

# Markers for Work Disability in Rheumatoid Arthritis

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**ABSTRACT.** Work disability is common in rheumatoid arthritis (RA), and accounts for a large fraction of its costs. People with RA who are work disabled have more joint involvement, radiographic damage, and/or laboratory abnormalities than people who are working. However, analysis of predictive and associative markers in 15 studies of work disability indicate that the demographic variables, such as age, occupation, level of education, and duration of disease, as well as functional status in activities of daily living (ADL) identified on a patient questionnaire, appear to identify work status more than physiological variables. Work disability results from complex interactions of a medical disease, demographic variables, social conditions, and government policies. Some patients with RA are work disabled before they see a rheumatologist. Improved work disability outcomes in RA will require attention to social, economic, and political issues, and wider physician and public education concerning RA, in addition to improved medical management of disease. (J Rheumatol 2001;28:1718–22)

*Key Indexing Terms:*  
WORK DISABILITY  
PREDICTORS

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Work disability is a frequent problem for patients with rheumatoid arthritis (RA)<sup>1-7</sup>, which accounts for a large fraction of the costs of this disease<sup>8-10</sup>. Work disability is one of the few indisputably undesirable outcomes of RA, which appears to be occurring at lower rates in the late 1990s compared to the early 1980s<sup>6,11</sup>. Information concerning risk factors for work disability would appear of considerable interest to ameliorate longterm consequences of RA.

Work disability has been thought to be based on and explained by physiological variables, such as limited range of joint motion, radiographic damage, and/or laboratory tests, in accord with a traditional “biomedical model”<sup>12-14</sup>. Indeed, information concerning these variables is routinely queried in the work disability process in the United States, Finland, and other countries. People who are work disabled do have more severe RA according to physiologic measures of joint involvement than those who continue to work. However, the most important determinants of work status appear to be demographic variables, such as patient’s age, occupation, level of education, and duration of disease, as well as functional status in activities of daily living (ADL) identified on a patient questionnaire.

We summarize 15 reports concerning work disability in RA and review the striking agreement in these studies regarding markers that are associated with or that predict work disability. Some of these studies are cross sectional,

and present only *associative* variables, while others present longitudinal data, with *predictive* markers for future disability. We then discuss possible strategies to preserve work capacity in patients with RA.

## MARKERS ASSOCIATED WITH WORK DISABILITY IN RA

Fifteen published studies of variables associated with or predictive of work disability in RA are summarized, including demographic and other variables that are not modifiable through medical care (Table 1), and variables that are potentially modifiable through medical care (Table 2). The number of studies in which variables were found to be associated significantly with work disability (+), associated but not significantly (NS), and not available (NA) is summarized in Table 3.

Among demographic variables, high age was associated significantly with work disability status in 11 of the 13 studies (85%) in which it was available. Low formal education level was associated significantly with work disability status in 9 of 13 studies (69%) in which it was available. Occupational heavy labor was associated significantly with work disability status in all 14 studies in which it was available. One other non-modifiable variable, duration of disease, was associated significantly with work disability status in 6 of 10 studies (60%); 4 studies involved cohorts in which duration of disease was similar in all patients with early arthritis, so that associations with work disability could not be analyzed.

Among potentially modifiable disease variables, the joint count was significantly associated with work disability status in all 11 studies in which it was available. However, in regression analyses, joint count data were generally not significant when information concerning age, occupation,

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Table 1. Work disability in rheumatoid arthritis: predictive or associated variables which are non-modifiable in medical care.

