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Accessibility of Chronic Pain Treatment for Individuals Injured in a Motor Vehicle Accident

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ABSTRACT

Background: Chronic Pain (CP) is a pervasive problem that can drastically lower one's quality of life. Therefore, it is imperative that CP sufferers receive appropriate intervention. At the Michael G. DeGroote Pain Clinic of Hamilton Health Sciences, assessed individuals are either recommended or not recommended for admission into the four-week interdisciplinary pain management Program. Despite receiving recommendation for admission, many are denied insurance coverage for unspecified reasons and cannot undergo required treatment.
Purpose: To investigate if there were clinically significant differences in demographics and pain-related measures between individuals granted *versus* denied insurance coverage for CP treatment.
Methods: Data were collected from 99 patients recommended for admission into the Program. Pain-related questionnaire scores and demographic information were compared between patients denied coverage (n=49) and patients granted coverage (n=50) using two-way MANOVA and Pearson chi-square tests of independence.
Results: Findings on pain-related variables revealed scores that warranted clinical attention in all patients. The majority of measures revealed no patient need-related differences between groups. Pain Stages of Change Questionnaire (PSOCQ) contemplation scores between groups were significantly, yet not clinically, different. Consistent with the literature, Tampa Scale for Kinesiophobia and PSOCQ pre-contemplation scores were significantly higher in males than females.
Conclusions: As hypothesized, these findings strongly support the hypothesis that there are no clinically meaningful differences between groups, suggesting that the separation of groups established by insurance companies was artificial, and not based on any tangible clinical factors. It also implies that insurance companies are likely provisioning funds on systems-related rather than patient need-related criteria.

KEYWORDS: Chronic pain; Insurance coverage; Interdisciplinary pain management.

ABBREVIATIONS: CP: Chronic Pain; PSOCQ: Pain Stages of Change Questionnaire; OHIP: Ontario Health Insurance Plan; FSCO: Financial Services Commission of Ontario; MIGs: Minor Injury Guidelines; HiREB: Hamilton Integrated Research Ethics Board; PDI: Pain Disability Index; BPI: Brief Pain Inventory; PCS: Pain Catastrophizing Scale; PRIME-MD PQ: Patient Questionnaire of the Primary Care Evaluation of Mental Disorders; PQ: Patient

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Questionnaire; PSOCQ: Pain Stages of Change Questionnaire; CPAQ-R: Chronic Pain Acceptance Questionnaire-Revised; TSK-11: Tampa Scale for Kinesiophobia-11; CAS: Clinical Anxiety Scale; CES-D: Center for Epidemiological Studies-Depressed Mood Scale; BDI: Beck Depression Inventory.

INTRODUCTION

Chronic Pain: An Overview

Chronic Pain (CP) is characterized as pain persisting for more than 6 months in the absence of ongoing nociceptive stimuli.[1-3] In Canada, CP affects approximately 11% to 29% of the general population.[4-6] This is problematic, as CP is often debilitating: as many as 60% of individuals with CP incur loss of income, eventual job loss or reduction in professional responsibilities.[7] Tang[8] reports that individuals living with CP have worsened quality of life and double the risk of suicide compared to those without CP. At the societal level, CP produces substantial economic burden in Canada, rivaling costs of cancer and heart disease combined.[7] Direct CP healthcare costs amount to approximately $6 billion per annum, while indirect costs amount to $37 billion per annum (e.g., loss of productivity, job loss, sick days, etc.).[7]

The Effectiveness of Interdisciplinary Chronic Pain Management

Due to the high economic and personal costs of CP, it is imperative that CP sufferers receive effective intervention.[3,9] Many pain management strategies can be utilized (e.g., monotherapy, multidisciplinary, interdisciplinary etc.) to reduce CP symptoms and increase overall quality of life.[10-12] The application of one treatment in isolation (e.g., monotherapy) is often ineffective, as it addresses only one aspect of CP (e.g., biological factors) offering little pain relief.[13] In comparison, interdisciplinary pain management has been shown to be highly treatment- and cost-effective, as it applies a biopsychosocial model to account for the variety of interconnected psychological, social and biological factors contributing to pain perception in the individual.[12,14] The interdisciplinary model also combines the expertise of many healthcare professionals (e.g., physicians, psychologists, physiotherapists, occupational therapists, etc.) who communicate regularly in one facility, working towards the common goal of the patient's treatment plan and progress.[11,14] In a study by Oslund et al,[15] CP patients who completed an interdisciplinary Program reported significant reductions in pain severity, pain-related emotional distress, pain interference with daily functioning and improvements in perceived control of pain. Accordingly, many experts have deemed the interdisciplinary model superior to other methods.[11,14]

