0008-3194/95/147–153/$2.00/©JCCA 1995

Chiropractic rehabilitation of spinal pain patients: principles, practices and outcome data

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Objective: *To review basic principles and practices of chiropractic rehabilitation for spine pain patients and to present data on outcomes of an active care program.*
Design: *Pre-post statistical comparisons of patient outcomes in a 6-week program of active care.*
Setting: *Rehabilitation clinic.*
Participants: *A convenience sample of seventy-three work-injured spine-pain patients from January 1993 to September 1994 who completed a 6-week intervention program. Forty eight (48) males with an average age of 41 years, and 25 females with an average age of 39 years were included.*
Outcome measures: *VAS for pain severity; Oswestry and Neck Disability Indices; self-ratings for improvement; an outcomes satisfaction index.*
Results: *The average duration of complaint was 48 days. Mean pre-post changes in pain scores (6.7 to 3.4) and disability scores (27.3 to 17.1) were highly significant ($p < .0001$). Eight-one percent (81%) of subjects were discharged as fit to return to at least modified work. The average level of self-rated improvement was 68%. The average level of satisfaction with outcome was 39/50. The highest correlations were found between disability status, self-rated improvement and outcomes satisfaction (.57–.81)*
Conclusion: *An active care program has been shown to produce high levels of clinical improvement and patient satisfaction in a sample of moderate-to-severely disabled spine-pain patients. While this study has limitations, investigations such as this are essential to improve the quality of care provided to work-injured spine-pain patients.*
(JCCA 1995; 39(3):147–153)

KEY WORDS: chiropractic, manipulation, rehabilitation.

But : *Réviser l'approche chiropratique en matière de réadaptation de patients avec douleur vertébrale et présenter les résultats d'un programme actif de soins de santé.*
Moyen: *Comparaison de statistiques d'un patient prises avant et après un programme de six semaines de soins actifs.*
Endroit: *Une clinique de réadaptation.*
Participants: *Un échantillonage de 73 patients, blessés au dos au travail, et ayant complété un programme de six semaines. Ces patients ont été traité entre janvier 1993 et septembre 1994 : 48 hommes avec une moyenne d'âge de 41 ans et 25 femmes avec une moyenne d'âge de 39 ans.*
Indicateurs des résultats : *Échelle analogique visuelle pour l'ampleur de la douleur, indice d'incapacité du cou et d'Oswestry, auto-évaluation de l'amélioration et indice de satisfaction.*
Résultats : *La durée moyenne du problème était de 48 jours. La moyenne des résulats du changement de douleur, avant et après (6, 7 à 3, 4), et l'évaluation d'incapacité (27, 3 à 17, 1) étaient hautement significatifs ($P<.0001$). Quatre-vingt-un pour cent des patients retournèrent au travail, mais, parfois à un autre travail. En moyenne, 68% des gens estimaient aller mieux. Le degré moyen de satisfaction face au résultat : 39/50. La plus grande corrélation se retrouve entre l'incapacité, l'auto-évaluation de l'amélioration et la satisfaction du résultat (0, 57 à 0, 81).*
Conclusion: *Il a été démontré qu'un programme de soins actifs résultait en un haut degré d'amélioration et de satisfaction des patients. L'échantillonnage était constitué de gens avec douleur vertébrale d'intensité moyenne à sévère. Malgré ses limites, ce genre d'étude est primordial pour l'amélioration de la qualité des soins à ce type de patient.*
(JCCA 1995; 39(3):147–153.

MOTS-CLÉS : chiropratique, manipulation, réadaptation.

Introduction

Within recent years, the incorporation of active-care, exercise-based rehabilitation programs into the chiropractic private practice setting has expanded considerably.[1,2,3]

Several developments have likely contributed to this.

1 There has been a development, over the last two decades, of an expanded, sophisticated biomechanical model in chiropractic. The work of Grice,[4] Gitelman[5] and Faye[6] has been instrumental in this area by emphasizing the dynamic

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behaviour of the spine within the context of the total locomotor system. In other words, chiropractors were receptive to and ready for this paradigm shift.

2 It is now recognized that chiropractors are particularly effective in providing quality education to their patients as to the nature of their pain problems.[7,8,9,10] Thus, chiropractors were ideally positioned to blend the newer "back school" components of spine rehabilitation[1,2] with their practice model.

