Six-month outcomes of an integrated primary care prevention and management program for chronic low back pain (LBP)

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Research Article

Keywords: primary care, Low Back Pain, person-centered care, integrated care, Chronic Pain, sub-acute pain

Posted Date: January 13th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1175366/v1>

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Abstract

Background

Accessible interdisciplinary, patient-centered and integrated primary care programs for chronic pain are needed for averting chronicity and improving patient outcomes. We sought 1) to develop an interdisciplinary low back pain (LBP) primary care program, and 2) to evaluate the program's implementation and impact on patients' physical and mental health over 6 months. A quasi-experimental pre-test/post-test design was used, and participants completed baseline, 3 and 6 months post-intervention evaluations. Referral and program process indicators were measured.

Methods

Clinically meaningful change in patient reported outcome measures of pain interference and intensity, physical function, depression and anxiety were defined *a priori* and evaluated. A multilevel regression analysis was performed to evaluate the impact of the program on change in individuals' pain interference over 6 months.

Results

Forty six percent of participants were seen within 60 days of referral to the LBP program, and 464 individuals completed the program. The majority ($\geq 60\%$) experienced a clinically meaningful improvement for pain intensity and interference at six months. A greater proportion of those with moderate (71%) or high risk (81%) of chronicity showed an improvement in pain interference than those with low risk (51%). A similar pattern emerged for depression and self-efficacy, but not for anxiety. Significant predictors of improvements in pain interference included higher prognostic risk of chronicity, younger age, sex, and lower baseline disability.

Conclusion

Results supported an improvement in participants' confidence to manage their LBP. Future research will compare alternative modes of delivery (e.g. telehealth) and stratification approaches to further tailor resources to individuals' needs.

Introduction

Chronic pain is a significant problem in the population and its prevalence increases with age (1). In 2010, the Chronic Pain Association of Canada reported that "the annual cost of chronic pain, including medical expenses, lost income, and lost productivity is estimated to exceed \$10 billion"(2). More than one-third of those suffering from CP experienced low back pain (LBP)(3). In an international survey, back pain was identified as the most common condition and is most prevalent among young and middle-aged individuals(4). According to the WHO there is a 19% annual incidence of new cases of acute LBP in adults(1), and among these cases 40% are persistent. Evidence to date suggests that early intervention for individuals at medium and high-risk of chronicity can significantly reduce disability at 3 months post-intervention.

To address the growing burden of LBP and ensure optimal management of patients, integrated primary care networks play an important role in delivering evidence based LBP care(5). Given the variation in the presentation of physical and psychosocial factors among individuals with chronic pain, a tailored approach that matches interdisciplinary care to individuals' needs is necessary(6). Evidence-based clinical guidelines, such as the McGill Spine Algorithm and others (7) as well as published data on risk factors of chronicity(8) support the development of an interdisciplinary, patient-centered and integrated model of care at the primary level for patients with chronic pain.

Self-management, physical and psychological therapies, and some forms of complementary medicine are recommended as first lines of treatment, with less emphasis on pharmacological and surgical treatments(5, 9). Guidelines encourage active treatments that address psychosocial factors and focus on improvement in function(1, 10). Early interdisciplinary diagnosis and treatment of chronic pain have been associated with decreased risk of chronicity, improved return to work, and quality of life outcomes (1, 11). Guideline recommendations also include strengthening consultation between professionals and improving access to and coordination of care at the primary, secondary and tertiary levels (12–14).

However, many gaps exist in the management of LBP. Primary health care providers face challenges in managing individuals with LBP including lack of awareness guidelines, and lack of resources and access to interdisciplinary teams. There is fragmented coordination of care between primary, secondary, and tertiary levels of care(1, 15–18). As a result, people living with LBP do not receive the necessary services to address these psychosocial needs. For many, lack of access to LBP care that is concordant with guidelines increases the chances of individuals experiencing chronicity, and long-term disability, significantly reducing the chances of recovery.

To address these challenges, the Centre of Expertise in Chronic Pain of the McGill University Health and Social Services Network, developed and implemented an interdisciplinary primary care program, based on evidence-based guidelines, targeting individuals with sub-acute and chronic nonspecific LBP. The objectives of this study were 1) to develop an interdisciplinary low back pain (LBP) primary care program, and 2) to evaluate the program's implementation and impact on patients' physical and mental health over 6 months.