The Michael G. Degroote Pain Clinic

The Michael G. DeGroote Pain Clinic at McMaster University Medical Centre in Hamilton, Ontario is a successful interdisciplinary pain management Program that helps CP sufferers manage their pain, increase their quality of life, and regain a sense of normalcy and control. The Program's duration is four weeks, from 9:30 am to 3:30 pm, Monday to Friday. The interdisciplinary team works collaboratively to adhere to the patient's individual needs and achieve pre-established goals. Patients take part in various activities facilitated by members of the interdisciplinary team. This effectively equips patients with a diverse set of skills to help them manage their CP and increase their overall functioning. For example, patients attend fitness and nutritional classes conducted by the physiotherapist in order to learn proper ways to exercise, stretch and increase overall energy levels.

Before CP patients can attend the Program, they must be referred by a physician, specialist, lawyer, or insurance company representative, be assessed, and then recommended for admission by the interdisciplinary team. Individuals are deemed appropriate or not appropriate for the Program following the initial assessment that involves the collection of demographic information, a medical and psychological assessment, an evaluation of functional status, an assessment of the patient's engage ability and an assessment of the individual's motivation for treatment through goal setting and overall understanding of the biopsychosocial approach.

Inclusion criteria for the Program include the presence of refractory pain and/or multidimensional impairments, reasonable goals, adequate grasp of the English language, and adequate cognitive functioning (e.g., the potential patient does not have a debilitating acquired brain injury or dementia).[16] Exclusion criteria are the seeking of a cure or total analgesia, the presence of an unstable medical condition and/or substance abuse disorder, and high fall risk.[16] The interdisciplinary team is permitted to use personal discretion and clinical judgment when determining whether the individual is suitable for the Program.

Obstacles to Entering Treatment: Denial by Insurance Companies

Unfortunately, even if assessed individuals are recommended for admission into the Program by the interdisciplinary team, some may still not receive necessary treatment due to financial restrains.[17] Service and treatment costs at the Program range upwards of $11,900 and are not funded through the publicly financed Ontario Health Insurance Plan (OHIP), necessitating that patients 'pay out of pocket' or make an insurance claim. This can create an extensive financial barrier if the individual is not authorized for insurance coverage, therefore decreasing the accessibility of CP treatment.

Many patients are referred to the Program following a motor vehicle accident (MVA) and accordingly seek insurance coverage for treatment through their automobile insurance company. The Financial Services Commission of Ontario (FSCO) is a regulatory organization overseeing and legislatively mandating the province's insurance sector.[18] To address non-catastrophic injuries sustained in a MVA, the FSCO has outlined insurance

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policies for affected individuals.[19] The Minor Injury Guideline (MIGs) states that automobile insurance companies are obliged to provide funding for minor injuries at a capped $3,500.[20] Comparatively, patients with impairments falling outside of the MIGs are eligible for upwards of $50,000 in medical and rehabilitation benefits.[19] However, a MVA injury falls outside of the scope of the MIGs in extremely limited circumstances.[20] To receive funding outside of the MIGs, the injured individual must provide evidence of a pre-existing medical condition that was documented by a healthcare professional before the MVA.[20] Moreover, an individual may still be ineligible for additional funding if it is deemed that the pre-existing condition has no bearing on achieving maximum recovery from the MVA.[20] Therefore, if automobile insurance companies contend that a patient's CP from a MVA is a minor injury, they are not obligated to cover amounts exceeding the capped $3500. Approximately 20% to 50% of CP sufferers who require intervention are denied adequate financial coverage by insurance companies, therefore rendering them unable to cope effectively.[17]

Insurance providers do not explicitly disclose their reasons for denying funding to patients injured in a MVA. Therefore, it remains unknown why exactly these individuals are granted coverage for CP treatment over others.[17] To our knowledge, no study to date has investigated this line of inquiry. The present analysis will attempt to delineate any differences between those granted *versus* denied insurance coverage for CP treatment by comparing scores on pain-related and demographic information questionnaires. The research hypothesis was that the two groups would not show any significant or clinically meaningful differences. This outcome would indicate that the criteria used by insurance companies to evaluate CP treatment claims are likely systems-related (e.g., financial or administrative) rather than patient need-related, which is important to communicate to insurance companies and other stakeholders (e.g., lawyers).