3 "Muscular re-education models" have been developed and incorporated into the mainstream of chiropractic thinking, particularly with the work of Lewit[11,12] and Janda.[13]

4 During this same time period, parallel developments occurred in medicine toward a "sports medicine" approach to the care of back pain,[14,15,16,17] largely motivated by studies which debunked the value of bed rest.[18,19] The new motto appears to be Deyo et. al.'s "keep it moving."[20]

5 The infusion of Waddell's insights into the behavioral dimension of low back pain,[21] particularly in focussing on the distinction between disease/impairment and illness/disability, and particularly as this relates to the occupational setting, has contributed to this trend.

Chiropractors appear to be participating in these new "active care" models in ever-increasing fashion. This is reflected in several trends in the profession, including the development, in the USA, of the Chiropractic Rehabilitation Association, and in Canada, of the emerging Fellowship in Chiropractic Rehabilitation. These bodies and others have initiated considerable postgraduate course work in musculoskeletal rehabilitation.

In Ontario, chiropractic rehabilitation clinics were created in 1989 in response to initiatives taken by the Workers' Compensation Board. The Ontario WCB developed the Medical Rehabilitation Plan which created a "Community Clinic Program" of outpatient clinics for the treatment of work-related soft tissue injuries.[22] These clinics have also been active in the area of motor vehicle accident-related personal injury rehabilitation. Other provinces are heading in similar directions.

In this paper, we outline some of the principles and practices of chiropractic spinal rehabilitation, particularly those which we have incorporated in a program of early, active intervention for work-related injuries. We report on a convenience sample of patients from 1993–1994, providing data on baseline characteristics at referral, and on the outcomes of this structured rehabilitation program. We conclude with some opinions and recommendations for the future of this challenging trend in chiropractic.

Principles and practices of chiropractic spinal rehabilitation

Burns[1] and Liebenson[2] have recently published excellent reviews of the history and scientific basis for prescribing therapeutic exercise and conducting spinal rehabilitation in the private-practice setting. Lahad et al.[23] have recently conducted a review of the effectiveness of exercise therapy in the primary and secondary prevention of low back pain, concluding that sufficient evidence exists supporting its use for this purpose. The foundation of the rehabilitation paradigm rests on changing the perspective of mechanical spinal pain disorders from a biomedical/pathology model to a biopsychosocial/functional model.[10,24] In this model, a systems approach[25] is used to unify the various biomedical dimensions of physiology, pathology, psychology and social sciences into a holistic perspective. In particular, the emphasis is less on disordered physiology as it is on disordered function.

As such, while the narrow goal of chiropractic **treatment** is the correction of discrete mechanical lesions and their accompanying consequences, and while the expected result of such treatment is the reduction of symptoms and improvement of function of this discrete lesion, there is a broader, more holistic context which includes the overall flexibility, strength and integration of movement of the spine and the locomotor system. Beyond this, consideration must be given to the demands of each individual's environments, – in the workplace, at home and at play – on the spine and locomotor system. Maximum recovery depends upon appropriately reintegrating the patient/person – physically and psychosocially – with these environments. From this biopsychosocial model, one can derive the need for interventions which extend beyond the manipulative treatment of the spinal subluxation, to therapeutic exercises, the goal of which is to improve regional and locomotor flexibility, strength, endurance and coordination, as well as improve overall aerobic fitness levels.

In fact, the more recent exercise movement in the management of low back pain (LBP) – the "sports medicine" approach – centered on this last issue, particularly the development of what came to be known as the "deconditioning syndrome". Following from the work of Mayer and others,[14,15,16,17] the subacute and, certainly, chronic low back pain (LBP) patient is seen to be exhibiting progressive weakness of trunk musculature, reduction of aerobic fitness and an increase in a complex of abnormal illness behaviours[21] centering around the issue of "fear-avoidance beliefs".[26] Patterns of pain and restricted motion are seen to be progressively reinforced in this kind of patient by avoidance of activity which is seen as a potential threat to provoke more pain. Additionally, such patients come to rely more heavily on external agents (therapists, drugs) to effect therapeutic change in their lives and become increasingly unable or unwilling to participate actively in their own recovery. Taken together, these and other factors form a profile – the deconditioning syndrome – which is an ideal target for a supervised, guided and progressive exercise program. The therapeutic program employed in this study has a number of characteristics and components. Referral for the program must be within 70 days post-injury, thus emphasizing that the intervention is as early as possible and appropriate. The underlying assumption is that primary care practitioners will provide entry-level treatment for the acute phase of a work-related spinal

injury[10] and will then refer for secondary – level active care to complete the recovery path of their patient.

