Outcomes of an interdisciplinary rehabilitation programme for the management of chronic low back pain

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ABSTRACT

BACKGROUND AND CONTEXT: The health and economic costs associated with chronic low back pain (CLBP) have increased substantially over the past few decades. Despite extensive research, a consistently valid, reliable and effective diagnostic and treatment regime for CLBP is yet to be determined.

ASSESSMENT OF PROBLEM: This paper presents an established interdisciplinary rehabilitation model for CLBP initially developed by the Canadian Back Institute. An audit describes the symptomatic, functional and vocational outcomes achieved for patients who attended the programme over three years throughout a national network of primary health care facilities in New Zealand.

RESULTS: Over a three-year period, 899 patients with CLBP completed their rehabilitation programme at one of eight affiliated clinics. Of the 899 patients discharged, 780 (86.8%) reported that their back pain had gone or reduced at the end of their rehabilitation. There was a statistically significant, and clinically relevant, improvement in both average pain and subjective functional scores from baseline assessment levels to discharge and follow-up scores ($p<0.001$).

STRATEGIES FOR IMPROVEMENT: Previous studies have shown that functional rehabilitation can improve outcomes in individuals with CLBP. This audit provides further support for the development of interdisciplinary functional rehabilitation programmes to help manage CLBP within the community.

LESSONS: The routine measurement of symptomatic, functional and vocational outcomes throughout the rehabilitation process can assist in quantifying the effect of treatment and providing evidence of value for patients, stakeholders and funding groups.

KEYWORDS: Low back pain; outcomes; rehabilitation

Background

The prevalence of chronic low back pain (CLBP) has increased dramatically over the past two decades, with more patients seeking health care and increasing rates of absenteeism from work due to back pain–related disability.[1] Health costs in New Zealand (NZ) associated with CLBP have also escalated with increasing rates of advanced imagery, surgery, interventional therapies, reduced workforce productivity and subsequent earnings compensation.[2,3]

To date, the medical community has not been able to establish a consistently effective, valid and reliable approach to diagnose and manage CLBP.[4,5] Back pain is a heterogeneous condition that can present with a variety of symptoms, functional capacity levels, psychosocial features and vocational consequences, and, despite ongoing advances in radiological imaging and diagnostic interventions, considerable difficulty remains in determining a specific tissue source for the condition.[5,6,7] There is also uncertainty about the most effective treatment for low back pain, although recent studies have suggested that a multidimensional, biopsychosocial model may be the most appropriate approach because it can accommodate and address the varied patho-

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anatomical, neurophysiological, physical and psychosocial features that are associated with the condition.[8,9,10]

In 2001, the authors of this audit introduced a CLBP rehabilitation programme to NZ that had been developed and utilised by a North American network of rehabilitation clinics known as the Canadian Back Institute (CBI). The CBI programme is characterised by a classification approach to the diagnosis of low back pain and a structured, interdisciplinary intervention consisting of client education and active exercise to help patients to control their back pain symptoms, improve their activity levels and address psychosocial barriers to recovery. A key component of the CBI system is a customised software programme that monitors and records baseline levels relating to patient demographics, symptoms, functional capacity and vocational status throughout assessment, discharge, and follow-up milestones.

Eight private practice clinics were established throughout NZ over a 10-year period. Patients with CLBP were referred to the programme primarily by their family doctor, orthopaedic specialist or primary health funder.

Purpose

This paper outlines the CBI methodology for assessing and managing CLBP and presents an evaluation of the programme as utilised in the NZ environment. Outcomes were audited for patients who attended and completed their rehabilitation programme between March 2007 and April 2010. The demographics and characteristics of the 1076 patients referred to the clinics are shown in Table 1.

The Central Regional Health and Disability Ethics committee advised that this study did not require ethics approval, as it falls under exemptions 11.9 of the Ethical Guidelines for Observational Studies: Observational Research Audits and Related Activities.

Assessment of problem

The CBI methodology was initially developed to identify clinically relevant LBP subgroups and direct treatment accordingly.[11] As opposed to identifying a distinct pain-generating pathology, the CBI classification system categorises patients with mechanical CLBP into subgroups based on the location and nature of symptoms and the response of pain to routine spinal movements and postures (see the appendix in the web version of this paper). A separate pattern (Pattern 5) identifies patients who exhibit pain-related features (i.e. pathological anxiety, fear avoidance, anger, depression, sleep disturbance or catastrophising) that can coexist with mechanical back pain and, at times, dominate the clinical presentation.