METHODS

Participants and Procedures

Participants in the present study were 99 adults who attempted several pain treatments, attained little pain relief, were unsure of how to cope with their pain, and faced significant reductions in daily functioning. Participants were referred to the Program by physicians, specialists, lawyers, Veteran's Affairs, Department of Defense or insurance company representatives. Once consulted, patients attended an orientation session introducing them to the Program and were assessed by an interdisciplinary team, which evaluated the physical and psychological aspects of pain, between March 7, 2013 and November 27, 2014. Participant inclusion criteria for this study were: ≥ age of 18; self-reported CP for ≥6 months; CP due to ≥1 motor vehicle accident(s) (MVA); and recommendation for admission into the Program by the interdisciplinary team. Including patients who had CP due to ≥1 MVAs was used because CP treatment costs of this nature are limited to full or partial coverage provided by private automobile insurance companies. This criterion ensured that the type of insurance claims were consistent among participants.

Individuals were mailed demographic information and pain-related questionnaires that they were to complete and bring into their initial assessment and orientation. All study participants provided informed consent. Ethics approval was obtained by the Hamilton Integrated Research Ethics Board (HiREB) of Hamilton Health Sciences.

Measures

Data for this study were collected from the questionnaires mailed to potential Program patients before their orientation and initial assessment. Patients completed 9 questionnaires measuring pain-related variables (see below), and a demographic information questionnaire. Table 1 presents a list categorizing and defining all variables.

a) Pain Disability Index: The Pain Disability Index (PDI) assesses the extent to which CP interferes with the individual's daily functioning.[21,22] Individuals circle the number that best reflects the level of disability from 0 (no disability) to 10 (total disability) experienced for each of the 7 categories of life activities: family/home responsibilities, recreation, social activity, occupation, sexual behaviour, self care, and life support activity.[21] The final score is calculated by summing all item scores.[21] The PDI has been shown to be a reliable measure, demonstrating high internal consistency (Cronbach α=0.86)[23] and high reported test re-test reliability (Intraclass correlation (ICC=0.91)) in patients who repeated their questionnaire one week after its initial completion.[24] The construct validity of the PDI has also been established, as patients with higher PDI scores had significantly more pain characteristics including restriction of activities and psychological distress (all p<0.001) than patients with low PDI scores.[23] As well, the PDI has shown significant associations with other pain-related variables (e.g., depression, pain intensity, employment status).[25,26]

b) Brief Pain Inventory: On the pain intensity dimension of the Brief Pain Inventory (BPI), individuals rate their pain intensity in the previous 24 hours in terms of worst, least, average and current pain at the time of assessment on a scale of 0 (no pain) to 10 (pain as bad as you can imagine).[27] The final score is obtained by calculating the average of the summed item scores. The pain intensity scale of the BPI has been supported as a valid and reliable measure for measuring pain intensity among CP patients. It has demonstrated acceptable internal consistency with a Cronbach α coefficient of 0.85, verifying the use of the scores as outcome variables in treatment outcome analyses. The responsiveness of the BPI is also established, as the scale scores showed significant (p<.05) improvements in detecting and reflecting improvement in pain intensity over time, compared to other related pain scales.[27]

