A chiropractic service arrangement for musculoskeletal complaints in industry: a pilot study

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Chiropractic services are commonly used by workers with musculoskeletal problems, especially low back and neck complaints. Research into the effectiveness and cost-effectiveness of this approach is, however, difficult to design without prior pilot studies. This study followed 32 workers with these complaints attending one such service and used five measures of outcome over a 6-month period. These measured pain (VAS), disability (FLP), quality of life (SF-36), perceived benefit and satisfaction with care. Additionally, sickness costs to the companies were recorded over two years encompassing the study period. Treatment utilization was also monitored. Over half the population were chronic sufferers. The effect sizes were large for pain and for seven out of eight dimensions of the SF-36 questionnaire at 6-month follow-up, although not for disability (FLP). High levels of satisfaction and perceived improvement were reported and sickness costs to the companies fell. However, the sample size in this pilot study was small and did not include controls. We would, therefore, recommend a full cost-effectiveness study incorporating a randomized trial in this area.

Key words: Backache; chiropractic; cost of care; industry; neck pain.

INTRODUCTION

The impact of work loss attributable to common musculoskeletal ailments and, in particular, low back pain is a persistent and major problem in industry. Its exponential rise, recorded for 1993, placed it highest among the reasons for certified sickness in the UK. Considerable efforts have gone towards identifying the essential features of this complaint in industrial populations and clinical guidelines, aimed at reversing its increase, advocate early diagnosis and intervention with avoidance of bed rest, the promotion of positive attitudes and the restoration of normal activities.

It is often considered helpful, in the interests of efficiency and continuity of care, to refer such cases early to specialist services which embrace these principles. Many companies employ physiotherapists within their organizations for this purpose. Others recommend referral to qualified practitioners of manipulation practising independently. The movement of chiropractic and osteopathy towards roles in mainstream health care adds an additional care resource for occupational health and chiropractic, in particular, has been the subject of a number of clinical trials. One large pragmatic randomized trial of chiropractic and hospital outpatient management incorporated return to work as an outcome measure. This trial reported that at follow-up between one and two years, the frequency and duration of absence from work had been less in the chiropractic group than those treated by hospital out-patient departments. Nevertheless, the subjects involved came from a general back pain population and no such trials have been successfully conducted in industrial settings. A number of retrospective studies of the costs-of-care have, however, been carried out in the United States. These give conflicting results. Mainly for want of prospective design, adequate randomization and valid outcome measures, they remain inconclusive as estimates of cost-effectiveness.
A further difficulty in conducting cost-effectiveness studies of such treatments for industrial back pain is the non-normal distribution of the length of spells. The vast majority of sickness absences for this complaint are short and often recurrent, making it important to take these recurrences into consideration. It is also difficult to conduct valid randomized controlled trials where a variety of employment-related issues may frustrate efforts to maintain homogenous treatment groups. In addition, a few chronic and high-cost cases have also been shown to have a disproportionate influence on results. Chiropractic has evolved over the past 30 years from a marginal role, treating mainly chronic cases,\textsuperscript{16} to one of greater public awareness which most patients present within one month.\textsuperscript{17} Paradoxically, its effectiveness with acute cases appears to be less in question than with chronic ones.\textsuperscript{18}

In the light of the socioeconomic importance of these issues and the difficulties in addressing them, it would be helpful to study baseline information derived from current service arrangements with chiropractors. This paper reports on one such arrangement in which chiropractic treatment was paid for by two firms for employees who complained of musculoskeletal problems at work. The study assessed pain, functional outcomes, quality of life, perceived improvement and employee satisfaction over 6 months. It also monitored the treatment costs and overall sickness costs to the companies in the years immediately prior to, during and after the study period.

**METHODS**

**Subjects**

The work forces of two Somerset companies, a dairy products manufacturer (500 employees) and a domestic utilities service and repair depot (250 employees) participated. These companies offered to subsidize the treatment of all employees who complained of musculoskeletal problems at work and these were referred to a local chiropractic clinic by the personnel departments and occupational health nurses. Employees were excluded if they were suffering from serious underlying pathology, but nerve root pain was admitted. The study began in January 1994. Thirty-seven consecutively presenting employees entered the study and all were seen by a chiropractor within 2 days of seeking an appointment.

