The Effect of a Period of Rehabilitation in a Rheumatic Diseases Unit on Patients with Rheumatoid Arthritis.

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ABSTRACT

The aim of this study was to evaluate the effectiveness of a period of rehabilitation in a rheumatic diseases unit. Thirty-nine patients with rheumatoid arthritis were included in two study periods, which involved assessment of six outcome measures on admission and again on discharge in a rehabilitation unit in Dublin. These measures incorporate each level of disease impact – impairment, disability and handicap (WHO 1980) and the more recent update of the International Classification of Functioning and Disability (ICIDH-2 2000) of body functions and structures, activities and participation.

Results suggest an improvement in each area of assessment. Objective measures of grip strength improved in 74\% of patients, and timed functional tasks in 77 – 86\% of patients. Patient reported measures on the Arthritis Impact Measurement Scale 2 (AIMS2) and Health Assessment Questionnaire (HAQ) and Quality of Life Index (QOL) indicated that 71.4\% - 80\% and 48\% of subjects reported an improvement respectively.

These figures suggest the beneficial effect of in-patient rehabilitation for patients with rheumatoid arthritis.
INTRODUCTION

Rheumatoid Arthritis (R.A) is a chronic and multifarious disease that can have a significant impact on many aspects of a patient’s life. Thus, the physical, social, psychological and economic effects must be embraced when considering the rehabilitation of patients with rheumatoid arthritis. Patients with poorly controlled disease, persistent pain and difficulties with activities of daily living may benefit from care provided by an interdisciplinary team. The essence of interdisciplinary intervention is in considering and addressing the broad issues of rheumatoid arthritis as they present for each individual patient. This type of care has been traditionally employed in an inpatient setting but is increasingly provided on an outpatient basis, while maintaining the interdisciplinary nature of the care. Interdisciplinary elements may comprise medical and social review, physiotherapy, occupational therapy and nursing involvement. One advantage of inpatient care may be the withdrawal from domestic/work pressures, which is not always viable when a patient is receiving outpatient interdisciplinary care.

Rehabilitation programmes aim to preserve the quality of life of the patient as well as curtail disease activity (Nordstrom et al., 1996). Throughout the world, studies have been undertaken to investigate the effects of rehabilitation on patients with rheumatoid arthritis in terms of clinical outcomes and economic cost. Vlieland et al (1995) reported the benefits of a period of hospitalisation in a rheumatic diseases unit (a unit which provides dedicated interdisciplinary care) on measures of disease activity, functional status and emotional status. Helewa at al (1989) found inpatient hospital care three times more effective than a comprehensive outpatient treatment programme, albeit
at a 2.5 fold increase in cost. However, Lambert et al (1994) demonstrated no obvious advantage to inpatient rehabilitation over day care, as clinical and economic outcomes were comparable in both groups. Similar findings were reported by Nordstrom et al (1996) and it was suggested that outpatient care for patients with RA might be an acceptable alternative to inpatient rehabilitation. These studies, designed to draw inference from a representative sample to a population, have demonstrated inconsistent results. While within individual healthcare systems throughout the world, spiralling health care costs have led to renewed debate regarding the benefits of hospitalisation of patients with rheumatoid arthritis.

The most recent Irish Health Strategy “Shaping a Healthier Future” (Department of Health, 1994) has at its core the principles of equity, accountability and quality of service, within the context of social and health gain. To date in Ireland, there are only two units that provide dedicated and coordinated inpatient rehabilitation to patients with rheumatic diseases. The results of randomised control trials are not always immediately applicable to a specific health care system. In the case of Ireland, the development of rheumatology rehabilitation services is emerging (Comhairle na n-Ospideal 1995) and yet there is a requirement to consider the efficacy of existing services. Investigating intervention may be carried out by clinical audit, which is defined as the “systematic, critical analysis of the quality of medical care, including the procedures for diagnosis and treatment, the use of resources, and the resulting outcome and quality of life for the patient” (NHS White Paper Secretaries of State fore Health, 1989). Before a full audit cycle can be completed, standards or accepted outcomes need to be established. These may be produced by groups of professionals or by individual departments. Thus with a
view to considering the effects of a period of in-patient interdisciplinary care for patients with RA, in one unit in Dublin, a preliminary review of outcome was investigated. The aim of this study was to measure the outcome of intervention in terms of impairment, disability and handicap.