c) Pain Catastrophizing Scale: The Pain Catastrophizing Scale

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Variable	Description	Type of Variable
granted_denied_insurance	Whether or not the individual was granted or denied insurance coverage for chronic pain treatment at the Program	Nominal: 1=granted coverage 2=denied coverage
gender	The individual's gender	Nominal 1=male 2=female
age	The individual's age in years	Scale
yes canada_no canada	Whether or not the individual was born in Canada	Nominal: 1=born in Canada 2=not born in Canada
years in canada	The number of years the individual has lived in Canada	Scale
marital status	The marital status of the individual	Nominal: 1=married or commonlaw 2=single 3=divorced, separated, or widowed
yes children_no children	Whether or not the individual has children	Nominal 1=yes 2=no
occupation	The individual's current or last known occupation	Nominal
yes employed_no employed	Whether or not the individual is currently employed	Nominal 1=employed 2=not employed
last employed months	The number of months since the individual has worked	Scale
education years	The number of years of education attained by the individual	Scale
pain duration months	The number of months that the individual has been experiencing chronic pain	Scale
injury number	The number of injuries the individual has incurred	Scale
doctor visits	The number of times the individual has visited the doctor due to their injury or injuries and/or chronic pain	Scale
specialist visits	The number of times the individual has visited a specialist due to their injury or injuries and/or chronic pain	Scale
ER visits	The total number of times the individual has visited the emergency room due to their injury or injuries and/or chronic pain	Scale
BPI	The individual's score on the pain intensity scale of the Brief Pain Inventory prior to potential treatment (shortly before initial assessment)	Scale
CES-D	The individual's score on the Center for Epidemiologic Studies Depression Scale prior to potential treatment (shortly before initial assessment)	Scale
PCS	The individual's score on the Pain Catastrophizing Scale prior to potential treatment (shortly before initial assessment)	Scale
CAS	The individual's score on the Clinical Anxiety Scale prior to potential treatment (shortly before initial assessment)	Scale
PQ	The individual's score on the Patient Questionnaire prior to potential treatment (shortly before initial assessment)	Scale
PDI	The individual's score on the Pain Disability Index prior to potential treatment (shortly before initial assessment)	Scale
TSK	The individual's score on the Tampa Scale for Kinesiophobia prior to potential treatment (shortly before initial assessment)	Scale
CPAQae	The individual's score on the Chronic Pain Acceptance Questionnaire activity engagement subscale prior to potential treatment (shortly before initial assessment)	Scale
CPAQpw	The individual's score on the Chronic Pain Acceptance Questionnaire pain willingness subscale prior to potential treatment (shortly before initial assessment)	Scale
CPAQt	The individual's total score on the Chronic Pain Acceptance Questionnaire prior to potential treatment (shortly before initial assessment)	Scale
PSOCQpcon	The individual's score on the Pain Stages of Change Questionnaire precontemplation subscale prior to potential treatment (shortly before initial assessment)	Scale
PSOCQcont	The individual's score on the Pain Stages of Change Questionnaire contemplation subscale prior to potential treatment (shortly before initial assessment)	Scale
PSOCQacti	The individual's score on the Pain Stages of Change Questionnaire action subscale prior to potential treatment (shortly before initial assessment)	Scale
PSOCQmain	The individual's score on the Pain Stages of Change Questionnaire maintenance subscale prior to potential treatment (shortly before initial assessment)	Scale

Table 1: List of collected demographic and pain-related variables.

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(PCS) measures negative thinking about pain.[28] The PCS is composed of 14 items that are rated on a scale from 0 (not at all) to 4 (all the time).[28] The items describe various perceptions and feelings that individuals may have regarding their pain and pertain to one of three subscales: rumination, magnification, and helplessness.[28] Once the individual rates the degree to which they experience the listed thoughts and feelings, the item scores are summed and their final score is obtained.[28] The PCS has demonstrated acceptable and satisfactory internal consistency for total PCS score (α=.97) and its three subscales: rumination (α=.87), magnification (α=.60), and helplessness (α=.79).[28] Convergent validity has also been demonstrated, as evident by the moderate correlation of total PCS scores with scores on negative affectivity (r=.75, p<00.1) and self-reported anxiety measures (r=.32, p<.001).[28] Strong test-retest reliability has been established for 6 weeks (r=.75) and 10 weeks (r=.70) in a sample population.[28] Evidence for construct validity was demonstrated by confirmatory factor analysis, establishing that the scale measures a single construct (e.g. catastrophizing) described by three related dimensions (e.g., rumination, magnification, and helplessness).[29] Osman et al[29] showed that the PCS demonstrates discriminate and criterion related-validity, as none of the examined demographic variables were significantly related to PCS total or subscale scores, and total PCS scores were useful in differentiating between criterion groups (t=4.99. p=<.001), respectively.[29]