Methods

DESCRIPTION

Design

This study was a quasi-experimental multiple pretest/post-test design. We used a quantitative and qualitative approach(19, 20) to evaluate the program over six months. Data collection was managed using the Research Electronic Data Capture (REDCap)(21). In this study, we report the quantitative results. The qualitative results are presented elsewhere(22). We used the Standards for Reporting Implementation Studies (StaRI)(23).

Context

Creation of the Interdisciplinary and Self-management LBP Program

Governance

In May 2012, following a strategic initiative of the Centre of Expertise in Chronic Pain (CECP) of the McGill University Health Network, an interdisciplinary program, based on evidence-based guidelines, targeting a population suffering from nonspecific LBP, was developed and implemented in four health regions in Quebec. Patient partners and representatives from clinical care, education, and research and the ministry of health and social services co-developed the program using an integrated knowledge translation approach(24). The aims of the program are to:

- Use an interdisciplinary approach in the delivery of services including prevention, early intervention and optimal management of chronic pain using pharmacological and non-pharmacological interventions as well as self-management,
- Develop hierarchical and effective bidirectional corridors of service between primary, secondary and tertiary level services,
- Build relationships with different partners in each local service network (primary care clinics, community organizations, pharmacists, etc.) to ensure optimal access to integrated primary level services throughout the CSSSs,
- Increase support and access to self-management support for individuals across the care continuum.

The governance committees of the CECP oversaw the development and implementation of the LBP program. Supplemental table 1 summarises the mandates and chairs of each committee. To inform each committee's work, the research committee synthesized and presented the evidence from the literature, particularly evidence-based strategies in the LBP guidelines, the Chronic Care Model, and assessments for LBP. Guided by the evidence, the committee developed the evaluation and implementation tools and included them as part of the program(22, 25-28). The deliverables of each committee resulted in the creation of the LBP Model of Care (supplemental figure 1), the trajectory of care (supplemental figure 2), and the process and treatment strategies to be used by the interdisciplinary team (supplemental figure 3 and Table 1).

Study sites and participants

The program was implemented in four local health regions (i.e. Centre de Santé et de Services Sociaux)[1]

The interdisciplinary program consisting of a nurse, a physiotherapist, a psychologist and a "physician champion in chronic pain" was designed to use evidence-based practices and provide self-management support(29).

Participants were individuals with subacute or chronic LBP who visited one of the four local health regions. Inclusion criteria for the study were diagnosis of sub-acute or chronic LBP ≤ 1 year, age of 18-75 years, and proficiency in French or English.

Intervention

Low Back Pain Model of Care

The program included an algorithm that defined the trajectory of service corridors with referral criteria to facilitate the transition from one service to another(30).

The program used standard tools for assessment to identify patients' treatment needs (31-35). All team members completed the baseline evaluation together, followed by a joint session with the patient to plan and implement the intervention (supplemental figure 3). Teams scheduled patient visits and entered clinical management information in a data capture system, REDCap(21). Over six months, the standardized clinical process included interdisciplinary follow-up at 1.5, 3 and 6 months after the initial visit, with telephone follow-up by the nurse at 4.5 months. The team determined individual follow-up with additional professionals (e.g. occupational therapist, social worker etc.) and referrals to other specialized services on a case-by-case basis according to individuals' psychosocial and medical needs and risk of chronicity for chronic pain. As defined in the algorithm (supplemental figure 2), the McGill Center of Expertise in Chronic Pain established corridors of service between primary and secondary and tertiary level medical and rehabilitation services to address depression that did not improve in the program, addiction, and return to work.

Core elements for the treatment plan were defined for each discipline (supplemental figure 3), focusing on empowering individuals develop the skills needed to manage symptoms and improve function. In addition, the interdisciplinary teams were trained to apply the 5A strategy to help individuals set realistic goals and defined an action plan to develop the skills needed to achieve these goals. The 5As(36) focuses on clinician completion of five specific tasks (Ask, Advise, Assess, Assist, Arrange), each supported by evidence(37, 38), necessary to effectively counsel patients about health habits, and to develop the skills patients' need to better manage their chronic condition.