**Documentation**

All patients who entered were judged suitable for treatment and were asked to complete a 10-centimetre Visual Analogue Pain Scale (VAS),\textsuperscript{19} a Functional Limitations Profile (FLP)\textsuperscript{20} and the MOS version of the SF-36 quality of life measure\textsuperscript{21,22} prior to treatment. One month later, these instruments were administered again and the number of chiropractor appointments were also recorded. An attempt was made to monitor days off work. This, however, failed owing to incomplete recording of questionnaires. In addition, patients answered questions about satisfaction with their care (very, mostly, somewhat or not satisfied), the amount of overall improvement perceived (cured, improved, unchanged or worse) and the extent to which they attributed this to their treatment. All of the one month assessments were repeated at a follow-up 6-months from the initial consultation.

The finance departments of both companies determined the overall costs of all sickness absences in their companies over the previous calendar year (1993) and monitored this during 1994 and 1995 for the benefit of the study. The arrangement with the chiropractic clinic continued throughout 1994 and 1995, even though no further cases were documented after June 1994. The chiropractic treatment costs to the companies were also monitored over these two years. No other services for musculoskeletal complaints were introduced by the two companies over this period.

**Analysis**

Initial and follow-up scores for pain, function and quality of life were expressed as means, with 95% confidence intervals and effect sizes. The latter were calculated as the difference between initial and follow-up scores divided by the standard deviation of the initial score.\textsuperscript{23} Overall perceived improvement and satisfaction are shown as the percentages of subjects giving each category of response. All questionnaires were mailed, in confidence, to the Somerset Health Authority for analysis.

**RESULTS**

Of the 37 employees recruited, 34 returned complete documentation. Thirty-two of these complained of neck/arm or back/leg pain. Of these, 24 were male of mean age 44.9 years (SD = 11.3) and seven were female of mean age 41.6 years (SD = 13.9). The areas and durations of complaints are shown in Table 1. The complaints of one-fifth of the subjects were of less than a week’s duration, whereas 57% were of more than 3 months. All scores for pain, functional outcomes and quality of life were normally distributed.

**Pain**

The pain scores for the 13 patients with neck and arm complaints and the 19 patients with low back trouble are shown separately in Table 2 at the initial, 1 month and 6 month assessment points. Back and leg cases were associated with larger treatment effects than neck and arm cases, especially at 1-month follow-up. Six-month follow-up revealed further increases in effect size.

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of patients</th>
<th>Duration of complaint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Under 6w</td>
</tr>
<tr>
<td>Neck/arm</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Back/leg</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 2. Pain scores (VAS) at pre-treatment, one and six months

<table>
<thead>
<tr>
<th>Region</th>
<th>Pre-treatment</th>
<th></th>
<th>One month</th>
<th></th>
<th>Six months</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score (sd)</td>
<td>95% CI</td>
<td>Mean score (sd)</td>
<td>95% CI</td>
<td>Effect size</td>
<td>Mean score (sd)</td>
</tr>
<tr>
<td>Neck and arm</td>
<td>4.54 (2.47)</td>
<td>3.19–5.88</td>
<td>2.38 (2.63)</td>
<td>0.95–3.81</td>
<td>0.87</td>
<td>0.62 (1.19)</td>
</tr>
<tr>
<td>n = 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back and leg</td>
<td>4.79 (1.99)</td>
<td>3.90–5.69</td>
<td>1.68 (1.78)</td>
<td>0.88–2.48</td>
<td>1.56</td>
<td>1.05 (1.33)</td>
</tr>
<tr>
<td>n = 19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Functional limitations profile at pre-treatment, one month and six months (n = 34)