**METHODOLOGY**

**Procedure**

A sample of convenience was utilised, since this study aimed to consider activities within one of two national units. Patients consecutively admitted to the in-patient unit during two defined time periods were considered for inclusion in the study. All patients considered had a definite diagnosis of rheumatoid arthritis, were over the age of eighteen years and had been referred for physiotherapy intervention. Ethical approval was granted from the appropriate committee and informed consent was obtained from each participant.

Each patient was assessed on admission to the unit and on discharge. The assessments addressed impairment, disability and handicap (WHO, 1980). Assessments that were not patient-reported were carried out in the same order and at the same time on each occasion. The same observer completed both admission and discharge assessments. Observers were unaware of admission scores when performing the discharge assessments.
Outcome measurements

**Impairment:** Hand-Grip Strength was measured using the mechanical hand-held “Jamar dynamometer”. Grip strength correlates well with functional indices and other measures of disease activity (Myers et al., 1980). The most comfortable size of grip was selected for each patient. Subjects were seated with their hand resting on their lap and were instructed to squeeze as hard as possible. The gauge was concealed from the patients. Measurements were repeated three times on each hand, alternating between hands. An average value for each hand was recorded (Sunderland et al., 1989). Measurements were recorded within forty-eight hours of admission to the unit and again within forty-eight hours of discharge.

**Disability:** a number of different assessments were used to consider disability.

- The Arthritis Impact Scale 2 (AIMS2) and the Health Assessment Questionnaire (HAQ) are self-report questionnaires, developed by Meenan et al (1980) and Fries et al (1980) respectively. The AIMS2 is an expanded version of the original AIMS. The primary purpose of this questionnaire is to measure health status in subjects with arthritis within the previous month, placing particular emphasis on measuring improvements produced by therapeutic interventions (Meenan et al., 1992). Mason et al (1988) in a factor analysis of AIMS responses from an RA patient population identified five components of health status in this chronic disease: lower extremity function, upper extremity function, affect, symptom and social interaction. The AIMS2 was completed on admission to the unit and again on returning home after one month. Stamped addressed envelopes were provided
for each patient. Reminders by telephone were issued if no replies had been received.

- The HAQ is also a self-administered questionnaire developed by Fries et al (1980). A shortened version of the questionnaire (Wolfe and Pincus 1991) is the form generally used and includes a functional disability scale and a visual analogue pain scale. The HAQ has been extensively tested for reliability and validity (Kirwan and Reeback, 1986). It is sensitive to change and is able to discriminate between therapies in short-term studies (Ramey et al 1996). It was completed on admission to the unit and on returning home, after one week. Similar reminders were issued for this test.

In the first data-gathering period, the HAQ and a QOL index (see below, Handicap) were utilised. Following the initial data gathering exercise, it was found that the QOL index was not displaying the benefits reported by patients in the HAQ. Since the QOL index was not specifically designed for patients with rheumatic diseases (Spitzer, 1981), it was considered that the outcome measure might have been insufficiently sensitive. With this in mind, the second study utilised the AIMS2 and the QOL index. The choice of the AIMS2 was dictated by the fact that it contains a significant quality of life overlap. By using this measure it could be determined whether patients believed their quality of life was not actually improving or if the use of the QOL index was inappropriate in RDUs.

- Jebsen Taylor Hand Function Test, subjects were seated in a standard rehabilitation chair, with a standard writing desk in a well-lit room. Instructions were given before each subtest after which questions were answered to ensure that the instructions were understood. The subtests were performed in the same
sequence and were performed on the non-dominant hand first. The time taken to complete each subtest was recorded for each hand. Jebsen et al (1969) suggest that this test is of value in assessing improvements in hand function gained by therapeutic procedures such as physical therapy and medication. This test was completed within forty-eight hours of admission to the unit and within forty-eight hours of discharge.

- The Timed “Up and Go” test is a timed walking test. It reflects essential components of functional independence in activities of daily living. Walking time can serve as an objective measure of lower extremity function (Spiegel et al., 1987). The test used in this study is the timed version of Mathias’ Get Up and Go test. It is a practical, reliable performance test of physical mobility (Mathias et al., 1986). Preliminary evidence suggests that it is also an objective means of following functional change over time (Podsiadlo and Richardson, 1991). Subjects were observed and timed while they rose from a standard rehabilitation chair, walked three metres, turned, walked back to the chair and sat down again. Subjects wore their regular footwear and used their normal walking aid. No physical assistance was given. Subjects commenced the test seated with their back against the chair, arms resting on the arm-rests and walking aid at hand. They were instructed that on the word “go” they were to get up and walk at a comfortable and safe pace to a line on the floor three metres away, turn, return to the chair and sit down again. Subjects were allowed walk through the course once before being tested in order to familiarise themselves with the test. Again,
this test was completed within forty-eight hours of admission to the unit and within forty-eight hours of discharge.