Implementation strategy

Four health regions received funding from the Ministry of health to implement the program 2 days/week within the context of an integrated network of services, while taking into account their respective organizational context and existing structures for delivering interdisciplinary chronic disease management. Each region used resources that were available (e.g. psychotherapist rather than psychologist). The CECF and the primary care coordinator in each region informed primary care physicians managing adults with LBP of the program. Physicians were encouraged to refer eligible patients with LBP lasting from six weeks to one year to their regional interdisciplinary primary care LBP program. Referral and acceptance into the program required that individuals not have one of the red flags indicating possible cancer, radiculopathy, significant herniated disc, or Cauda Equina Syndrome (supplemental figure 2). The CECF organized a full-day workshop to train clinicians. In addition, preceptorships and mentorships between specialized hospital care specialists and primary care clinicians were organized. Finally, coaching or ongoing support was also provided by the CECF. Regular meetings (bi-annual) were held to review the data and discuss the challenges that the sites might be experiencing. This provided each site with opportunities to learn each other's successes, optimizing the program at each site.

EVALUATION

Implementation Measures

Various process outcomes were used to evaluate the implementation of the program. These included the number of physicians that referred to the program and the number of patients. Human resource needs for the LBP program and indicators of management including reasons for referral, time to first patient contact with the LBP program, the number of visits to each health professional across risk of chronicity sub-groups based on the Keele STarT Back(39), and the proportion of individuals that remain and adhere to the program were also evaluated.

Impact of the Program on Patient Reported Outcome Measures (PROMs)

Patients completed a set of PROMs and questionnaires at baseline and three and six months. The first section evaluated the impact of pain, physical and mental health, functional status, quality of life, current roles, and quality of care and follow-up. These measures included the Oswestry Disability Index (ODI) designed to assess limitations of various activities of daily living(31), the Brief Pain Inventory (BPI) that provides a quick and easy means of measuring pain intensity and the extent to which pain interferes in the lives of the pain sufferers(32), the Fear Avoidance Beliefs Questionnaire (FABQ) that assesses patients' beliefs about how physical activity and work affected their low back pain(40), the Hospital Anxiety and Depression Scale (HADS) used for detecting states of depression and anxiety in the setting of a hospital medical outpatient clinic and the severity of the emotional disorder, the Patient Health Questionnaire (PHQ-9) that assesses for the presence of a depressive disorder(33), the RAND-12 designed to measure general health status that includes 8 concepts (physical functioning, role functioning physical, bodily pain, general health, vitality, social functioning, role functioning emotional, and mental health) and the results can be expressed in terms of two meta-scores: the Physical Component Summary (PCS) and the Mental Component Summary (MCS), and the Patient Global Impression of Change (PGIC)(34). The pain self-efficacy scale was administered to assess individuals' confidence in carrying out activities despite their pain(35). The *Patient Assessment of Chronic Illness Care* (PACIC) questionnaire asked about specific actions or qualities of care, congruent with the CCM that patients report they have experienced in the delivery system. A subset of these PROMs was completed at 1.5 and 3 months. Table 1 summarises the PROMs and visits at which they were administered.

The last part of the questionnaire collected socio-demographic information and information about the individuals' primary care doctor and clinic. For individuals who did not return to the program after the initial visit, an exit questionnaire was administered to ask patients why they did not return, whether they are receiving services elsewhere and whether their insurance coverage has changed.

Statistical Analyses

Implementation measures included calculating the proportion of individuals referred that were accepted in the program, and the proportion that remained in the program and completed the 6-month evaluation. The average number of visits to each clinician within each risk of chronicity group was also evaluated.

Effectiveness was evaluated by identifying the percentage of participants that experienced an improvement greater than the minimally clinically important difference (MCID), no change, or deterioration for each PROM. Changes on PROMs were evaluated between baseline (initial visit) to 3 months and between baseline to 6 months. Sub-group analyses were conducted to compare the proportion that experienced a MCID across three sub-groups of the Keele STarT-Back (low, medium, and high risk of chronicity) at baseline.