<table>
<thead>
<tr>
<th>Function</th>
<th>Pre-treatment</th>
<th></th>
<th>One month</th>
<th></th>
<th>Six months</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score (sd)</td>
<td>95% CI</td>
<td>Mean score (sd)</td>
<td>95% CI</td>
<td>Effect size</td>
<td>Mean score (sd)</td>
</tr>
<tr>
<td>Ambulation</td>
<td>5.94 (6.91)</td>
<td>3.62–8.25</td>
<td>3.03 (2.27)</td>
<td>2.27–3.79</td>
<td>0.42</td>
<td>2.59 (1.17)</td>
</tr>
<tr>
<td>Body Care</td>
<td>5.75 (6.09)</td>
<td>3.70–7.80</td>
<td>2.88 (1.66)</td>
<td>2.46–3.30</td>
<td>0.48</td>
<td>2.58 (0.76)</td>
</tr>
<tr>
<td>Mobility</td>
<td>3.06 (1.82)</td>
<td>2.45–3.67</td>
<td>2.75 (0.00)</td>
<td></td>
<td>0.17</td>
<td>2.75 (0.00)</td>
</tr>
<tr>
<td>House management</td>
<td>10.14 (12.58)</td>
<td>5.91–14.37</td>
<td>5.30 (4.74)</td>
<td>3.71–6.89</td>
<td>0.38</td>
<td>3.23 (1.83)</td>
</tr>
<tr>
<td>Work</td>
<td>3.32 (0.20)</td>
<td>3.32–3.36</td>
<td>3.43 (0.07)</td>
<td>3.41–3.45</td>
<td>-0.45</td>
<td>3.45 (0.03)</td>
</tr>
</tbody>
</table>

Table 4. Quality of life (SF-36) at pre-treatment, one month and six months (n = 34)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pre-treatment</th>
<th></th>
<th>One month</th>
<th></th>
<th>Six months</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score (sd)</td>
<td>95% CI</td>
<td>Mean score (sd)</td>
<td>95% CI</td>
<td>Effect size</td>
<td>Mean score (sd)</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>75.45 (24.19)</td>
<td>67.32–83.58</td>
<td>90.45 (8.04)</td>
<td>87.89–92.31</td>
<td>0.62</td>
<td>94.39 (7.78)</td>
</tr>
<tr>
<td>Role — physical</td>
<td>45.45 (46.12)</td>
<td>41.42–49.48</td>
<td>66.67 (39.36)</td>
<td>53.44–79.90</td>
<td>0.46</td>
<td>87.88 (28.04)</td>
</tr>
<tr>
<td>Body pain</td>
<td>39.97 (23.09)</td>
<td>32.21–47.73</td>
<td>59.09 (25.93)</td>
<td>50.38–67.80</td>
<td>0.82</td>
<td>77.61 (22.74)</td>
</tr>
<tr>
<td>General health</td>
<td>77.19 (13.47)</td>
<td>72.67–81.71</td>
<td>76.79 (15.89)</td>
<td>71.46–82.12</td>
<td>-0.03</td>
<td>77.94 (16.47)</td>
</tr>
<tr>
<td>Vitality</td>
<td>60.76 (15.72)</td>
<td>55.48–66.04</td>
<td>64.55 (18.04)</td>
<td>58.49–65.10</td>
<td>0.35</td>
<td>72.42 (17.19)</td>
</tr>
<tr>
<td>Social functioning</td>
<td>75.30 (27.70)</td>
<td>66.00–84.60</td>
<td>85.00 (18.97)</td>
<td>78.63–91.37</td>
<td>0.35</td>
<td>93.33 (18.64)</td>
</tr>
<tr>
<td>Role — emotional</td>
<td>72.73 (42.86)</td>
<td>58.33–87.13</td>
<td>88.54 (26.29)</td>
<td>79.87–97.33</td>
<td>0.37</td>
<td>126.20 (156.51)</td>
</tr>
<tr>
<td>Mental health</td>
<td>78.91 (13.05)</td>
<td>74.53–83.29</td>
<td>82.06 (13.23)</td>
<td>77.61–86.51</td>
<td>0.24</td>
<td>86.06 (12.37)</td>
</tr>
</tbody>
</table>

Functional outcomes

In order to test function in the population as a whole, the results for all 34 employees were combined. These are shown in Table 3. The effect sizes are modest and only three of the five sections, Ambulation, Body Care and House Management, are near or above 0.50 at 6-month follow-up. The treatment effects at the 6-month point in these were larger than at 1 month. The Work section of this instrument registered a small negative change which, owing to an even smaller variance, yielded a negative effect of -0.55.

Quality of life

Only three of the eight dimensions of the SF-36 questionnaire registered effect sizes near or above 0.50 at 1 month. However, seven of the eight did so at 6 months (see Table 4). Little change was recorded in General Health over the assessment period. The Role dimensions (Physical and Emotional) showed substantial change at 6 months as did Body pain and Vitality.

