>17%</td>
<td>5%</td>
<td>10%</td>
<td>18%</td>
</tr>
<tr>
<td>% patients absent in previous week due to ill-health</td>
<td>16%</td>
<td>20%</td>
<td>15%</td>
<td>26%</td>
<td>23%</td>
<td>18%</td>
<td>26%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Values are mean (SD) or median [IQR] depending on the distribution of the data. Categorical data are presented as %. * in those absent due to ill-health. # WPAI (0=condition no effect on work – 10=condition completely prevented work) /10 * 100*

Verstappen et al, EULAR 2017
Interventions
Pharmacological Interventions

- Anti-TNF use did not prevent new work disability
- Patients who responded to anti-TNF therapy were less likely to become work disabled

Unadjusted OR
- Adjusted OR (adjusted for HAQ, DAS28 and job type)

Verstappen et al. Rheumatology, 2010;49:1570-7
<table>
<thead>
<tr>
<th>Author</th>
<th>Study design</th>
<th>Treatment</th>
<th>N</th>
<th>Disease duration in months</th>
<th>Presenteeism measure</th>
<th>Time points</th>
<th>Result</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anis, 2009</td>
<td>RCT (COMET)</td>
<td>MTX ETN+MTX</td>
<td>100</td>
<td>105</td>
<td>WPAI (imputed based on HAQ) WLQ (imputed based on HAQ)</td>
<td>Baseline – 52 wks</td>
<td>WPAI % productivity loss, bootstrapped mean (95%CI): 23.1 vs 15.6, ∆-7.5 (95%CI -11.2, -4.2) WLQ % productivity loss, bootstrapped mean (95%CI): 6.2 vs 4.8, ∆-1.4 (95%CI -2.1 to -0.7) [↑][↑]</td>
<td>[↑]</td>
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<tr>
<td>Kavanaugh, 2009</td>
<td>Phase II RCT (RAPID I)</td>
<td>CZP200+MTX, CZP400+MTX, Placebo</td>
<td>162</td>
<td>139 69</td>
<td>WPS-RA</td>
<td>0, 4, 24, 52 wks</td>
<td>RAPID I: MTX: mean 5.5 vs 4.2 vs 5.2 vs 5.2 CZP200: mean 5.2, 3.5, 2.7, 2.4 CZP400: mean 5.1, 3.6, 2.7, 2.4 [=] [↑] 24 and 52</td>
<td>[↑]</td>
</tr>
<tr>
<td>Van Vollenhoven, 2010</td>
<td>RCT</td>
<td>MTX ADA+MTX ADA+placebo</td>
<td>214</td>
<td>219 231</td>
<td>VAS degree to which patient's normal work performance is affected by RA in last week (0=unaffected to 100mm=completely affected)</td>
<td>0, 4, 8, 10, 12, 26,42, 52, 76 and 104 wks (random effects model)</td>
<td>Comb. Vs MTX: ∆ difference ranging from 7.2 to 15.7 across visits ADA vs MTX: ∆ NS at most visits [↑]</td>
<td>[↑]</td>
</tr>
</tbody>
</table>

RCT = randomised clinical trial; anti-TNF=anti-tumour necrosis factor; ETN = etanercept; ADA = adalimumab; INF=infliximab; MTX=methotrexate; N=number of participants; WPS-RA=Work Productivity Survey for Rheumatoid Arthritis; WPAI = Work Productivity and Activity Impairment Scale; * disease duration of total study population; ∆ = difference; [=] = no significant difference; statistical significant difference
## Non-Pharmacological Interventions

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention group (patients with inflammatory arthritis)</th>
<th>Control group (patients with inflammatory arthritis)</th>
</tr>
</thead>
</table>
| Allaire et al, 2003 | • 1.5 hrs sessions during 5 months:  
  – Job accommodation  
  – Vocational counselling and guidance  
  – Education and self-advocacy                                                                                                                                             | • Written information on how to manage health related employment                                                                              |
| De Buck et al, 2005 | • Hospital-based multidisciplinary vocational rehabilitation programme during 4 to 12 weeks  
  – Systematic assessment  
  – Optional: education, counselling or treatment  
  – Discussion                                                                                                                                     | • Usual outpatient care                                                                                                                                 |
| Macedo et al, 2009  | • Comprehensive occupational therapy for a max. of 6 months  
  – Work and functional assessment  
  – Occupational therapy intervention  
  – Referrals to eg multidisciplinary team or community service                                                                                             | • Routine review by rheumatologist                                                                                                                                 |

