Financial and Career Losses Due to Rheumatoid Arthritis: A Pilot Study

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ABSTRACT. Objective. To use a novel method of estimating income loss associated with rheumatoid arthritis (RA).

Methods. For the 26 RA patients (16 female and 10 male, mean age 52.77 yrs) participating in our study, job histories were used to estimate earning potential based on the United States Department of Labor job analysis. To estimate current function, work samples were performed using the Valpar Instrument Battery. The tests include measures of motor coordination, finger dexterity, and manual dexterity. Databases were used to estimate current earning potential on the basis of these performance measures.

Results. Estimated earnings decreased from $18,409 to $13,900 per yr. Furthermore, it was estimated that the number of jobs patients could perform dropped from 11.5 million to 2.6 million.

Conclusion. These preliminary estimates suggest that RA causes significant reductions in earning potential and in the number of jobs that can be performed. This methodology, using a small sample of patients, produced results consistent with larger population studies. (J Rheumatol 1997;24:1527–30)

Key Indexing Terms:
RHEUMATOID ARTHRITIS
INCOME LOSS

The increasing incidence of musculoskeletal conditions diagnosed each year has resulted in decreases in work force participation due to arthritis disability and impairments. Along with an increase in awareness of arthritis through the popular media has come the expectation of a corresponding increase in applications for disability benefits and accommodations in the workplace. The combination of pain, activity limitation, and work disability makes arthritis the leading cause of work loss in working adults over age 50. Wolfe noted that in addition to the disability caused by arthritis, patients must contend with the adverse effects of therapy. Deterioration of functioning due to arthritis is a significant predictor of dropout rates in the workplace. Although many population-based studies have addressed the effects of musculoskeletal diseases in general, specific illnesses such as rheumatoid arthritis (RA) may have a profound effect upon daily functioning. RA is not only a joint disease; systemic manifestations such as fatigue, fever, and weight loss may also be present. The impact of arthritis on work disability is difficult to evaluate. Most published studies on the economic costs of RA use survey, self-report data. New methods have been developed to estimate work potential on the basis of observed performance. The purpose of this paper is to estimate the financial and career losses of patients with RA, using these observational methods.

MATERIALS AND METHODS

Patients. Twenty-six RA patients (16 female and 10 male) (mean age = 52.77 yrs) were recruited consecutively through the university-based practice of one of the collaborators (MW). Institutional review was obtained from the University of California, San Diego Committee on Human Subjects. Reviews of patient records confirmed a diagnosis of RA. Cases were selected so that half of the patients had been diagnosed in the last 5 yrs while the other half had carried the diagnosis for more than 5 yrs. The time of onset was confirmed by the review of patient records. Characteristics of these 2 groups are summarized in Table 1. Differences between the male and female participants are shown in Table 2. Male participants were older, and had been diagnosed at a later age. Although income prior to diagnosis was comparable for men and women, postdiagnosis income was significantly lower for women.

Measures. This study estimates income loss and job functioning using 2 methods. Since we were unable to collect data on performance prior to illness, we estimated earning potential from work history. Work samples were

Table 1. Summary of participant characteristics.

<table>
<thead>
<tr>
<th>Group 1 (RA &lt; 5 years)</th>
<th>Group 2 (RA &gt; 5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>13</td>
</tr>
<tr>
<td>Females</td>
<td>8</td>
</tr>
<tr>
<td>Males</td>
<td>5</td>
</tr>
<tr>
<td>Number currently</td>
<td>10*</td>
</tr>
<tr>
<td>earning income</td>
<td></td>
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*Three subjects were nonresponders (2 female, one male) for income data.
used subsequently to evaluate current earning potential. A Worker Trait Profile (WTP) was developed for each participant using a combination of assessment methodologies. This process used the data collection approach of the job analysis system outlined in the United States Department of Labor (DOL) Handbook for Analyzing Jobs. The procedure is very comprehensive; it requires data for each of the factors and subfactors of the DOL Worker Qualifications Profile, as well as medical limitations and functional capacity data. Integration of the different assessment methodologies used to develop the WTP allows for cross validation of factors and subfactors ratings across different assessment formats. The primary assessment procedures were the Transferable Skills Assessment (TSA) and the Self Report Profile (SRP). The TSA is a computerized system used to review past experiences such as work, school, and hobbies, and to develop job related skills from those elements. By identifying the skills, knowledge, attitudes, and aptitudes required from a history, one can determine an earning potential as evidenced by actual demonstrated successful behavior. Comparison of recent history with earlier history allows for investigation of work capacity deterioration.