- The Timed Stair Climb requires subjects were to walk up and over a small staircase (4 steps of 15cm up and 15cm down) at a comfortable pace, without stopping. Subjects were permitted to use assistive devices where necessary. A practice climb was allowed once before being tested in order to familiarise themselves with the test. The task was timed. Measurements were recorded within forty-eight hours of admission to the unit and within forty-eight hours of discharge.

- **Handicap:** this was measured with the QOL index (Spitzer 1981). The QOL index is also a self-report questionnaire, completed after one week. The chronic diseases such as RA affect quality as well as duration of life, therefore in its assessment, the ability to effectively measure health status is essential (Brown et al., 1984). In addition to measuring change in timed functional tasks it is also essential to establish whether patients themselves have perceived this change in relation to their everyday activities (Pioro and Kwoh 1996). It was completed with in forty-eight hours of admission and again within a week of discharge.

**RESULTS**

The results presented here are the combined results of the two data periods. Descriptive statistics only are used due to the nature of the study, which availed of a sample of convenience. The calculation of central tendencies such as means and modes were made to describe the data, depending on the measurement level of the relevant tool.
The study was intended as a basis for further studies and to allow the implementation of audit in the department in the unit. Thus inferential statistics were not deemed appropriate. A randomised trial investigating the effectiveness of inpatient versus outpatient care for patients with rheumatoid arthritis is now in place based on the findings of this study and in light of current opinion and needs in the area.

Patients consecutively admitted to the unit during the data gathering periods were considered for inclusion. Those excluded had no definite diagnosis of RA (n=1), had a documented history of cognitive impairment (n=1), had been readmitted for continuation of treatment (n=1) or had an orthopaedic history that was deemed a major disabling condition (n=1). In total 39 patients with RA were assessed pre and post intervention. The mean age of subjects was 56.8 years (range 18-80 years). The mean length of stay was 19.1 days (range 7-35 days).

The results are examined with respect to changes in outcome of impairment, disability and handicap scores; changes between pre and post intervention scores; percentage of patients achieving change in a defined range in each outcome measure; outcome related to length of stay and outcome related to disease duration.

**Changes in outcome of impairment, disability and handicap scores (Table 1)**

**Impairment**

**Grip Strength**

Admission and discharge scores were available for 38 patients, as one patient was unable to hold the dynamometer. Grip strength is measured in pounds of pressure and increased
in 28 subjects (73.6%). It remained the same in 1 (2.6%) and worsened in 9 subjects (23.6%).

**Disability measures**

**Hand Function**

Measurements were taken for all 39 patients. The Jebsen-Taylor Hand Function test is a timed test. The length of time taken to perform tasks is summed for each hand and an average is calculated between each hand. This overall time decreased in 30 patients (76.9%) suggesting an improvement and increased in 9 patients (23.1%).

**Timed “Up and Go”**

Data was available on 36 patients, as 3 patients were unable to perform the test. An improvement (quicker to perform the test) was observed in 31 (86.1%) and 5 (13.9%) patients took longer to perform the test.

**Stair Climb**

Data was available on 36 patients, as 3 patients were unable to perform the test. Scores improved (quicker to perform the test) in 29 patients (80.5%) and 7 patients (19.5%) took longer to complete the test.

**AIMS2**

This data was gathered during the second data-gathering period on 22 patients. Data was available for 21 patients as 1 patient failed to return the questionnaire. The AIMS2 is scored in a consistent fashion so that a low value indicates a high health status. The range of overall scores is between 0 and 10 with 0 representing good health status and 10 representing poor health status. Scores decreased for 17 patients (81%), suggesting an improvement and increased for 4 patients (19%).
HAQ

This data was gathered during the first data-gathering period on 17 patients. Again, a higher score indicates a greater degree of disability. The possible range of scores is from 0 to 3, with increments of 0.125. Data was available for 14 patients as 3 patients failed to return the questionnaires. The scores for 10 patients (71.4%) decreased, suggesting an improvement, while the scores for 2 patients (14.3%) remained the same and increased for 2 (14.3%) patients.

Handicap

Quality of Life

This data was gathered during both data-gathering periods. With regard to scoring for this questionnaire, a higher score indicates a higher health status. Data was available for 35 patients as 4 patients failed to return the questionnaires. The scores for 17 patients (48.5%) increased, remained the same for 11 patients (31.4%) and decreased for 7 patients (20%).