The program begins with a comprehensive intake assessment which includes attention to injury history, course of condition, subjective symptom rating, physical, neurologic and functional testing. The key objectives of the intake assessment are to:

1 Establish or confirm the diagnosis
2 Identify key pain generators
3 Identify key functional impairments
4 Identify critical psychosocial barriers to recovery
5 Identify an individualized profile of functional deficiencies for which exercise and education might be beneficial interventions.

The outcome of the intake assessment process is an individualized, injury-specific intervention plan which has a high likelihood of success at discharge. Additionally, the intake process should develop a reliable, quantitative baseline of clinical information against which clinical progress and outcome can be measured. The variables included in this individualized patient data base may be related to symptom-rating, functional impairment, psychosocial status etc. (See: Methods, below)

The intervention program must have three components: 1 – Treatment, 2 – Exercises, 3 – Education.

1 The Treatment program offered to patients in this study largely consisted of chiropractic therapeutic measures, primarily spinal manipulation, provided by the primary referring practitioners.[10]
2 The Exercise program is characterized by the following features:
   (a) The program must be individualized. This applies to the kind of exercises employed, the target tissues or structures, the target functions and the intensity levels.
   (b) The program must be injury-specific, however it should also be comprehensive and holistic, i.e. total-body conditioning, coordination, and functional capacities, particularly those which are relevant to work demands.
   (c) The exercises must be progressively increased based on the patient's tolerance, capacities and needs.
   (d) The program is performed on a daily basis.
   (e) The exercise program reported in this study also increases progressively with regard to time in the program. The initial period of exercise activity may start at 30–45 minutes per day within the first week and then progress to 60–90 minutes in the second week. From week 3–6 the program may involve 120–150 minutes of exercise per day.

Table 1
Schema of exercise therapy in spine-pain rehabilitation

Goal	Methods
Flexibility	Stretching exercises: passive, assisted active neuromuscular facilitation
Regional strength recovery	Isometric, then isotonic strength exercises Open chain exercises
Recovery of coordination of motor patterns	Functional isotonic exercises Progressive loading Closed chain exercises
Recovery of aerobic fitness	Aerobic exercises
Recovery of muscular endurance	Endurance exercising
Recovery of work capacities	Work simulation exercises

(f) The exercise program is modified on an ongoing basis particularly by feedback from the patient. This is provided verbally, by daily log entries, and on the basis of regular re-assessments. The progressive incremental expansion of the exercise program, in terms of the numbers, kinds and intensity level of exercises and in terms of their goals and applications (see below) is consistent with the concept of "continuous quality improvement" in clinical management. In fact, these types of exercise programs are ideal models for integrating concepts of CQI[27,28] into the health care arena.

(g) The exercise program evolves with respect to the goals and applications for the patient. The typical schema is outlined in Table 1.

3 The Education Program is delivered in several models: i – individual and/or group models; ii – formal and/or informal. The focus of the education program must be injury-specific, but must also include attention to general health issues, particularly those related to the injury site. An example would be as follows:

For a lumbar sprain injury–

- Information on the anatomy and function of the lumbar spine;
- biomechanical and ergonomic information on the daily use of the spine;
- information on weight control and smoking cessation as they relate to back pain;
- discussion on benefits of proper sleep, and techniques to achieve relaxation.

The education program is delivered in a multi-media context, including: 1 – written documents, pamphlets, fact-sheets etc., 2 – the use of charts, slides, videos, 3 – interactive learning sessions.