Patients referred to a clinic receive a structured physiotherapy assessment that includes a detailed symptomatic history, a focused spinal physical examination and additional screening to eliminate systemic or organic disease. The assessment is designed to direct the therapist to categorise patient symptoms to one of the five distinct subgroups of back pain "patterns".[11] A previous study has demonstrated that this classification process has a reasonably high level of agreement between both senior and less experienced clinicians (agreement=79%, Kappa=0.61).[12]

WHAT GAP THIS FILLS

What we already know: Functional rehabilitation has been shown to be an effective approach to improving outcomes for clients with chronic low back pain.

What this study adds: This paper provides an outline of an established interdisciplinary rehabilitation programme for chronic low back pain that can be adapted and utilised within a primary health care setting. The audit reviews the outcomes that were achieved for 1076 patients who were referred for a functional rehabilitation programme over a 36-month period.

Table 1. Descriptive data for sample group at assessment (N = 1076)

Variable	Mean (SD)
Age	40.4 (11.3)
Injury duration	321.7 (342.0)
Pain score (VAS)	4.9 (2.2)
Functional score (CBIQ)	39.1 (9.6)

The CBI approach to treating back pain is based around a philosophy of customised patient education, self-management of mechanical back pain, and graduated functional activity.[13] Patients attend the clinic for a one-hour appointment for a minimum of three sessions a week over a six- to 12-week period. The rehabilitation programme consists of three progressive stages. The initial treatment stage (stage one) includes a series of 'pattern-specific' exercises and rest positions to help patients to gain control and reduce their back pain symptoms. Every patient also attends a series of individual and group education sessions on a range of topics related to the management of back pain and resolving psychosocial barriers to recovery. As symptoms reduce, patients are progressed through a series of exercises and stretches to help improve their general spinal mobility (stage two) before embarking on a final stage of progressive functional exercises and vocational simulation activities in a supervised gym setting (stage three). At the end of the programme, patients are encouraged to adopt a self-management approach to their back problem and continue with a regime of home-based exercises.

Strategies for improvement

This clinical audit investigated patients who were referred to the clinics for a contracted rehabilitation programme over a period of three years (April 2007 – March 2010). Patients were eligible for the programme if their symptoms had continued for over a six-week period and their back pain, and subsequent reduced functional capacity, were a barrier to returning to independence or work. Patients with major trauma, infection or suspected systemic illness were excluded from the programme and audit. Patients who did not complete baseline subjective questionnaires on their initial assessment were also excluded from the sample group.

The rehabilitation programme was conducted within each clinic by an interdisciplinary team of physiotherapists, occupational therapists, psychologists and exercise therapists. To ensure consistency, each clinician received ongoing training throughout the audit period on the CBI classification system and the spinal assessment and treatment methodology.

Clinical data were gathered at the initial patient assessment to record baseline information relating to patient symptoms, medical history, injury and employment history, psychosocial and neurological status. All patients completed a functional questionnaire (Canadian Back Institute Questionnaire—CBIQ) based on the Low Back Outcome Score[14] but modified and validated for use in these clinical settings.[15,16] At completion of the programme, every patient completed a discharge questionnaire relating to changes in pain level based on the Visual Analogue Scale (VAS), global assessment of treatment effect[17] (pain has gone, decreased, same or increased) and perceived functional status (CBIQ). At approximately a six-month follow-up period, patients were contacted via telephone to obtain updated information relating to back pain symptoms, functional capacity and vocational status. Baseline and outcome questionnaires were consistent throughout the assessment, discharge and follow-up checkpoints.

For the purposes of the audit, primary outcomes included:

1. change in pain rating on an 11-point VAS from initial assessment through to discharge and follow-up
2. change in perceived functional capacity (based on change in the CBIQ score)
3. global assessment of treatment effect, and
4. change in vocational status from assessment, discharge and follow up.

All analysis was conducted using the statistical software SPSS for Windows, version 15.0.1. An alpha level of 0.01 (two sided) was used as the criterion for statistical significance.