| Study <sup>Reference</sup>  | Type of Study, duration, yrs | No. of Patients | Mean Disease Duration (yrs) at Start/at Review | Working at Review, % | Older Age | Lower Educational Level | Physically Heavier Occupation | Duration of Disease |
|-----------------------------|------------------------------|-----------------|--|----------------------|-----------|-------------------------|-------------------------------|---------------------|
| Yelin, 1980 <sup>1</sup>    | CS                           | 180             | 10   | 40                   | NS        | NS                      | +                             | +                   |
| Makisara, 1982 <sup>2</sup> | CS                           | 405             | 10   | 50                   | +         | +                       | +                             | +                   |
| Pincus, 1984 <sup>3</sup>   | LO, 9                        | 75              | 11/20  | 15                   | NA        | NA                      | NA                            | NA                  |
| Yelin, 1987 <sup>4</sup>    | LO, 4                        | 306             | 10/14  | 50                   | +         | NS                      | +                             | NS                  |
| Kaarela, 1987 <sup>7</sup>  | LO, 20                       | 103             | < 0.5/20                                       | 20                   | NA        | +                       | +                             | -                   |
| Jantti, 1999 <sup>19</sup>  |                              |                 |  |                      |           |                         |                               |                     |
| Reisine, 1989 <sup>43</sup> | CS                           | 122             | NA   | 57                   | +         | NS                      | +                             | NS                  |
| Borg, 1991 <sup>15</sup>    | LO, 2                        | 83              | < 2/2  | 63                   | +         | NS                      | +                             | -                   |
| Callahan, 1992 <sup>5</sup> | CS                           | 175             | 11   | 28                   | +         | +                       | +                             | +                   |
| Allaire, 1995 <sup>18</sup> | CS                           | 469             | 7  | 78                   | +         | +                       | +                             | +                   |
| Doeglas, 1995 <sup>36</sup> | CS                           | 119             | 2  | 45                   | +         | +                       | +                             | +                   |
| Reisine, 1995 <sup>44</sup> | LO, 5                        | 392             | 9/14   | 66                   | +         | +                       | +                             | NS                  |
| Mau, 1996 <sup>16</sup>     | LO, 6                        | 73              | < 1/6  | 51                   | +         | NA                      | +                             | +                   |
| Fex, 1998 <sup>17</sup>     | LO, 7                        | 86              | < 2/7  | 66                   | +         | +                       | +                             | -                   |
| Wolfe, 1998 <sup>6</sup>    | LO, 18                       | 436             | 5/NA   | NA                   | NS        | +                       | +                             | NS                  |
| Sokka, 1999 <sup>11</sup>   | LO, 10                       | 82              | < 2/10   | 58                   | +         | +                       | +                             | -                   |

ESR: Erythrocyte sedimentation rate; CS: cross sectional; LO: longitudinal; +: significant association; NS: not significant; NA: not available; -: disease duration same in all patients.

Table 2. Work disability in rheumatoid arthritis: predictive or associated variables that are modifiable in medical care.

| Study <sup>Reference</sup>  | Type of Study, duration, yrs | No. of Patients | Functional Status Questionnaire | Joint Count | Radiographic Stage | ESR | Pain Scores | Patient Global Status | Physician Global Status | Psychological Status |
|-----------------------------|------------------------------|-----------------|---------------------------------|-------------|--------------------|-----|-------------|-----------------------|-------------------------|----------------------|
| Yelin, 1980 <sup>1</sup>    | CS                           | 180             | NA                              | +           | NA                 | NA  | NA          | NA                    | +                       | NA                   |
| Makisara, 1982 <sup>2</sup> | CS                           | 405             | +(Lee)                          | NA          | NA                 | NA  | NA          | NA                    | NA                      | NA                   |
| Pincus, 1984 <sup>3</sup>   | LO, 9                        | 75              | NA                              | NA          | NA                 | NA  | NA          | NA                    | NA                      | NA                   |
| Yelin, 1987 <sup>4</sup>    | LO, 4                        | 306             | +(HAQ)                          | +           | NS                 | NS  | NA          | NA                    | NA                      | NA                   |
| Kaarela, 1987 <sup>7</sup>  | LO, 20                       | 103             | +(HAQ)                          | +           | +                  | NA  | NA          | NA                    | NA                      | NA                   |
| Jantti, 1999 <sup>19</sup>  |                              |                 |                                 |             |                    |     |             |                       |                         |                      |
| Reisine, 1989 <sup>43</sup> | CS                           | 122             | +(HAQ)                          | NA          | NA                 | NA  | NA          | NA                    | NA                      | NA                   |
| Borg, 1991 <sup>15</sup>    | LO, 2                        | 83              | +(HAQ)                          | +           | NA                 | NS  | NS          | NA                    | NA                      | NS                   |
| Callahan, 1992 <sup>5</sup> | CS                           | 175             | +(MHAQ)                         | +           | +                  | NS  | +           | +                     | NA                      | NA                   |
| Allaire, 1995 <sup>18</sup> | CS                           | 469             | +(HAQ)                          | NA          | NA                 | NA  | +           | NA                    | NA                      | NA                   |
| Doeglas, 1995 <sup>36</sup> | CS                           | 119             | +(HAQ)                          | +           | NA                 | +   | NA          | NA                    | NA                      | NA                   |
| Reisine, 1995 <sup>44</sup> | LO, 5                        | 392             | NS                              | +           | NA                 | NA  | +           | NA                    | NA                      | NA                   |
| Mau, 1996 <sup>16</sup>     | LO, 6                        | 73              | NA                              | +           | +                  | +   | NA          | NA                    | NA                      | NA                   |
| Fex, 1998 <sup>17</sup>     | LO, 7                        | 86              | +(HAQ)                          | +           | +                  | NA  | NS          | NA                    | NA                      | NS                   |
| Wolfe, 1998 <sup>6</sup>    | LO, 18                       | 436             | +(HAQ)                          | +           | NA                 | +   | +           | +                     | NA                      | +                    |
| Sokka, 1999 <sup>11</sup>   | LO, 10                       | 82              | +(HAQ)                          | +           | +                  | NS  | +           | +                     | NA                      | NA                   |