*Hoving et al. Cochrane Database Syst Rev 2014*
OMERACT Worker Productivity Group

Multi-Item Measures

PASS & MID

Global Measures

Worker Productivity

Contextual Factors

Organisational policies & practices
- Team dynamics at work
- Compensation of work absences (e.g., by replacement workers)

Economic climate/labour regulations
- Employment opportunities
- Labour and employment laws

Nature of work
- Work demands
- Self-employment
- Taxonomy

Work accommodations
- Adapted devices & equipment
- Flexibility of work schedule
- Reduced hours, modified duties

Workplace support
- Task assistance by co-workers
- Co-worker and employer attitude
- Social support (non-workplace)

Non-workplace support
- Task assistance at home
- (friends/family)

Related skills / abilities
- Work experience
- Coping skills
- Self-efficacy

Personal appraisals
- Task significance
- Career choices
- Self-esteem/toward roles
- Self-perception
- Physical function

Demographics
- Age and gender
- Socioeconomic status
- Education

Economic need
- To qualify for benefits or pension
- Income needs

Work-life balance
- Work/lifestyle balance
- Competing life roles

Rheumatologic condition had no effect on my work

0 = low pain
10 = high pain

Patient’s score at T1
PASS & MID

Patient’s score at T2

important change
(i.e. exceeds MID)

no important change

Rheumatologic condition completely prevented me from working

0 1 2 3 4 5 6 7 8 9 10
**Worker Productivity**

**Nature of work**
- Work demands
- Self-employment
- Job autonomy

**Organisational policies & practices**
- Team dynamics at work
- Compensation of work absences (e.g., by replacement workers)

**Economic climate/labour regulations**
- Employment opportunities
- Labour and employment laws

**Work accommodations**
- Adaptive devices & equipment
- Flexibility of work schedule
- Reduced hours, modified duties

**Workplace support**
- Task assistance by co-workers
- Co-worker and employer attitude
- Social support (workplace)

**Non-workplace support**
- Task assistance at home
- Social support (friends/family)

**Personal factors**
- Fatigue/energy
- Self-perception
- Physical function

**Demographics**
- Age and gender
- Socioeconomic status
- Education

**Economic need**
- To qualify for benefits or pension
- Income needs

**Work-life balance**
- Work/leisure balance
- Competing life roles

**Related skills / abilities**
- Work experience
- Coping skills
- Self-efficacy

**Organisational policies & practices**
- Team dynamics at work
- Compensation of work absences (e.g., by replacement workers)

**Economic climate/labour regulations**
- Employment opportunities
- Labour and employment laws

**Work accommodations**
- Adaptive devices & equipment
- Flexibility of work schedule
- Reduced hours, modified duties

**Workplace support**
- Task assistance by co-workers
- Co-worker and employer attitude
- Social support (workplace)

**Non-workplace support**
- Task assistance at home
- Social support (friends/family)
Impact job demands on Productivity loss

**High Demands**
- **Absenteeism**
- **Presenteeism**

**Low Demands**
- **Absenteeism**
- **Presenteeism**
## Predictors of work disability in RA

<table>
<thead>
<tr>
<th></th>
<th>↑ Disease duration</th>
<th>↑ Age</th>
<th>↓ Education</th>
<th>Marital status</th>
<th>Gender</th>
<th>↑ ESR</th>
<th>RF*</th>
<th>↑ Functional disability</th>
<th>↑ Joint count</th>
<th>↑ X-ray score</th>
<th>↑ Pain</th>
<th>↑ Disease severity</th>
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<tbody>
<tr>
<td>Doeglas</td>
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<td>-b</td>
<td>+b</td>
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</tr>
<tr>
<td>% sign. associations</td>
<td>3 (38)</td>
<td>10 (71)</td>
<td>4 (36)</td>
<td>4 (36)</td>
<td>0 (0)</td>
<td>3 (43)</td>
<td>3 (25)</td>
<td>13 (100)</td>
<td>4 (36)</td>
<td>2 (33)</td>
<td>2 (33)</td>
<td>1 (25)</td>
</tr>
</tbody>
</table>

ESR = erythrocyte sedimentation rate; RF = rheumatoid factor; + = significant finding; b = baseline value; m = mean value from over time.