Results of intervention

One thousand and seventy-six patients with CLBP were referred to the clinic over a three-year period. The mean age of the group was 40.4 years (SD=11.3, Range 17–76), 62.7% of the group were male and the mean duration of symptoms was 322 days (SD=342 days; median=208 days) (see Table 1). Outcome measures were completed at discharge by 899 of the 1076 patients (83.6%), 87/1076 (8.0%) withdrew early from the programme, and 90/1076 (8.4%) completed their

Table 2. Pain and functional scores at assessment, discharge and follow-up

	Assessment Mean (SD)	Discharge Mean (SD)	Follow-up Mean (SD)
Pain score (VAS)	4.9 (2.2)	3.0* (2.4)	2.8 (2.5)
Functional score (/70)	39.1 (9.6)	50.4* (11.9)	53.6 (13.3)

* Statistically significant difference $p<0.001$

Table 3. Global assessment of treatment effect at discharge and follow-up

Pain control status	Pain gone	Pain decreased	Pain same	Pain increased
Discharge	170/896 (19%)	610/896 (68%)	99/896 (11%)	17/896 (2%)
Follow-up	145/752 (19%)	434/752 (58%)	117/752 (16%)	56/752 (7%)

programme but did not complete the relevant discharge forms.

Table 2 shows the baseline outcomes at assessment, discharge and follow-up for pain and functional scores. There was a statistically significant difference in pain and functional scores between assessment and discharge ($p<0.001$) and between assessment and follow-up ($p<0.001$). The completion rate for both the discharge and follow-up data was 83.6 %.

Table 3 displays the global assessment of treatment effect at discharge and follow-up. At discharge, 87.0% of patients reported that their pain had gone or decreased when compared to their symptoms at assessment. At follow-up, 77.0% of patients stated that their pain had gone or decreased when compared to their symptoms on assessment.

Of the 1076 patients referred for rehabilitation, 940 (87.4 %) listed their employment status as being available for employment (workforce group) and the remainder (12.6%) were classified as students, retirees or homemakers. Five hundred and forty-four of the 940 patients in the workforce group (57.9%) were not working at the time they entered the programme due to their CLBP symptoms.

At the end of the programme, 819 of the 940 patients in the workforce group (87.1%) completed their programme and associated discharge forms and were recommended to (1) return to work on full pre-injury work hours, or (2) return to work on permanently reduced work hours/duties, or (3) redirect for specialist review (i.e. orthopaedic surgeon, pain specialist or vocational physician). Table 4 shows the discharge recommendations and work status at follow-up for the workforce group. Overall, 708 of the 819 patients (86.4%) in

Table 4. Return to work (RTW) recommendation and work status at follow-up for workforce group

Work status at assessment	Not working	Working full-time or reduced hours	Total
	544 (58%)	**396(42%)**	**940 (100%)**
RTW recommendation at discharge			
Return to pre-injury hours	375 (81%)	333 (94%)	708 (86%)
Permanent reduction in hours	9 (2%)	7 (2%)	16 (2%)
Redirect for specialist review	82 (17%)	13 (4%)	95 (12%)
TOTAL	466	353	819
Work status at follow-up			
Working	251 (65%)	253(85%)	504 (74%)
Not working	137 (35%)	44 (15%)	70 (26%)
TOTAL	388	297	685

the workforce group were recommended to return to their pre-injury work hours at discharge, 16/819 (2.0%) were recommended to return to work with permanently restricted work hours, and 95/819 (11.6%) were redirected for specialist review. Of the 819 workforce patients who were discharged, 685 (83.6%) were contacted via phone approximately six months (mean=192 days) after their discharge date to ascertain their actual work status, 504 of the 685 patients contacted (73.6 %) had achieved durable employment.

Lessons and messages

This programme was developed to meet the needs of the community for an interdisciplinary rehabilitation service for people in the community with CLBP. The 1076 subjects in the audit sample represent a group of patients with established CLBP (mean symptom duration=317 days) and moderate functional ability. The outcome measures and subsequent analysis demonstrated statistically significant improvements for both pain and functional level from baseline assessment to discharge and follow-up.