ESR: Erythrocyte sedimentation rate; CS: cross sectional; LO: longitudinal; +: significant association; NS: not significant; NA: not available; HAQ: Health Assessment Questionnaire; MHAQ: Modified Health Assessment Questionnaire.

and duration of disease was available. Radiographic stage was significantly associated with work disability status in 5 of 6 studies in which it was available, again not significant when demographic variables and duration of disease were available. The erythrocyte sedimentation rate (ESR) was significantly associated with work disability status in 3 of 7 studies (43%). Physician global status was associated significantly with work disability status in the only study in which it was recorded.

Among self-report patient questionnaire measures, poor functional status according to a patient questionnaire was associated with work disability status in 11 of 12 studies in which it was available; 10 of these studies included the Health Assessment Questionnaire (HAQ) or modified HAQ (MHAQ). Pain score was significantly associated with work disability status in 5 of 7 studies in which it was recorded (72%). Patient global status was significant in all of 3 studies in which it was reported. Psychological status was

Table 3. Work disability in rheumatoid arthritis: associated markers in 15 published reports.

| Variable                        | Statistically Significant | Not Statistically Significant | Not Available |
|---------------------------------|---------------------------|-------------------------------|---------------|
| Non-modifiable variables        |                           |                               |               |
| Age                             | 11                        | 2                             | 2             |
| Formal education level          | 9                         | 4                             | 2             |
| Occupation                      | 14                        | -                             | 1             |
| Duration of disease             | 6                         | 4                             | 1             |
| Modifiable variables            |                           |                               |               |
| Joint count                     | 11                        | -                             | 4             |
| Radiographic stage              | 5                         | 1                             | 9             |
| Erythrocyte sedimentation rate  | 3                         | 4                             | 8             |
| Functional status questionnaire | 11                        | 1                             | 3             |
| Pain score                      | 5                         | 2                             | 8             |
| Patient global status           | 3                         | 0                             | 12            |
| Physician global status         | 1                         | 0                             | 14            |
| Psychological status            | 1                         | 2                             | 12            |

reported significant in one of 3 studies in which it was available.

Overall, there appears substantial agreement in these studies that age, formal education level, occupation, joint involvement by physical examination or radiograph, functional status, and pain score are significantly associated with work disability (Table 3). While the table includes both associated and predictive markers, results appear quite similar for both types of variables in different studies. In particular, most studies in which it is available indicate that a patient questionnaire disability score is an independent predictor of work disability in RA<sup>6,15-17</sup>.

Certain studies indicated favorable or unfavorable values for variables associated with work status (Table 4). These studies suggest that anatomic stage<sup>1</sup>, MHAQ scores<sup>5</sup>, HAQ and RADAR combined scores<sup>18</sup>, pain, ESR, and HAQ scores<sup>6</sup>, and HAQ and Larsen radiographic scores<sup>19</sup>, were predictive of a likelihood of working, including MHAQ score < 1, pain score < 1, HAQ score < 1.56 or 0.5, and radiographic score < 20 (Table 4). In theory, these values would be reasonable targets for potential efforts to prevent work

disability, although demographic data concerning age, occupation, and education level may overwhelm medical efforts to prevent work disability through improving clinical status variables.