The principle aims of the education program[8,10,26] are: 1 – reduction of distress and fear-avoidance behaviours; 2 – enhancement of motivation and capacity to participate effectively in the exercise program – this goal being consistent with the notion of "client empowerment" contained in the CQI model; 3 – prevention of future recurrences through management of pain and through ergonomic and biomechanical modifications in the patient's lifestyle, and, 4 – having the patient accept an increased level of responsibility for his/her recovery.

The intervention program ends with a comprehensive discharge evaluation which includes:

1 debriefing of the patient and providing a home exercise program;
2 final clinical evaluation with symptom, disability and psychosocial rating;
3 rating of program and outcomes satisfaction;
4 determination of work readiness and discharge status for the Workers' Compensation Board (see: Methods).

In 1994, Gill et al.[29] reported on a series of 50 patients enrolled in a similar "community-clinic" program in Hamilton, Ontario. They reported statistically significant reductions in pain, disability, and handicap level as well as reductions in Sickness Impact Profile scores.[29] As well, a high rate of return to work (74%) was reported.

Methods

Patients are referred to the rehabilitation facility by their treating practitioner. Ninety-five percent of patients in this study group were referred from chiropractors, with only 5% from medical doctors. The intake assessment served as the venue for obtaining baseline data. Demographic data included: gender, age, duration of current complaint, occupation, primary language.

Clinical information was obtained by using standardized case history protocols for neck or low back pain, as well as by the use of pain and disability rating instruments. Pain was rated on the visual analogue scale[30,31] and scored out of 10, while perceived disability was rated on the Oswestry Low Back Pain Index[32] or the Neck Disability Index[33] (scored out of 50). The first pain score was designated as VAS1, while the first disability rating was designated as DIS1. Comprehensive physical examinations were conducted but the results of these assessments will not be reported here.

At discharge, pain (VAS2) and disability (DIS2) ratings were obtained. Additional outcomes included:

1 a self-rated improvement scale consisting of a 10 cm visual analogue scale. The patient was asked to consider "how much improvement in your activity level?" has occured since the beginning of the program. This VAS was anchored by "none" and "complete";
2 doctor's discharge rating as one of the following: a) Full return to work, b) return to modified work, or c) no return to work, and,
3 a questionnaire consisting of ten items which rated their level of satisfaction with the goals of the program. These goals ranged from "reducing my pain" to "helping me to learn more about my pain in order to prevent future recurrences". This instrument was named the "Outcomes Satisfaction Index".[34] A more comprehensive report of the properties of this instrument is forthcoming.

Analyses of the data consisted of descriptive statistics, t-tests for pre-post comparisons, and Pearson's Product Moment correlations and Chi Square tests for inter-instrument comparisons. As this was an exploratory study of the possible intercorrelations between various outcome variables, the p-value was set at .05.

Results

This report includes all patients who completed the entire rehabilitation program from January 1993 to September 1994. Seventy-three (73) subjects (48 males and 25 females) were eligible. The mean age of the males was 40.5 ± 11.2 years, while for the females it was 38.5 ± 11.3 years. All patients had sustained a work-related injury within 70 days of the initial visit, although the mean number of days from time of injury to initial visit was 48 days (range: 8–69). All patients had received at least one week of chiropractic treatment prior to the