Since the sample of subjects is not randomised, nor the data normally distributed, inferential analysis of the above data is not considered. With a view to considering more closely the levels of change that occurred for subjects, Table 2 outlines the percentage of patients achieving change within a defined range in each of the outcome measures. The majority of patients demonstrated an improvement of less than 39%. This is with the exception of the QOL, where the greatest percentage of patients showed a deterioration or no change.
Changes between pre and post intervention scores.

Table 3 identifies the differences between admission and discharge scores. With the exception of the AIMS2 and the QOL, mean values are quoted. Median values are given for AIMS2 and QOL since the data is not interval-ratio data (Daly, 1991).

Outcome related to length of stay.

Table 4 considers data comparing mean/median admission and discharge scores in patients who were admitted for 14 days or less and patients who were admitted for greater than 14 days.

DISCUSSION

Following an eleven-week study to evaluate the effectiveness of in-patient rehabilitation in a rheumatic diseases unit (RDU) the majority of patients displayed an improvement in all outcome measures.

As the rehabilitation setting is an RDU, improvements in patient status cannot be attributed to one dimension of the multidisciplinary team. Rather it can be considered the result of a combination of inputs. This holistic approach is the essence of a rehabilitation unit (Spiegel et al., 1987).
Impairment, Disability and Handicap

Overall, mean scores improved for all outcome measures, except the QOL index (Table 3). At the level of impairment, grip strength was measured. Measurement of hand grip strength has been frequently used to assess hand function and general weakness in RA patients (Lee et al., 1974). Scores improved in 73.6% of the patients studied, remained the same in 2.6% and deteriorated in 23.6% of patients. Regarding the amount of improvement seen Table 3, the majority of patients, displayed an improvement of under 40%, with most improvement in the 20 –39% category. Considering the nature of rheumatoid arthritis and its effect on the wrists and hands, a change in assessment values would be expected. However as can be seen from the percentage improvement displayed in his area, major improvements are not observed. Vlieland et al., (1996) in studying eighty patients with RA found that grip strength improved following in-patient, multidisciplinary treatment. Measurements of grip strength can be affected by many variables. These include the choice of dynamometer, patient age, gender, weight and limb dominance (Keating and Matyas, 1996). Sunderland et al (1989) report that the use of an electronic dynamometer may lead to more sensitive readings than a mechanical dynamometer such as the one used in this study. However, the choice of mechanical dynamometer was made on the basis of equipment availability at time of study.

At the level of disability, hand function, the Timed “Up and Go” test, timed stair climb and AIMS2 were measured. Hand function was measured using the Jebsen Taylor Hand Function Test. In the current study, 76.9% of patients showed improved hand function following rehabilitation, whereas 23.1% deteriorated. However, the improvement was
less than 20% in the majority of patients. Yet, at the level of impairment, the majority of improvement was between 20 and 39%. This emphasises the need for including measurements at the level of disability to comprehensively evaluate treatment effects, as it is at this level that there is most effect on a patient’s life. This moderate improvement in hand function may be related to the progressive debilitation of hand function associated with the RA disease process. Therefore, very substantial changes in hand function may not be seen following intervention.

Functional mobility was assessed using the Timed “Up and Go” test and Stair Climb. Results for this timed functional task indicated that 86.1% of patients improved, whereas 13.9% deteriorated. Podsialdo and Richardson (1991) discovered that an “Up and Go” completion time of 20 seconds or less was demonstrated in those elderly patients who were independently mobile. In this study, 9 of the 36 participants had admission scores that greatly exceeded this time: these patients used some form of walking aid. With this functional baseline on admission, it is reasonable to assume that substantial change in walking time may not be observed. Conversely, there were also those patients with a high level of mobility on admission. These patients, in effect may not have had room for improvement. Skelton and McLaughlin (1996) used the timed stair climb as an outcome measure to determine functional abilities in the elderly. Improvement and decreased scores were seen in 78.3% and 21.7% of patients respectively. Results for the Timed “Up and Go” and Stair Climb tasks indicate an improvement in timed functional mobility in both studies.

At the level of disability, the AIMS2 and the HAQ were used as outcome measures. In the case of the former, 81% of patients reported an improvement, whereas
19% indicated no improvement. Scores on the HAQ suggested an improvement in 71.4% of patients with 14.3% remaining the same and 14.3% deteriorating. The similar findings of improvement, deterioration and no change support the study by Brown et al., (1984), which in comparing the AIMS and the HAQ administered to 48 patients with RA, reported a high correlation between these separately developed instruments in the areas of physical disability, pain and psychological impact.