d) Patient Questionnaire of the PRIME-MD: The Patient Questionnaire of The Primary Care Evaluation of Mental Disorders (PRIME-MD PQ) functions as a preliminary symptom screen for mental disorders and measures the number of recent bothersome symptoms and overall health rating.[30] The Patient Questionnaire (PQ) instructs the individual to check off "yes" or "no" for each item in a 25-symptom list. At the end of the PQ, the individual rates their overall health as "excellent," "very good," "good," "fair," or "poor." Their final score is calculated by summing the number of times the individual checked-off "yes," on the 25 items and the rating of their overall health is noted.[30] The validity of this scale has been established by comparing independent mental health professional diagnoses against diagnoses attained by the scores of the PRIME-MD.[30] From this, the scale has demonstrated excellent overall accuracy (88%) and good agreement (κ=0.71). As well, the PQ has been shown to be a useful tool in screening mental disorders demonstrating good to excellent sensitivity across all diagnoses including mood (69%), anxiety (94%), alcohol (81%) and eating (86%) disorders.[30] Specificity measures of the PQ are comparable for mood (82%), anxiety (53%), alcohol (91%) and eating (88%) disorders.[30]

e) Pain Stages of Change Questionnaire: The Pain Stages of Change Questionnaire (PSOCQ) measures patient readiness to adopt a self-management approach to their CP condition.[31] The PSOCQ instructs the individual to rate how strongly they agree or disagree with statements using a scale from 1 (strongly disagree) to 5 (strongly agree).[32] Each item loads on to one of four stages of change: pre-contemplation, contemplation, action or maintenance.[32] A) Pre-contemplation (PSOCQpcon): Believing that the problem is mostly medical and that pain relief is left up to physicians. B) Contemplation (PSOCQcon): Willing but reluctant to adopt a self-management approach to chronic pain problems. C) Action (PSOCQacti): Reflecting on the acceptance of a self-management approach and engageability in such treatment. D) Maintenance (PSOCQmain): Reflecting on an established self-management approach and intention to continue this approach.[31] The scores for each stage are averaged, resulting in four final scores that range between 1 and 5, with scores closer to and including 5 indicating a higher probability of the individual being at a particular stage(s).[32] If the individual scores high on PSOCQcon, PSOCQacti and/or PSOCQmain, they are more likely to benefit from treatment that involves self-care strategies.[32] Data analysis supports this four-factor scale, as this model fit the data without significant deviations (X2(317)=333.68, p=>0.05) and demonstrated a goodness-of-fit index of 0.92.[31] The PSOCQ has demonstrated excellent reliability in each subscale: pre-contemplation (α=.77), contemplation (α=.82), action (α=.86), and maintenance (α=.86) and excellent test-retest reliability (α=0.74-0.88 over a one to two-week period).[31] Evidence for criterion-related validity has also been established, as measures of control, accommodation, and active coping were strongly positively related to maintenance (r=.61, r=52, r=.49 respectively) and strongly negatively related to pre-contemplation (r=−.55, r=−.37, r=−.35 respectively).[31] The PSOCQ's validity is further supported by its association with treatment outcome[31,33] its usefulness in predicting commitment in self-management pain treatment,[32] and its relationships with other pain-related measures.[34]

f) Chronic Pain Acceptance Questionnaire: The Chronic Pain Acceptance Questionnaire-Revised (CPAQ-R) measures chronic pain acceptance.[35] The CPAQ-R instructs patients to rate the degree to which each statement applies to them using a scale from 0 (never true) to 6 (always true).[35] The statements quantify one of two constructs of pain acceptance: activity engagement or pain willingness.[35] Item scores are sorted based on the acceptance construct and are subsequently added, resulting in two subscale scores and a total score (the sum of the two sub-scale scores).[35] The CPAQ-R has demonstrated good internal consistency and Cronbach alpha values for each sub-scale: activity engagement (α=0.82) and pain willingness (α=0.78), providing evidence for its reliability for its use as a pain measure.[35,36] The CPAQ-R has also demonstrated adequate predictive validity, as outcomes like depression, pain-related anxiety, and psychosocial disability could be significantly predicted by both pain willingness (all p<0.05) and activity engagement (all p<0.05) subscales.[36]

g) Tampa Scale for Kinesiophobia: The Tampa Scale for Kinesiophobia-11 (TSK-11) measures pain related fear of movement (Miller et al, Unpublished report, 1991). Individuals indicate how strongly they agree with 11 statements using from a scale of 1 (strongly disagree) to 4 (strongly agree) corresponding to one of two categories: somatic focus (tendency to notice and report physical symptoms) or activity avoidance.[37] The final