## Predictors of work disability in RA

<table>
<thead>
<tr>
<th>Doeglas</th>
<th>Physically demanding job</th>
<th>Self employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eberhardt</td>
<td>+b</td>
<td></td>
</tr>
<tr>
<td>Borg</td>
<td>+b</td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>+b</td>
<td></td>
</tr>
<tr>
<td>Reisine</td>
<td>-</td>
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</tr>
<tr>
<td>Mau</td>
<td>-b</td>
<td>-b</td>
</tr>
<tr>
<td>Fex</td>
<td>-b</td>
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</tr>
<tr>
<td>Callahan</td>
<td>+b</td>
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<tr>
<td>Reisine</td>
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<td>De Roos</td>
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</tr>
<tr>
<td>Yelin</td>
<td></td>
<td>+b</td>
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<tr>
<td>Wolfe</td>
<td></td>
<td>+m</td>
</tr>
<tr>
<td>Jantti</td>
<td>-b</td>
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<tr>
<td>Sokka</td>
<td></td>
<td>+b</td>
</tr>
<tr>
<td>Barrett</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 (43) | 5 (71) | 0 (0)

+ = significant finding; b=baseline value; m= mean value from over time

Challenges and Barriers to Remain in Work

Challenges

- PC work difficult when having a flare
- Commute to work
- Lack of understanding
- Financially
- Flexibility
- Availability of equipment

Advantages

- It pays the mortgage. I can afford to go on holiday, it sometimes keeps me going when I don't feel like it.
- Gives me a sense of purpose and makes me get going in the morning. Keeps me cheerful.
- I retain a bit of independence and self-respect.
- Continue to be active, keeps mind active. Social financially better off.
- I like the job. The company of the house.
- Flexibility when I do my hours, I can still in the morning, I can work in the afternoon if I feel better.
- It is very physical and tiring, however, I have requested that I do not work more than 2 days in a row, and this is working fine OK.
- Local, close to home. Park right outside the building. All on one level, no stairs.
- Some equipment made available after first being diagnosed
- Colleagues know and understand
- They are fully aware of my condition. They have acknowledged my requirements to reduce hours and flexible working.

Work Matters

A UK wide survey of adults with Rheumatoid Arthritis and Juvenile Idiopathic Arthritis on the impact of their disease on work

Challenges and Barriers to Remain in Work

- Complications / side effects from medication
- Employer wanted me to go once he / she was aware of long-term condition
- Lack of understanding from employer
- Lack of understanding and support from home
- Unable to get to or travel to work
- Needed specific adaptations at work to carry out job
- Problems with colleagues
- Fatigue affecting ability to work
- Time off sick
- Unable to carry out duties because of physical limitations

Verstappen et al, EULAR 2018
Challenges and Barriers to Remain in Work

Problems patients with RA experience in their current job for those working (W) or in their last job prior to stopping work or early retirement (NW).  
- Not serious;  
- Neither serious nor non-serious;  
- (Very) serious.  

* p<0.05

Verstappen et al, EULAR 2018
Barriers and Facilitators

Interventions

- Gender
- Age
- Job type
- Self-employment
- Job demands
- Company size
- Flexible working hours
- Help colleagues

Decreased Presenteeism & Absenteeism
Conclusions

- Work important for patients with RA:
  - Self-esteem
  - Financial independence

- Worker productivity loss still major socio-economic problem in patients with RA

- Several disease related and job related factors associated with worker productivity loss

- Personalized interventions
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