Self-Report Profile (SRP). The SRP requests self-report information for each of the factors and subfactors of the Worker Qualifications Profile, as well as medical limitations and functional capacity data. This procedure is a self-report employability skill and functional capacity evaluation.

Based on the work history, these methods were used to estimate the highest aptitude level used in jobs performed prior to age of diagnosis. These levels were determined from a standard 1 to 5 scale established by the DOL. For aptitude (I = top 10%, 2 = top 1/3 minus top 10%, 3 = middle 1/3, 4 = lower 1/3 minus bottom 10%, 5 = bottom 10%). The DOL specifically defines 12,741 jobs in the US labor force. In addition, numbers of individuals employed in job classes, training requirements, wage statistics, aptitude level requirements, etc., can be obtained from databases.

Work samples. To determine current level of functioning, typing (using a keyboard) and work sample tasks were chosen from the Valpar International Corporation and LIFECORP KFM Snapshot instrument batteries that objectively assess motor coordination (K), finger dexterity (F), and manual dexterity (M). These batteries measure work-related skills and use criterion-referenced testing. This method involves an objective standard or achievement level rather than norm referenced testing, which compares a subject’s performance to that of a normative group. In patients with RA the scores for, K, F, and M typically decrease over time. They are the focus of the assessment of economic and career losses in this study.

The exercises selected for this study include assessment of hands and fingers with and without the use of small tools to assess both fine and gross motor functioning.

We employed a typing exercise from the Valpar Component Work Sample that uses an electronic typewriter to simulate typing tasks appropriate for disabled and able-bodied persons. A special daisy wheel that prints in Greek letters and scientific symbols was used. Subjects followed instructions to type specific arrangements of the letters and symbols from the “home” position. The exercise was timed and each subject had an opportunity to practise the exercise to ensure understanding of the task. Valpar has set time performance standards for this exercise through an engineering discipline known as Methods-Time Measurement (MTM). MTM is used to characterize work requirements. The subject’s performance time was compared to this standard to determine the rate of work in relation to task requirements. This typing task requires speed and accuracy and assesses both K and F.

The LIFECORP KFM Work Sample Unit is a combination of 3 individual exercises requiring the manipulation of small parts (i.e., screws and rivets) by hand and with the use of a small screwdriver. The exercises focused on K, F, and M. The exercises were timed and each subject had an opportunity to practise the exercise to ensure understanding of the tasks prior to testing. LIFECORP also utilizes the MTM procedure for setting standard time performance or rate of work requirements. The subject’s performance was compared to this standard to determine relative rate of work on each exercise. These tasks require both speed and accuracy.

Numerous studies have examined the reliability and validity of work samples. In a study of over 1600 Social Security Disability Income (SSDI) applicants, scores on work functioning were stable for about 80% of the applicants. Most studies find that work samples provide information that has considerable covariance with other paper-pencil and interview assessments. However, the associations are not perfect. This is consistent with VALPAR studies showing that about 20% of the applicants required additional assessment. Validity studies comparing results or work sample screening for work performance report relatively high predictive validity coefficients, especially in the area of psychomotor skills. The tasks selected for these exercises emphasized manual functions rather than knowledge or cognitive abilities, since the former are presumed to be affected by RA, while the latter are not.