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score is obtained by summing the item scores.[37] The TSK-11's psychometric properties demonstrate good test-retest reliability (ICC=0.81, standard error of measurement (SEM)=2.54), internal consistency (α=0.79) and responsiveness (standardized response mean (SRM)=-1.11).[37,38] Additionally, The TSK-11 has established concurrent (convergent) validity and predictive validity.

h) Clinical Anxiety Scale: The Clinical Anxiety Scale (CAS) measures clinical anxiety using a scale from 1 (rarely or none of the time) to 5 (most or all of the time).[39] Individuals rate how often they have experienced each item in the 25-statement list.[39] Once the scores for items 1, 6-8, 13, 15, 16, and 17 are reversed (e.g., a score of 1 is reversed to a score of 5), the final score is calculated by summing up the individual scores and subtracting.[25,39] The CAS has been shown to be a very reliable measure indicated by a high internal consistency (α=.94) and low standard error of measurement (SEM=4.2).[40] As well, the CAS has demonstrated good known-groups discriminant validity (r=.77), effectively distinguishing between low-anxiety groups and clinical anxiety populations.[40] Moreover, it is significantly superior at discriminating these populations compared to other anxiety tools including the Rational Behaviour Inventory, Generalized Contentment Scale, and Psycho-Social Screening Package (all $p<0.002$).[40]

i) Center for Epidemiological Studies-Depressed Mood Scale: The Center for Epidemiological Studies-Depressed Mood Scale (CES-D) measures depressive symptoms in non-psychiatric samples.[41] Using a scale from 0 (rarely or none of the time; less than 1 day) to 3 (most or all of the time; 5-7 days), individuals are instructed to rate how often they have experienced each symptom in the 20-item list during the past week.[41] Most items in the list are related to depressed mood, feelings of guilt and worthlessness and helplessness. Items 4, 8, 12 and 16, however, test positive affect and are reversed before calculating the individual's final score (e.g., a score of 0 is reversed to a score of 3).[41] The final score is calculated by summing up the individual item scores.[41] While a final score of 16 indicates depressed mood in the normal population, a score of 19 suggests depressed mood in the CP population, preventing significantly higher classification of depression.[42,43] The CES-D has demonstrated high internal consistency in both the general (α=0.85) and psychiatric populations (α=0.90), and can effectively discriminate between these two groups.[41] Evaluated test-retest reliability of the CES-D has found moderate correlations (r=0.45-0.7) between initial and follow-up scores three to twelve months after the initial questionnaire was given.[41] The CES-D's criterion validity has been shown, as its scores are positively correlated with other self-report scales that measure symptoms of depression (r=0.55-0.74) and negatively correlated with scales measuring variables different from depression (r=-0.55); providing evidence for its convergent and discriminant validity, respectively.[41] The CES-D has found to be a valid measure of depressive symptoms in the general and CP populations. Moreover, it has shown good predictive validity in identifying depression in the CP population, and superior sensitivity in identifying differences in depression severity when compared to other depression scales (e.g., the Beck Depression Inventory (BDI)).[44,45]

Demographic Information

The demographics questionnaire recorded age, gender, place of birth, years living in Canada, marital status, number of children, current or last known occupation, last month/year employed, years of education, pain duration, total number of injuries, number of times individual has visited a family physician and/or specialist, and the number of times the individual has visited the emergency room.

Statistical Analysis

The scores on the above measures and questionnaires were calculated using scoring guidelines and transferred to a scoring summary sheet. All raw data, including the information obtained from the demographics questionnaire, were entered into a Microsoft Excel spreadsheet along with the participant's date of initial assessment and insurance coverage status (granted *versus* denied). Interval and ratio pain variables were analyzed in a two-way multivariate analysis of variance (two-way MANOVA). All data used in these analysis were normally distributed. The MANOVA was conducted to a) assess the main effect of the independent variables *granted_denied_insurance.* (granted *versus* denied insurance coverage for the pain treatment Program) and *gender* (male-female) on study variables (e.g., pain-related questionnaire scores) and to b) determine if there was an interaction effect between the two independent variables on the continuous study variables collectively. If interaction effects were detected, then planned follow-up analysis would be performed on any relevant covariates that should be controlled for by using a MANCOVA. Univariate between-subjects effects in the MANOVA were also analyzed for the same independent variables (e.g. *granted_denied_insurance, gender, granted_denied_insurance*gender*) against the same dependent variables (e.g. pain scores).