We conducted hierarchical multivariable regression to evaluate the relationship between patient and staff and process covariates and the change in pain interference as the outcome. We first estimated univariate models, and all significant covariates (95% confidence interval does not include the null value) in the unadjusted models were included in the multivariate model. Exceptions were covariates that had a high correlation with other covariates or had missing data that exceeded 10%, which were not included in the model. The exception was sex, which we felt was important to include in the multivariate model, even if it was not significant in the univariate model given the importance of sex differences in response to interventions(41). The analyses were performed using SAS version 9.4. (SAS Institute, Cary, NC, USA).

Ethical Considerations

All procedures were conducted in accordance with the Declaration of Helsinki Ethics approval for this study was obtained from the McGill University Health Center IRB (#MP-CUSM-12-220 GEN/2013-999). Written informed consent was obtained from all the participants.

[1] At the time of this study health regions were decentralized and referred to as Centre de santé et de services sociaux and since then merged with other health regions to form Centre intégré universitaire de santé et de services sociaux (CIUSSS)

Results

Characteristics of the participants

The average age of participants was 55 (SD=15) and 63% were female. Twenty four percent had a mild risk of chronicity, 33% a moderate risk, and 27% a severe risk.

Implementation Evaluation

Between May 2012 and March 2017, 24 primary care physicians referred 1545 individuals to the four programs. Among these, 321 (21%) individuals could not be reached after referral, and 752 (49%) were accepted into the program of which 689 (92%) consented to use their data for evaluation purposes. Reasons for not being accepted into the program were available for 135 individuals and were mainly related to not meeting the inclusion criteria for age (n=47), the duration of pain (n=71), or pain resolving (n=41), or having a red flag (n=46). Among the 689 who consented, a total of 225 (33%) dropped out, and 464 completed questionnaires at 3 months. Reasons for not continuing in the program were available for 110 individuals and were variable (Supplemental table 2).

Those who did not complete the program (n=225) had slightly higher levels of pain interference, anxiety, and depression at baseline as compared to those that remained in the program (n=464) (Table 2). Among those who dropped out compared to those who remained in the program, there was a slightly higher proportion in the high-risk chronicity group.

Each site had a nurse, physical therapist, psychologist, and primary care physician with expertise in chronic pain. One site opted to have the primary care physician see patients with a medical need only if identified by the nurse. Programs started with 1 day/week and moved to 2 days/week once referral rates increased. Each site was able to triage and treat on average 75 patients/year for each day the program was offered.

Forty six percent of individuals with LBP were seen less than 60 days after referral. Common reasons for having the first visit more than 60 days after referral were difficulty reaching people to schedule the first visit or receiving referrals during times when team members were away.

The average number of visits to the nurse, physician, and psychologist was slightly higher for the high risk of chronicity group than the low and moderate risk groups (supplemental figure 4). Participants had, on average more visits to the physiotherapist than all other team members for all risk groups.

Impact on physical, mental and social health

The majority ($\geq 50\%$) experienced a clinically meaningful improvement in pain intensity and interference at six months (Figure 1). A greater proportion of those in the moderate (71%) or high risk (81%) of chronicity group showed an improvement in pain interference than in the low-risk group (51%). The pattern between risk of chronicity groups was the same for pain intensity. A similar pattern was seen for disability as measured by the ODI. For depression, the proportion that had a clinically meaningful improvement in the moderate (34%) and high risk (55%) group was higher compared to the lower risk group (22%) (supplemental figure 5). In contrast, a greater proportion of the low risk group (74%) experienced a clinically meaningful improvement in anxiety at 6 months compared to the moderate (68%) and high risk (70%) group (supplemental figure 5). A larger proportion of individuals in the moderate (46%) and high risk (59%) group also experienced a clinically meaningful improvement in self-efficacy at 3 months compared to the low risk group (33%). This pattern remained up to 6 months, however, the differences were not as large (low risk=48%, moderate risk=53%, high risk=54%) (supplemental figure 6).

Table 3 presents the univariate relationship between the measures and covariates and pain interference changes over six months. The multivariate model revealed significant predictors of change in pain interference between baseline and six months (Table 4). Significant predictors included prognostic risk of chronicity (Start Back) (MC [CI] $_{\text{high/low}}$ -0.6[-1.4, 0.3], MC [CI] $_{\text{medium/low}}$ -0.4[-1.1, 0.3]), age (for a change of 10 years, 0.2[0.0, 0.4]), sex was borderline significant (95% CI is -0.99 to 0.05) and baseline disability (Oswestry Disability index- change of 20 units (-0.5[-0.9, -0.1])). Similar to the univariate model, the number of months since implementation of the program did not emerge as a significant predictor in the multivariate model.