Perceived benefit

Figures 1A and 1B show the subjects' appreciation of the degree of improvement in their conditions at 1 and 6 months respectively. Neck/arm and back/leg patients are disaggregated for this and it is clear that the perceived benefits are substantially greater than the measurable changes. In both types, however, it appears that most of those who did not regard themselves as cured by 1 month felt they had reached this point by 6 months. Interestingly, more of the back/leg than the neck/arm patients felt they had reached this point by 6 months. The treatment effects at the 6-month point in both types, however, it appears that most of those who did not regard themselves as cured by 1 month felt they had reached this point by 6 months. Interestingly, more of the back/leg than the neck/arm patients felt cured at 1 month and this is reflected also in the pain scores (see Table 2). More of the back/leg (84%) than the neck/arm patients (77%) were convinced that the treatment received was the source of benefit. Eight per cent of the neck/arm patients did not think the treatment was of benefit compared to 5% of back/leg patients.

Satisfaction with care

Whereas there was greater perceived improvement and reduction in pain at 6 months than at 1 month, this was
reversed for patient satisfaction. Figures 2A and 2B illustrate the satisfaction levels at these follow-up points. Although these levels are very high and no-one reported being dissatisfied, the 6-month scores suggest less complete satisfaction than the 1-month scores.

Treatment utilization

Treatment utilization corresponds to fewer people attending at the 6-month point. Between 15% and 26% of patients had no treatment after 1 month and utilization dropped by approximately two-fifths between 1 and 6 months. The mean number of treatments per month, averaged over 6 months, was 3.23 for neck/arm problems and 5.32 for back/leg. There is evidence here of treatment continuation which, in some instances, might reflect follow-up and support to prevent recurrence; in others, the actual time taken to deal with various aspects of the complaint; and, in yet others, the need for continued treatment to maintain improvement.
Sickness costs

The total sickness costs to the two companies (all ailments) in the year prior to the study were reported to be £156,810 (this figure included two back cases with costs estimated by the companies at £20,000, who did not use the service.) Nevertheless, the overall costs fell by £46,280 (30%) in the first year of the arrangement and by a further £21,875 (20%) the following year.

Treatment costs, however, absorbed 40% (£18,590) and 82% (£17,959) of these savings in the two years respectively.

DISCUSSION

Our sample population, albeit small, is male-dominated and in early middle age, reflecting a high cost sickness
group in terms of industrial back-related illness. The population is unusual in that there was a large proportion of chronic cases. These are not associated with treatment effects as large as in acute back pain and any implications for future trials should be considered in this light. However, it is perhaps now timely to consider the evaluation of treatments for chronic back pain given the suggestion that there is a need for more research evidence of the effects of manipulation generally, and functional restoration programmes on this problem.

The outcome measures
Owing to the small and nonrandom sample in this pilot study, and in the absence of a control group, it would be wrong to attempt to attribute any of these measured outcomes to the treatment given. It is, however, appropriate to consider the performance of the outcome measures themselves in the interests of future trials. The study attempted to assess neck/arm cases and back/leg cases concurrently by using three instruments (VAS for pain, FLP and SF-36) which might encompass both types of problem. Small effect sizes at one month in the functional and generic scales may not be important in future cost-effectiveness studies since these rest mainly on longer-term follow-up results. However, the FLP was not as responsive as the VAS and SF-36 and it might, therefore, be necessary to either consider another disability measure for combined conditions or resort to separate trials for them. There are a large number of disability scales for back pain, however, apart from the Neck Disability Index, few have been tested for neck/arm pain.

Costs
It is difficult to infer how the arrangement with the chiropractic service may actually have influenced the sickness costs to the two companies. Problems of the locomotor system are, however, major contributors to these costs and further research using more detailed economic analysis is certainly merited if industry is to benefit from potential savings in this area. If the service arrangement with the chiropractors had a major influence on savings, then greater attention to the prevention of recurrences without the need for ongoing treatment may be merited in order to maintain these savings year-on-year. This again assumes, however, that many of the same cases re-presented and highlights the need for cost-per-case analysis on a long-term follow-up basis. Certainly, the uncontrolled nature of this study makes the drawing of conclusions about the cost-effectiveness of chiropractic inappropriate. We recommend a randomized comparison incorporating an alternative treatment or control group and a carefully planned assessment of costs.

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REFERENCES