Each nominal demographic variable was analyzed in a Pearson chi-square test of independence, which also used *granted_denied_insurance* and gender as independent variables. Finally, each continuous demographic variable was analyzed by an independent groups t-test. All tests were performed using the statistical software package SPSS 22.0 (Statistical Package for the Social Sciences, version 22.0).

Out of the 30 variables obtained from each individual, 27 patients were missing ≥1 of these variables. In total, 91 missing values out of a possible 2970 were accounted for (>0.03%). Possible reasons for missing data include: a) failure to fully complete the demographic package (e.g., the individual left questions blank); b) the existence of a language barrier, making it difficult to complete the demographic package or one or more pain questionnaires fully; c) failure to provide a proper

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response to a numerical question (e.g., responding with "a lot" or "too many to count" when reporting number of ER visits in the demographic questionnaire). Due to these reasons, the missing data were assumed to be missing at random (MAR). In order to address these MAR data in the MANOVA analysis, a mean imputation procedure was utilized. Using the average calculated mean scores as imputed values decreases the variability among the data, yet maintains the power of the sample size.

RESULTS

Participant Demographics

In total, 99 participants were included in the analyses. There were an almost equal number of females (n=50) and males (n=49) in the sample (Table 2). The majority of the patients were born in Canada (n=67). The mean±SD age in years of the 99 participants was 46.53±11.98. Among participants who responded with a numerical value (i.e., excluding answers that were left blank or responded with 'multiple') (n=78), the average number of times the individual had visited a family physician since their pain problem began was 28.37. The majority of patients (n=59) were unemployed. The independent groups t-test yielded no significant results (p>0.05) for all continuous demographic information. Fifty individuals were deemed appropriate for treatment at the Program, granted financial coverage, and admitted into the Program. The remaining 49 individuals were also deemed appropriate, but because they were denied financial coverage, did not enter the Program.

Descriptive Statistics

Data analyzed were interval, ratio, or nominal. The interval and ratio data included 23 of the 30 collected variables. Table 3 summarizes the mean±SD clinical cut-offs and ranges of pain-related questionnaires between the group granted insurance coverage and the group denied insurance coverage. The variable *occupation* varied widely across the data set. As such, frequencies were only reported for the remaining 6 nominal variables.

Admission Scores on Pain Questionnaires

All individuals, both those granted insurance coverage (n=50) and those denied coverage (n=49), met the pre-established average ranges and clinical cut-offs for the CAS, CES-D, and PCS according to the literature.[28,40,44] Both groups' average scores were also within the average range of admission scores at the Program for the PDI, BPI, PQ, TSK, and CPAQ and PSOCQ subscales.

Patient Demographics	Granted Insurance Coverage	Denied Insurance Coverage	Independent Groups t-test on continuous variables
Age, years, mean±SD	46.56±12.02	46.49±12.06	t=0.03 , p=0.98
Sex (n): Male Female	 26 24	 24 25	N/A
Born in Canada, years: Yes No	 35 13	 32 15	N/A
Years Lived in Canada	41.09±13.65	40.61±15.62	t=0.16 , p=0.87
Marital Status (n): Married or commonlaw Single Divorced, separated, or widowed	 35 9 6	 29 10 10	N/A
Children (n): Yes No	 42 8	 34 15	N/A
Employed (n): Yes No	 18 32	 22 27	N/A
Last Employed, months, mean±SD	33.07±27.82	38.00±47.85	t=0.63, p=0.53
Education, years, mean±SD (range)	13.71±2.57	14.25±4.20	t=0.77, p=0.44
Pain Duration, months, mean±SD (range)	45.50±43.40	66.69±98.68	t=1.39, p=0.17
Number of Injuries, mean±SD (range)	1.89±1.65	1.83±1.75	t=0.18 , p=0.86
Number of Doctor Visits, mean±SD (range)	30.29±30.10	26.55±42.01	t=0.51, p=0.61
Number of Specialist Visits, mean±SD (range)	5.70±5.02	4.93±4.07	t=0.84 p=0.40
ER Visits, mean±SD (range)	1.78±4.41	1.74±2.36	t=0.06, p=0.95

Table 2: Patient demographics between those accepted *versus* denied insurance coverage.