#### HOW TO REDUCE RISK OF WORK DISABILITY IN RA?

Several studies indicate that longterm outcomes of RA can be improved with early and aggressive therapy with conventional disease modifying antirheumatic drugs (DMARD), including retardation of radiographic damage<sup>20-24</sup>, better functional outcomes<sup>25-32</sup>, and longer life span<sup>33-35</sup>. It appears likely, therefore, that development of work disability could be influenced by active therapy with DMARD, but no longterm data are available to document this possibility.

An important consideration in efforts to improve work disability outcomes is that work disability is not infrequent even during the first few years of disease<sup>7,11,15-17,36</sup>. Work disability may be seen more commonly early in disease course in certain European countries compared to the United States, because of different social and economic disability

Table 4. Work disability in rheumatoid arthritis: favorable versus unfavorable values for predictive or associated variables that are modifiable in medical care.

| Study <sup>Reference</sup>        | Disease Duration (yrs)            | Variable (range)                  | Favorable        |            | Unfavorable       |           |
|-----------------------------------|-----------------------------------|-----------------------------------|------------------|------------|-------------------|-----------|
|                                   |                                   |                                   | Value            | Working, % | Value             | Working % |
| Yelin, 1980 <sup>1</sup>          | 10                                | Anatomic stage (1-4)              | 1 or 2           | 100        | 3 or 4            | 28        |
| Callahan, 1992 <sup>5</sup>       | 11                                | MHAQ (1-4)                        | < 1.56           | 94         | > 1.56            | 27        |
| Allaire, 1995 <sup>18</sup>       | 7                                 | HAQ and RADAR (0-3)               | < 1.28 or < 1.65 | 86         | > 1.28 and > 1.65 | 25        |
| Wolfe & Hawley, 1998 <sup>6</sup> | Predictive variables over 5 years | Pain (0-3)                        | < 1              | 92         | > 2               | 45        |
|                                   |                                   | ESR                               | < 30             | 80         | > 60              | 50        |
|                                   |                                   | HAQ (0-3)                         | < 1              | 90         | > 2               | 45        |
| Jantti, 1999 <sup>19</sup>        | 20                                | HAQ (0-3)                         | ≤ 0.5            | 58         | ≥ 1               | 8         |
|                                   |                                   | Larsen radiographic score (0-100) | < 20             | 54         | > 40              | 13        |

ESR: Erythrocyte sedimentation rate; HAQ: Health Assessment Questionnaire; MHAQ: Modified Health Assessment Questionnaire; RADAR: Self-report joint count.

policies in different countries<sup>6</sup>. In all countries, however, a number of patients with RA may already be work disabled prior to diagnosis<sup>17</sup>. Therefore, the first months and the first year with RA may be crucial in work disability, suggesting that patients should be seen by a rheumatologist early in disease course.

Prolonged unemployment can lead to the development of an “unemployed” identity<sup>37</sup>, and the burden of diagnosis of a chronic disease may lead to psychological distress. Consultation with a social worker, physical therapist, occupational therapist, or a psychologist may also be of value in early RA in order to prevent work disability. Preliminary data indicate that active therapy with DMARD and multidisciplinary team care may reduce permanent work disability rates in patients with early RA, as the number of patients with full time sick leave was reduced from 34% to 14% over a year, and only one of 111 patients retired<sup>38</sup>.

In an era when there was little that could be done to prevent longterm damage in RA, the rationale for early intervention was limited, although one study from the 1970s does suggest that early intervention is associated with better longterm outcomes<sup>20</sup>. However, at the present time, when more powerful DMARD are available to control disease activity and slow progression, early intervention in RA appears an urgent matter. Substantial delays are often seen in the diagnosis of RA in the community, as many physicians rely on rheumatoid factor, which is negative in 20% of patients throughout their course, and in 50–70% of patients in the first 6 months of disease<sup>39</sup>. Therefore, improvement of work disability outcomes in RA may depend as much on education of physicians as on new DMARD.

In summary, work disability is a major consequence of RA for the individual patient, her or his family, and for society. Work disability results from a complex interplay of a medical disease, demographic variables such as age and occupation, as well as social conditions including the unemployment rate and government policies on application for disability payments<sup>18,40-42</sup>. Major improvement in work disability outcomes in RA appears a realistic possibility at this time, but may depend as much on physician and public education, as well as health policy issues, as on medical advances.

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