Previous studies have defined a clinically significant difference in pain scores as a change of 1.8 to 2 on a 10-point rating scale of pain.[17,18] This audit demonstrated a 1.9 point reduction in pain scores on completion of the programme and a 2.1 point change at follow-up. Other studies suggest that a 30% change is required to represent a minimally clinically important difference in functional score.[18,19] This audit demonstrated a 28.9% improvement in functional score from assessment to discharge and a 37.1% increase from assessment to follow-up.

The CBI classification system offered a number of advantages to our clinical team in the implementation of a CLBP rehabilitation programme in a primary care setting. The structured assessment process assisted our physiotherapists to stratify patients presenting with mechanical CLBP into simple subgroups (patterns), identify those with concurrent psychosocial features, and screen out the very few patients whose symptoms did not fit a mechanical pattern. Patients with suspected organic disease, alternate musculoskeletal pathology (i.e. hip osteoarthritis), or those who did not respond to conservative rehabilitation, were referred internally to an affiliated orthopaedic specialist. The triaging of patients for specialist structured back pain consultation was considered to have additional cost benefits by reducing unnecessary specialist consultations and limiting waiting times for appropriate orthopaedic review.

A treatment model also had benefits for both the health professional team and the patient. In this project, all clinical staff and patients were familiar with the pain pattern classifications, the treatment stages, and the treatment approach, and this ensured that there was a common pathway for all groups involved in the rehabilitation process.

The majority (86.4%) of patients in the programme were recommended to return to work at the end of their rehabilitation, and 73.6% of the group had achieved this recommendation on follow-up. It is important to note that there was considerable variance in work history for the sample group and a number of patients did not have a job to return to at the end of their functional rehabilitation. Furthermore, return to work may be influenced by factors other than physical ability. Pre-injury work history, motivation, emotional reaction, economic and cultural considerations, job availability, job satisfaction and compensation benefits may override any improved symptomatic or functional gains that support a return to employment.[16]

A number of studies have demonstrated the value of active functional rehabilitation for treating CLBP.[20,21,22] This audit provides further support for this approach and demonstrates the outcomes that can be achieved within a structured, interdisciplinary model. The audit also highlights the importance of routinely monitoring symptomatic and functional outcomes throughout, and beyond, the rehabilitation period to objectively measure the impact and value of treatment for health insurers, national health organisations, clinicians and patients.

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COMPETING INTERESTS

Chris Hoffman and Peter Robertson are Directors and shareholders of The Back Institute and TBI Health. Chris Gregg is a shareholder of TBI Health, Hamilton Hall is the Medical Director for the Canadian Back Institute and Greg McIntosh is employed as an epidemiologist at the Canadian Back Institute.

APPENDIX A: Canadian Back Institute Patterns of Mechanical Low Back Pain

Pain Pattern	Subjective symptoms	Objective signs
Pattern 1 Fast responder	Back dominant pain (back, buttock, trochanter, groin) Pain is usually intermittent (can be constant) Pain is worse with flexion-based spinal postures and/or movement	Pain is worse when bending forward Pain is better or no change with loaded (standing) spinal extension; always better with unloaded (prone) spinal extension
Pattern 1 Slow responder	Back dominant pain (back, buttock, trochanter, groin) Pain is usually constant (can be intermittent) Pain is worse with spinal flexion **and** extension postures and/or movement	Pain is worse when bending forward, **and** when bending backwards (unloaded and loaded)
Pattern 2	Back dominant pain (back, buttock, trochanter, groin) Pain is always intermittent Pain is only worse with spinal extension postures and/or movement Pain is relieved with spinal flexion postures and/or movement	Pain is worse when bending backwards (unloaded and loaded) Pain is relieved when bending forwards (unloaded and loaded)
Pattern 3	Leg-dominant pain (pain below the buttock) Pain is **always** constant Leg pain is aggravated and/or relieved with different spinal postures and/or movements	Leg pain changes with spinal movement and/or position Pain can be reduced with specific postures but never abolished Positive nerve tension test and/or distinct neuropathy
Pattern 4	Leg dominant pain (pain below the buttock) Pain is **always** intermittent Leg pain is aggravated with upright activity (particularly walking) and relieved with rest and/or posture change	Normal or non contributory spinal examination at rest Can have conduction loss