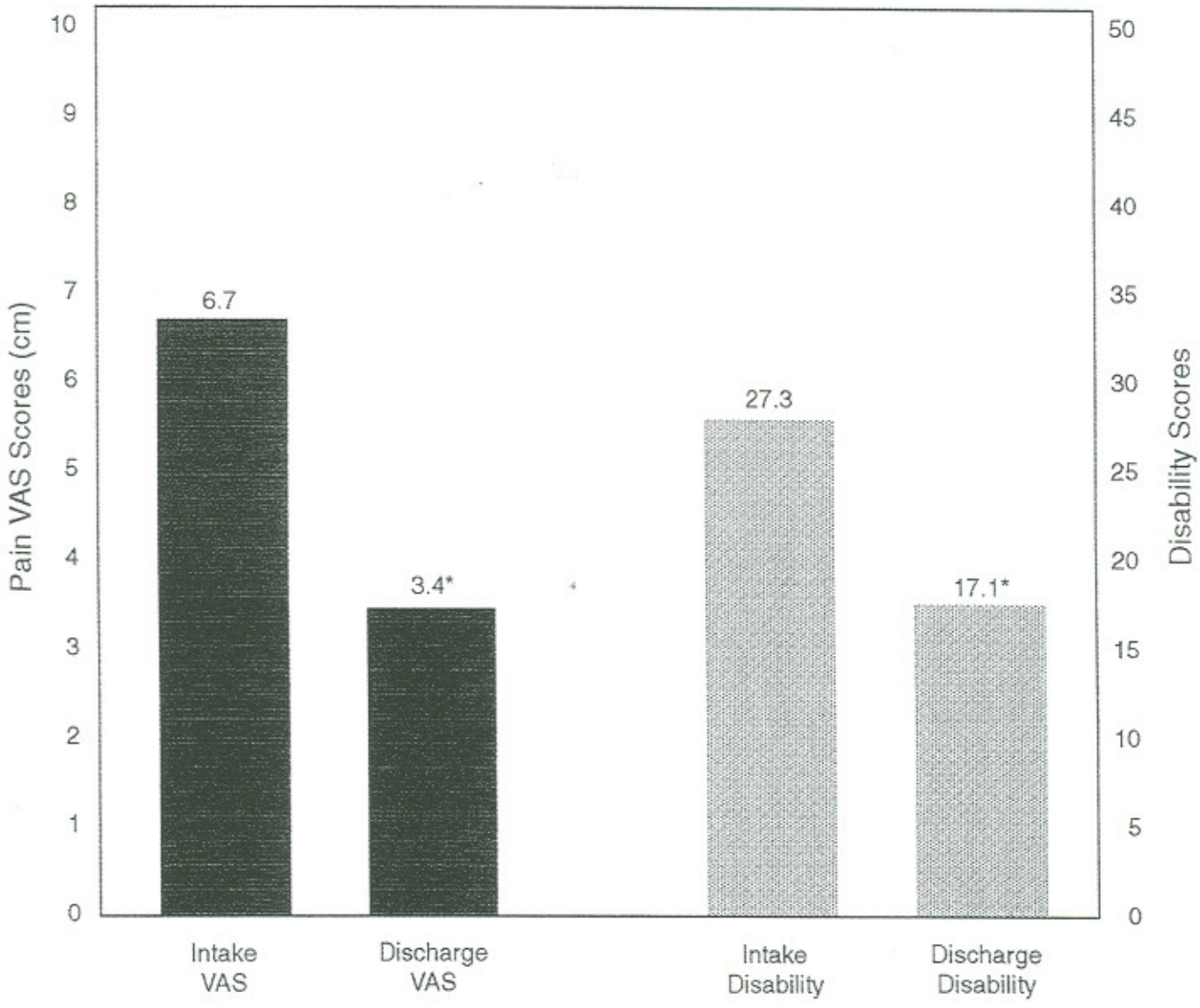
initial rehabilitation visit.

With regard to the sites of injury, 73% had sustained injuries in the lumbopelvic region (the vast majority being of the sprain/strain variety), 22% in the cervical region and 5% in the dorsal region.

The mean intake pain score (VAS1) was 6.7/10 ± 2.2, while the mean intake disability score (DIS1) was 27.3/50 ± 8.3. At discharge, the mean VAS2 was 3.4 ± 2.4 and the mean disability score was 17.1 ± 9.9. Figure 1 displays these data with the corresponding statistical values. The distribution of discharge status ratings was: Full return to work (RTW) = 34%, Modified-RTW = 47%, and no return to work = 19%. The average outcomes satisfaction score was 39.4 ± 6.8/50. The average level of self-reported improvement in functional ability was 68.36 ± 24.9%.

Table 2 lists the correlations found between these variables.