Discussion

The research evidence to date supports greater use of the bio-psychosocial model for the management of individuals with LBP(42–44). Achieving a comprehensive care model that addresses individuals' physical, mental, and social needs requires collaborative care across health professionals. The creation of a Center of Expertise in Chronic Pain provided the structure to develop a hierarchical network of services from primary to tertiary level care to manage chronic pain. The goal was to optimize care delivery to meet individuals' needs while maximizing resources by creating a strong primary care interdisciplinary program and redesigning clinical pathways with the focused implementation of best practices. This may minimize unnecessary referrals to hospital-based care, shorten waiting time, and ensure that individuals receive the care they need to address health and well-being and prevent progression to chronicity. The program's creation addressed a gap in the best first contact care, where a recent review showed that only a minority of patients receive simple positive messages to stay active and exercise. The review adds to evidence that the care doctors provide patients with LBP is dominated by guideline-discordant interventions that are unnecessary, expensive, and "low-value" (i.e., the harm is more likely than benefit)(45–47), another gap addressed by the implementation of the CECF LBP program.

Creating an integrated interdisciplinary program in primary care, embedded in each health region, provided individuals with LBP a thorough bio-psychosocial evaluation to match the intensity and type of interventions to the complexity of their needs. Almost 50% of those referred to the program were eligible, preventing potentially unnecessary referral to tertiary level care. While the average number of visits was only slightly lower among the high-risk group than the low and moderate risk group, all had a larger number of visits to the physiotherapist. Emphasizing physical activity and exercise was the program's intended focus, in line with LBP clinical practice guidelines.

The majority of individuals, particularly in the moderate and high-risk group, showed clinically meaningful improvement in physical and mental health outcomes. This is similar to other studies that found that individuals with greater physical and mental health limitations benefit more from interdisciplinary care than those in the low-risk group. While evidence supports a multidimensional individualized treatment approach, for the most part, access to programs that promote physical and psychological therapies and discouraging the use of pain medications, steroid injections, and spinal surgery is limited(47). The likely sustainability of the McGill Center of Expertise in Chronic Pain LBP program is routed in the redesign of the clinical process in each health region to shift resources from unnecessary care to guideline-concordant care for LBP.

We evaluated the clinical program and individual factors that are significantly associated with changes in pain interference throughout the program. We found that those in a younger age group and those with a higher risk of chronicity and disability at baseline benefited the most in terms of improvements in pain interference. These are also sub-groups of individuals most likely to experience deteriorations in function if intervention is not started early(48), increasing the risk of opioid dependency (49).

The implementation of the McGill Center of Expertise in Chronic Pain LBP program across four different health regions has provided the preliminary data needed to move to scale up for a broader chronic pain population in several ways(50). First, the leadership in the organizations, the Provincial Ministry of Health, McGill Center of Expertise in Chronic Pain, and the Quebec Patient Association for Chronic Pain were involved in setting the agenda for change, aligning incentives (e.g. recurrent funding to maintain the primary care interdisciplinary team 1 day/week) and establishing accountability. This included the involvement of patient partners from the Quebec Association for Chronic Pain. Second, the program's careful design in phases for going to full scale (i.e., *Set-up, Develop the Scalable Unit, Test of Scale-up, and Go to Full Scale*)(50) increased the readiness of each site to adopt the program. Third, the collaboration and co-production of the program within and between clinical teams in each region enhanced adoption mechanisms (i.e., leadership engagement, communication methods, leveraging social networks, and building a culture of urgency and persistence). Finally, breaking down of silos by bringing together expertise in clinical care, education and research provided support systems needed to move to large-scale programming. These support systems include a learning system that connects adopters and experts, and a data system to support measurement for improvement. The positive outcomes of the LBP program to date have led Regions to include establishing infrastructure such as information technology and equipment in their strategic action plans.