Procedure. Patients were contacted by phone and invited to participate in a research project investigating the economic ramifications of RA. Once subjects agreed to participate, they were scheduled to be assessed at the San Diego State University Interwork Institute. Each subject participated in a one-hour evaluation. At the beginning of the session, a designated tester took a complete work history. From that information, the highest aptitude levels of K, F, and M were determined for performance prior to age of onset. The work sample tests were then administered to the subjects to establish current levels (post-condition) of K, F, and M.

Analysis. Analysis of data from performance tasks was done by Lifestyle Enhancement Systems, Inc. Subject’s (timed) raw scores on each of the tasks were converted into levels scores for K, F, and M. These levels are defined in detail in the DOL publication. Subjects received scores for K and F on the typing task, for K, F, and M on the Work Sample Unit task.
Additionally, the K and F scores were combined to give an overall profile score. These scores were then used to assess both economic and career losses in RA patients.

The precondition KFM profiles (based on work history) were then compared to the aptitude requirements of each of the 12,741 jobs in the DOL database. The number of jobs that required aptitude levels equal to or less than those levels demonstrated by the individual were counted (precondition DOL job count). The average earnings for those jobs were then calculated (precondition earnings).

The postcondition KFM profiles (based on work sample testing) were then compared to the aptitude requirements of each of the 12,741 jobs in the DOL database in the manner described above, giving the postcondition DOL job count. Estimated potential lost wages were then calculated by subtracting precondition estimates from the postcondition earnings.

College president and fast foods worker are separate job titles. However, there are more fast food workers than there are college presidents. Therefore, the total number of pre and postcondition jobs was determined by multiplying the number of job titles by the number of individuals in each of those jobs. Pre and postcondition earnings (weighted) were calculated by adding the earning data to that calculation. The means and standard deviations (SD) are given for each calculation.

RESULTS

Table 3 summarizes the means and SD for all arthritis patients with regard to earnings and job availability according to normative data from the DOL\(^5\), and scores on each of the level scores for both pre and post-RA time frames.

Wages were estimated from the precondition work history and adjusted for inflation to expected current earnings. The performance tasks were then used to estimate current earning potential. These methods showed that estimated earnings dropped from an average of $18,409 to $13,900 per year for postcondition earning (based on postcondition performance). Similar results were obtained for jobs that could be performed before and after the onset of RA. The number of jobs (e.g., job titles multiplied by number of jobs in the economy according to the DOL) that could be performed prior to the condition was estimated to be 11,516,056.57. This dropped to 2,647,560.83 jobs for the postcondition estimate. K dropped from a precondition level of 3.61 to a postcondition level of 2.61. For all variables, postcondition levels for wages, number of jobs, and aptitude levels (e.g., K, F & M), were significantly lower than precondition levels.

DISCUSSION

Results of this study suggest that individuals with RA suffer significant job and income losses. Changes in K, F, and M may have caused individuals with RA to lose their jobs due to performance deficits, pain, and disability. Patients with RA who remain in the labor force may participate on a limited basis or change work fields to preserve some of their income. Patients also reported changes in performance depending on current levels of pain, suffering, and impairment.

These financial and career losses due to RA must be interpreted with caution. This was a pilot study that tested a new methodology with several important limitations. First, because of the small non-randomly selected sample, we cannot generalize our results to all RA patients. Generalizations are further constrained because the severity of RA may not have been representative of all patients. Disease severity is important because RA is a progressive disease with serious physiological sequelae that lead to increasing disability. Further, the cause of disability at one stage (pain, fatigue) may be different from the cause of disability at a later stage (deformity). Second, subjects were recruited from the private practices of local rheumatologists. As a result, they represent those who can afford medical services, seek medical attention due to significant disease symptomatology or demonstrate medication-seeking behavior. A more stratified sample of subjects would help to clarify issues of disease progression as it relates to possible continued career and financial losses.