With regard to the AIMS2, the majority of patients (57%) reported an improvement of less than 20%. In the case of the HAQ, equal numbers of patients reported an improvement of less than 20% (28.5%) or felt that they were worse/had no change in their disability status (28.5%). Thus it appears that the AIMS2 may be more accurate than the HAQ in reflecting the improvements found in the other outcome measures. Overall, at the level of disability, an improvement was seen in the majority of study participants.

The level of handicap was measured using the Quality of Life Index (Spitzer, 1981). Measuring handicap and quality of life (QOL) is difficult. It depends on an individual’s psychological coping mechanism and the extent to which a person adapts his/her lifestyle (Wade, 1992). Improvement in this outcome measure was reported in 48.5% of patients, 31.4% were unchanged and 20% reported deterioration in quality of life. This is an unexpected finding considering that 81% of patients reported an improvement in the AIMS2 and 71.4% in the HAQ. Therefore, as different self-report questionnaires were used, at disability level, results indicate a decreased sensitivity of the QOL index to change in rheumatological patient status. Spitzer developed this QOL index in 1981 primarily for use in patients with cancer. It is considered suitable for use in
other chronic diseases. However based on the findings of this study this particular QOL index may not be a sensitive measure for use in rheumatological disease assessment.

**Outcome related to length of stay**

The average length of stay in the rheumatic disease unit was 19.05 days, with a range from 7 to 35 days. Patients who were admitted for 14 days or more had admission scores suggesting that their performance was poorer on all outcome measures compared to those patients who stayed for less than 14 days. It can therefore be stated that patients with a poorer baseline received a longer intervention period. At discharge, all outcome measures, with the exception of the timed stair climb, displayed superior scores than those recorded at admission. This is a positive finding, reflecting the effectiveness of the unit in providing beneficial treatment periods to those patients with greater disability. This was not simply reflected in observed measures but also in the patient reported measures. These findings support the study by Vlieland et al., (1995) who suggests that patients with long-standing destructive disease and a high level of disease activity improve most during hospitalisation. Similar work by Anderson et al., (1988) and Vlieland et al., (1995) showed that in-patients hospitalised for active disease showed an improvement that appeared to be linear with time during stay.

Following these two data collection periods, it is clear that the studied unit provides longer hospitalisation time to those patients who require it. These patients subsequently display benefit from the received intervention.
**Recommendations;**

- conduction of similar studies in other rheumatological conditions such as Ankylosing Spondylitis, Osteoarthritis or Systemic Lupus Erythematosus.
- a comprehensive review of in-patient versus out-patient rehabilitation to determine the most effective setting is also necessary. This is in accordance with the current economic framework for cost effectiveness coupled with cost benefit.
- incorporation of outcome measures assessed in study into routine clinical practice to effectively evaluate treatment programmes. They are quick and easy to administer.
- the use of an alternative quality of life measure in future rheumatology studies

**Limitations**

This study was limited by restricted data gathering periods and a sample of convenience was used.

**Conclusion**

Following the investigation into the effect of a period of in-patient rehabilitation on thirty-nine patients with Rheumatoid Arthritis (RA), it can be concluded that for these patients admission to the rheumatic diseases unit (RDU) was beneficial. This benefit is evident at the levels of impairment, disability and handicap, each of which was evaluated during the study.

Greatest benefits were demonstrated in hand grip strength, the Timed “Up and Go”, the AIMS2 and the HAQ. As these timed tasks reflect functional independence, it may be
assumed that on discharge patients displayed superior functional abilities. In accordance with the recent and justifiable trend towards measuring outcomes in patient terms, the AIMS2 and the HAQ were used. It is imperative that improvements are not confined to one aspect of disease impact. The physical, social and psychological needs of a person’s life must be targeted to elicit maximum benefit from rehabilitation. Outcome measures such as those used in the study could be easily incorporated into everyday use in the unit and will ensure this holistic approach to patient care.

The combined results of both studies indicate that a RDU is an effective setting for treating patients with RA. Thus it can be concluded that a period of rehabilitation in a RDU will display improvements in the three areas of disease impact – impairment, disability and handicap.

Currently, a randomised trial of inpatient versus outpatient care for patient with rheumatoid arthritis is underway. Using ten outcome measures at the level of impairment, disability and handicap, and incorporating a comprehensive economic evaluation, the most effective setting for the rehabilitation of this patient group, both clinically and economically, will be ascertained.

References


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