Limitations

While the program's design and evaluation provided a strong base to launch the primary care interdisciplinary program within an integrated care network, there are limitations to this work. Mainly, as this was an implementation repeated measures study design, we did not include a control group. Some of the changes in outcomes that occurred can be expected to occur spontaneously without intervention. Further, dropouts before the end of the 6-month program occurred, mainly among those that experienced improvements early on in the program or did not want to commit the time to the program. Tailoring the length of the program and mode of delivery online for some components may help maximize resources and allow the program to reach a larger number of individuals. Also, the programs used REDCap,(21) a data capture system mostly intended for research. Future integration of electronic medical records in the programs will allow us to capture additional information on specific interventions individuals receive.

Declarations

Ethical considerations

Ethics approval for this study was obtained from the McGill University Health Center IRB (#MP-CUSM-12-220 GEN/2013-999).

Consent for publication

Participants provided written informed consent to use their data for research purposes.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to pending approval from the ethics committee to share the data but will be available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

Funding

This project was funded by a grant from FRQS- MSSS- Pfizer and the Richard and Edith Strauss Foundation. S. Ahmed was supported by an FRQS career award and A. Gogovor by an FRQS Doctoral award.

Author's contributions

Sara Ahmed,: Conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing of the original draft, visualization, supervision, project administration and funding acquisition.

Regina Visca: Conceptualization, methodology, investigation, resources, data curation, Review and editing original draft, supervision, project administration and funding acquisition.

Amede Gogovor: Conceptualization, methodology, investigation, data curation, Review and editing original draft, project administration and funding acquisition.

Owis Eilayyan: Investigation, data curation, Review and editing original draft, data curation.

Roderick Finlayson: Conceptualization, investigation, Review and editing original draft, project administration and funding acquisition.

Marie-France Valois: Validation, formal analysis, Review and editing original draft.

Mark A. Ware: Conceptualization, methodology, investigation, Review and editing original draft, funding acquisition.

Acknowledgements

We would like to thank the members of the CECF LBP committees and patients for their contributions to the creation of the program and this study. We would also like to thank Ms. Mushirah Hossenbaccus, M.Eng and Mr Patrick Ware, MPH for assisting with coordination of the project and data collection.

*Members of the McGill Réseau universitaire intégré de santé et services sociaux (RUISSS) Center of Expertise in Chronic Pain LBP Project (<https://www.mcgill.ca/ruisss/>)

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Tables

Table 1: McGill Center of Expertise Low Back Pain Clinical Process and Assessment

	Meetings	Recruitment	Screening	Initial interdisciplinary evaluation	Week1	Week2	Week3	Week4(1month)	Week 5	Week 6	3 m
General Practitioner (treating)		x									
Evaluation & interdisciplinary follow up	Doctor advisor (pain)		PRN	x						PRN	X
	Clinician nurse			x						x	X
	Physiotherapist		PRN	x							
	Psychologist		PRN	x							
Individual Meeting	Clinician nurse				X	x	PRN	PRN			
	Physiotherapist				X	X					
	Psychologist				X	x	PRN	PRN			
Grp Meeting	Physiotherapist-group(3-4patients)						x	x	x		
	Self-management							Session of 6 weeks (2.5h per week)			
	Patient report sent to referring physician
Evaluation	Brief analysis of pain			✓						✓	✓
	Disability test Oswestry			✓							✓
	Screening test StarT Back			✓							
	RAND-12			✓							
	Individual evaluation in regard to pain (FABQ)			✓							
	Opioid Risk Assessment Tool			✓*							
	Hospital Anxiety and Depression Scale (HADS)			✓							✓
	PHQ-9			✓						✓	✓
	Patient Assessment of Care for Chronic Conditions (PACIC)			✓							
	Self-efficacy			✓							✓
	Back to work (RAMS)			✓*							
	General impression of changes										✓

Referral as needed to the following services: Health education center, nutritionist, occupational therapist, kinesiologist, social worker