Perhaps the most important limitation is that different methods were used to evaluate precondition and postcondition job performance. The former was based on self-report-

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Precondition wages</td>
<td>$18,409</td>
<td>$1517</td>
<td>t = 2.96, p &lt; 0.01</td>
</tr>
<tr>
<td>Postcondition wages</td>
<td>$13,900</td>
<td>$8112</td>
<td></td>
</tr>
<tr>
<td>Precondition wages (weighted)</td>
<td>$16,754</td>
<td>$1863</td>
<td>t = 1.73, p &lt; 0.001</td>
</tr>
<tr>
<td>Postcondition wages (weighted)</td>
<td>$12,804</td>
<td>$8016</td>
<td></td>
</tr>
<tr>
<td>Precondition jobs (job titles x No. of those jobs in the economy)</td>
<td>11,516,056.57</td>
<td>11,615,945.27</td>
<td></td>
</tr>
<tr>
<td>Postcondition jobs (job titles x No. of those jobs in the economy)</td>
<td>2,647,560.83</td>
<td>5,601,242.42</td>
<td>t = 4.27, p &lt; 0.001</td>
</tr>
<tr>
<td>Precondition job count (No. of jobs available(^6) for age, education, etc.)</td>
<td>1351</td>
<td>1376</td>
<td>t = 3.89, p &lt; 0.001</td>
</tr>
<tr>
<td>Postcondition job count</td>
<td>214</td>
<td>444</td>
<td></td>
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</table>

\(^6\)According to US Dept. of Labor
ed work history, while the latter was based on observation. Unfortunately, a time perspective using precondition observation would be very difficult because large numbers of people would need to be tested to capture those few who would eventually develop RA. Precondition and postcondition assessments do use the same DOL database. It is interesting that these methods produce estimates that are similar to self-reported income for women, but not for men (Table 2).

We feel that the contribution of this study is the demonstration of a unique new methodology. The performance tasks go beyond self-report and the methods link observed task performance to expected earning potential. To the best of our knowledge, this is the first study to use these methods to evaluate selected elements of arthritis outcomes. The growing demand for measures of task performance and the intriguing results in this study suggest that further investigation using these methods is warranted.

Table 2 indicates that reported income loss was lower for men ($2,556) than for women ($7,406). It might be argued that women are more likely to leave the work force when they are not the primary breadwinner. The observational methodology does not depend on current job to estimate current earning potential. Instead, it uses actual performance of observed tasks. Using this methodology, differences between income loss for men and women were not statistically significant. These results should not be biased by selective attrition from the workforce. We must caution, however, that the sample size for these comparisons was very small. Thus, speculation about sex differences must await confirmation by larger studies.

Despite the limitations of this study, its results are consistent with studies using very different methodologies. Several investigators have attempted to calculate the economic consequences of RA. Functional limitations contribute to the decrease in income due to pain, difficulty in performing work-related tasks, depression, and treatment side effects. RA is associated with a decrease in labor force participation.

A series of studies by Yelin document the impact of arthritis, using very different methodologies. In one study, it was shown that 51–60% of those with RA report some work disability. Rates may be higher in some community-based groups. Another study showed that approximately 42% of adults with arthritis have activity limitations. Early studies based on the National Health Interview Survey suggested that work force participation is 20% lower for men with arthritis and 25% lower for women with arthritis than for members of the general population. Each of these studies uses public databases in which the diagnosis of arthritis and the performance of activities is unverified. The method applied in the current study is complementary to these survey studies. We find it intriguing that studies applying such different methods have produced very similar conclusions.

Regardless of the method they use, these studies suggest that the impact of RA upon earning potential is substantial. The expected result is an increase in applications for accommodations in the workplace and disability benefits. Workers are entitled to these benefits under the Americans with Disabilities Act when work at precondition performance levels is either difficult or no longer possible. We encourage continued investigation of these important issues.

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REFERENCES