Figure 1
Pain and disability ratings at intake and discharge



*$p = 0.0001$

Table 2
Correlation data for program outcome variables

Correlation	rValue	P Value
VAS2/IMPROV	–.67	.03
DIS2/IMPROV	–.78	.008
EXP/VAS1	–.135	.71
EXP/DIS1	–.08	.82
EXP/VAS2	.24	.498
EXP/DIS2	–.48	.159
EXP/IMPROV	.39	.26
EXP/OUT.SAT	.348	.325
OUT/SAT/VAS2	–.38	.278
OUTSAT/DIS2	–.41	.24
OUTSAT/IMPROV	.81	.004
OUTSAT/PATSAT	–.05	.876
VAS DIFF/EXP	.09	.648
VAS DIFF/OUTSAT	.27	.18
DIS DIFF/EXP	.43	.025
DIS DIFF/OUT SAT	.54	.004
DIS DIFF/IMPROV	.567	.003

Discussion

When the average time to referral from the initial injury of 48 days (almost 7 weeks) is combined with the high intake pain and disability scores, this group of work-injured spinal pain patients can be characterized as sub-acute to chronic with serious unresolving complaints, and who are at a high risk for converting to a chronic pain state.[35,36] As such, the outcomes of this program are of considerable clinical and social magnitude, particularly regarding the potential for effective secondary prevention of chronicity. Taken together, the outcomes of this program are characterized by an average 50% reduction in measured pain level and an average 42% reduction in measured disability level. Eighty-one (81%) percent of patients were discharged as fit for at least modified work. There was also a high level of patient satisfaction for the achievement of a variety of clinical and psychosocial recovery goals (average 76% rating). Patients' self-rated levels of improvement in function (68%) were slightly higher than the average reduction in disability scores (see below).

A high level of congruence was noted among many of the outcome variables. The high negative correlations between the "pain" and "disability ratings" at discharge, separately, with the "self-rated level of functional improvement", and the high positive correlation between "change-in-disability scores" (i.e. reduction of disability) and the "self-rated improvement score" indicate that patient's self-perceptions of improvement are generally good reflections of actual clinical status, especially regarding perceived state of disability.

When these findings are added to the above-mentioned fact that "self-rated functional improvement levels" were, on average, 20% higher than the "change-in-disability scores", then considerable support is lent to this simple measure as a powerful outcome indicator.

The high positive correlations between "improvement in function level" and "change-in-disability scores", separately, with "outcomes satisfaction" scores provides good evidence for construct and concurrent validity of the Outcomes Satisfaction Index, thus warranting further investigations with this instrument.

The poor correlations between "change-in-pain-scores" and the other variables is puzzling, as is the reduction in correlation between "pain scores" and "disability scores" at discharge as compared to intake. These items need further study in subsequent studies.

The findings of our study compare very favourably to these of Gill et al.[29] who reported on a similar physiotherapy-based program. They reported an average 36% reduction in pain scores, 39% improvement in disability status and a 74% return-to-work rate. In our study group, pain reduction averaged 50%, disability score improvement averaged 38%, while return-to-work rate (full and modified) was 81%.

This study has limitations, particularly with regard to sampling issues and non-randomization. There is a strong selection bias created when using a convenience sample of patients whose primary practitioners only refer for rehabilitation once these patients are deemed to be recovering poorly. However, this patient base is more representative of the population of spine-pain patients in the current system of rehabilitation programs, and, as such, our findings are probably highly relevant to these programs. Additionally, the sample size in this study was somewhat small, limiting the statistical power.

Another limitation is the use of the multiple correlation matrix, especially with the *p*-value at .05. It is possible that spurious correlations can arise in these circumstances. In the case of our findings, many of the correlations had *p*-values well below .05. As well, the correlations reported here all have logical consistency, and so, taken together, they represent a defensible profile of findings.

Further studies ought to include larger sample sizes, the use of objective data from clinical and physical assessments, and more in-depth reporting on exactly which areas of the program generate the highest levels of patient satisfaction.

Conclusion

A convenience sample of work-related spine-pain cases enrolled in an active program of chiropractic rehabilitation has been described. Descriptive data at intake reveal a profile of serious, unresolving complaints. A battery of clinical and psychosocial instruments has been used to assess the outcomes

of a six-week intervention program consisting of treatment, exercise therapy and education.

Given the study design limitations and sampling bias, this program is seen to produce high levels of clinical improvement with a high level of discharge success rate. Good correlations have been found between many of the outcomes variables indicating good construct and concurrent validity of these measures. Patient satisfaction with outcomes is rated as quite good and may be based upon the combination of clinical/physical improvement and improvements in attitudes regarding their pain and disability.

Studies such as this are essential in the ongoing effort to improve the quality of care provided to work-injured spine pain patients.

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