*Assess as required

Table 2: Baseline characteristics of participants at baseline

Variable (Range)	Stayed in N= 464 ; Mean (sd)	Dropped-out N= 225; Mean (sd)	p-value §
Age	55.4 (14.8)	49.2 (16.2)	<0.0001
Gender (% Female)	294 (63%)	132 (59%)	0.2208
Pain Severity (0-10)	4.7 (1.9)	5.2 (2.0)	0.0011
Pain Interferences (0-10)	4.6 (2.4)	5.3 (2.4)	0.0017
HADS-Depression	6.2 (4.1)	7.3 (4.2)	0.0027
HADS-Anxiety	8.7 (3.8)	9.3 (4.0)	0.1086
Oswestry	32.8 (15.5)	36.4 (15.7)	0.0054
Physical Health (0-100)	35.6 (10.1)	34.7 (9.5)	0.3527
Mental Health (0-100)	47.6 (11.2)	44.1 (10.8)	0.0008
Keels Start Back (0-9)	4.9 (2.3)	5.5 (2.3)	0.0037
Mild	112 (24%)	42 (19%)	0.1004
Moderate	155 (33%)	68 (30%)	
Severe	127 (27%)	81 (36%)	

§ p-value from t-test for continuous variables and chi-square for categorical variables.

Table 3. Univariate Association Between Variables and Change in Pain Interference between Baseline and 6 months (n= 314 patients).

	Mean Change	95% CI	R ²
Age (change of 10 years)*	0.23	(0.05, 0.41)	0.022857
Age			
< 35	Ref		0.023575
35 to 44	0.43	(-0.64, 1.50)	
45 to 54	0.75	(-0.24, 1.73)	
55 to 64*	1.01	(0.02, 2.00)	
≥ 65*	1.06	(0.12, 2.00)	
Male vs Female	0.00	(-0.54, 0.53)	0.000000
Marital status			
Married or Common Law	Ref		0.030690
Divorced or Separated	0.68	(-0.15, 1.51)	
Never Married	0.08	(-0.75, 0.91)	
Widowed	-1.11	(-2.60, 0.39)	
Other, please specify	0.77	(-0.73, 2.26)	
Missing	0.85	(-0.12, 1.81)	
Education			
College or University	Ref		0.007779
Secondary School	-0.15	(-0.80, 0.50)	
Primary School or None	-0.70	(-2.14, 0.74)	
Other	-0.44	(-1.71, 0.83)	
Missing	0.27	(-0.58, 1.13)	
Employment			
Full time	Ref		
Part-time	-0.62	(-1.58, 0.34)	0.058075
Retired	0.41	(-0.24, 1.06)	
On disability	0.86	(-0.26, 1.99)	
Other	-0.86	(-1.73, 0.00)	
Missing	0.96	(-0.01, 1.94)	
Private Insurance			
Yes	Ref		0.007569
No	-0.40	(-1.04, 0.24)	
Missing	0.22	(-0.65, 1.08)	
Type of drug plan			
Private Plan	Ref		0.003572
Gov't Funded Pharmacare	-0.17	(-0.88, 0.53)	
Missing	-0.30	(-0.90, 0.30)	
On social assistance			
No	Ref		0.004831
Yes	0.51	(-0.62, 1.65)	
Missing	0.36	(-0.53, 1.26)	
Canadian pension			
No	Ref		0.009422
Yes	0.48	(-0.14, 1.10)	

Missing	0.35	(-0.48, 1.17)	
Ethnicity			
Caucasian	Ref		0.012044
Other	0.38	(-0.39, 1.15)	
Missing	0.57	(-0.08, 1.23)	
Start Back			
Low	Ref		0.106154
Medium*	-1.16	(-1.81, -0.51)	
High*	-1.90	(-2.59, -1.21)	
Missing*	-1.75	(-2.67, -0.83)	
Number of visits to			
Nurse	0.06	(-0.07, 0.20)	0.002939
MD	-0.09	(-0.25, 0.07)	0.004579
Physiotherapist	-0.06	(-0.26, 0.15)	0.001109
Psychologist	0.05	(-0.09, 0.19)	0.002016
Adherence to program: Nurse			
No (< 6 visits)	Ref		0.000003
Yes ($\geq$ 6 visits)	-0.01	(-0.61, 0.60)	
Adherence to program: Physiotherapist			
No (< 6 visits)	Ref		0.002349
Yes ($\geq$ 6 visits)	-0.27	(-0.94, 0.39)	
Number of months since implementation	0.00	(-0.02, 0.02)	0.000327
Within 12 months of implementation	-0.15	(-0.85, 0.54)	0.000692
FABQ - Physical Activity	-0.07	(-0.11, -0.02)	0.034749
#FABQ - Work	-0.01	(-0.03, 0.01)	0.002723
Baseline Pain Severity*	-0.50	(-0.63, -0.38)	0.200287
Baseline Pain Inference*	-0.55	(-0.64, -0.46)	0.353137
Baseline HADS – Depression, mean (SD)*	-0.11	(-0.18, -0.05)	0.041907
Baseline HADS – Depression			
Minimal ($\geq$ 0 and < 8)	Ref		0.027882
Mild ($\geq$ 8 and < 11)	-0.52	(-1.37, 0.32)	
Moderate ($\geq$ 11 and < 16)*	-1.00	(-1.83, -0.16)	
Severe ($\geq$ 16)	-1.09	(-2.67, 0.48)	
Missing	-0.46	(-1.51, 0.59)	
Baseline HADS – Anxiety, mean (SD)*	-0.08	(-0.14, -0.01)	0.018080
Baseline HADS – Anxiety			
Minimal ($\geq$ 0 and < 8)	Ref		0.032402
Mild ($\geq$ 8 and < 11)	-0.65	(-1.34, 0.04)	
Moderate ($\geq$ 11 and < 16)	-0.49	(-1.18, 0.21)	
Severe ($\geq$ 16)*	-1.47	(-2.56, -0.37)	
Missing	-0.20	(-1.32, 0.92)	
Baseline PHQ9, mean (SD)*	-0.08	(-0.12, -0.03)	0.044974
Baseline PHQ9			
No depression ($\geq$ 0 and < 5)	Ref		0.06100

Minimal (≥ 5 and < 10)*	-0.87	(-1.49, -0.24)	
Mild (≥ 10 and < 15)*	-1.26	(-2.09, -0.43)	
Moderate (≥ 15 and < 20)	-0.59	(-1.67, 0.48)	
Severe (≥ 20)*	-1.77	(-2.93, -0.62)	
Missing	-1.05	(-2.15, 0.05)	
Baseline ODI total, mean (SD)*	-0.05	(-0.07, -0.04)	0.132580
Baseline ODI total			
Minimal disability (≥ 0 and < 20)	Ref		0.102976
Moderate disability (≥ 20 and < 40)*	-1.17	(-1.85, -0.49)	
Severe disability (≥ 40 and < 60)	-1.79	(-2.58, -1.00)	
Crippled (≥ 60 and < 80)	-2.59	(-3.93, -1.24)	
Bed bound (≥ 80 and ≤ 100)	-3.57	(-5.74, -1.39)	
Missing	NA		
Baseline Self Efficacy*	0.16	(0.01, 0.30)	0.022020
Baseline RAND 12 – Physical*	0.07	(0.04, 0.10)	0.100486
Baseline RAND 12- Mental*	0.04	(0.01, 0.07)	0.040176
TCI score (change of 1 unit)	-0.85	(-1.85, 0.14)	0.010245
*PACIC change			
Improved	Ref		0.005465
Stable	-0.03	(-0.91, 0.85)	
Worsen	-0.35	(-0.96, 0.27)	

n=277; #n=24

*Significant values

Table 4. Multivariate Model for Mean Change in Pain Interference between baseline and 6 months (n=314)

	Model 2	
	(234 patients, $R^2 = 0.265913$)	
	Mean Change	95% CI
Age (change of 10 years)*	0.18	(0.00, 0.35)
Male vs Female	-0.47	(-0.99, 0.05)
Start Back		
Low	Ref	
Medium	-0.39	(-1.08, 0.30)
High	-0.56	(-1.40, 0.29)
missing	-0.87	(-1.85, 0.10)
Number of months since implementation	0.00	(-0.02, 0.02)
Baseline Pain Severity*	-0.37	(-0.54, -0.19)
Baseline ODI total (change of 20)*	-0.50	(-0.93, -0.07)

*Significant values

Figures

Pain Intensity Change from Baseline to 3 Months (MCID)

Pain Intensity Change from Baseline to 6 Months (MCID)

Pain Interference Change from Baseline to 3 Months (MCID)

Pain Interference Change from Baseline to 6 Months (MCID)

*MCID = 0.5 SD

Figure 1

Legend not included with this version

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