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Pain-Related Questionnaire	Clinical Cut-Off and/ or Program Range	Mean±SD of Individuals Granted Coverage (n=50)	Mean±SD of Individuals Denied Coverage (n=49)
CAS	30 (± 5), 18-52	41.16 ±20.02	39.69±21.72
CES-D	27, 19-43	32.33±12.64	33.56±11.28
CPAQ, activities engagement	15-34	23.38±11.54	21.92±12.05
CPAQ, pain willingness	9-25	18.23±7.77	16.90±12.35
CPAQ, total	27-56	41.23±16.96	37.04±19.91
PCS	≥30, 17-42	32.08±14.05	32.83±12.28
PDI	37-57	47.73±11.70	45.08±11.57
BPI	4.5-8	6.32±1.56	6.29±1.41
PQ	9-17	13.20±2.98	13.48±3.86
PSOCQ, precontemplation	2.2-3.5	3.03±0.70	3.064±0.733
PSOCQ, contemplation	3.5-4.5	3.98±0.50	3.71±0.57
PSOCQ, action	2.8-4	3.08±0.80	3.01±0.77
PSOCQ, maintenance	2.6-3.9	3.10±0.79	3.25±0.72
TSK-11	23.63-37.09	30.42±7.11	31.85±6.51

Table 3: Clinical cut-offs and ranges of pain-related questionnaires between insurance coverage groups.

Two-Way MANOVA

A MANOVA comparing the effects of gender and insurance coverage on all continuous pain-related scales was performed. Comparing the independent variables across all pain-related measures yielded no significant main effects for *granted_denied_insurance* ($F(14, 82)=1.269$; $p= 0.244$; Wilks' $\Lambda=0.822$) or gender ($F(14,82)=1.220$; $p=0.277$; Wilks' $\Lambda=0.828$), as hypothesized. As well, there was no statistically significant interaction effect between *gender* and *granted_denied_insurance* on the dependent variables ($F(14, 82)=0.632$; $p=0.830$; Wilks' $\Lambda= 0.903$). Table 4 presents the results of these multivariate tests.

Univariate between-subjects effects from the MANOVA were analyzed in the context of each independent variable (e.g. *granted_denied_insurance* and *gender*) on the pain-related questionnaire scores. Those granted insurance coverage and those denied insurance coverage for the Program did not differ significantly on any pain-related measure except the *PSOCQcont* (PSOCQ contemplation score) ($F(1,95)=6.161$; $p=0.015$), (Cohen's d=0.5) (see Table 5). The gender groups (male or female) did not differ significantly on any pain-related measure except the *TSK*($F(1,95)=4.809$; $p=0.031$) (see Table 6) and *PSOCQpcon* (PSOCQ pre-contemplation score) ($F(1,95)=6.516$; $p=0.012$) (see Table 7).

Effect	Wilks' Lambda Value	F	Hypothesis df	Error df	Sig.
Intercept	0.004	1344.175	14.000	82.000	.000
granted_denied_insurance	.822	1.269	14.000	82.000	.244
gender	.828	1.220	14.000	82.000	.277
granted_denied * gender	.903	.632	14.000	82.000	.803

Table 4: MANOVA results for pain questionnaire scores with *accepted_rejected* and *gender* as factors.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2.764	3	.921	3.435	.020
Intercept	1463.162	1	1.463.162	5454.929	.000
granted_denied	1.653	1	1.653	6.161	.015*
gender	0.987	1	.987	3.679	.058
granted_denied_insurance * gender	.202	1	.202	.751	.388
Error	44.604	95	.470		
Total	1492.210	99			
Corrected Total	28.245	98			

*Significance of F value, $p<0.05$ (two-tailed).

Table 5: Between-subject results for PSOCQcon with *accepted_rejected* and *gender* as factors.

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Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	405.241	3	135.080	3.195	.027
Intercept	95568.591	1	95568.591	2260.682	.000
granted_denied_insurance	56.184	1	56.184	1.329	.252
gender	203.283	1	203.83	4.809	.031*
granted_denied_insurance * gender	150.322	1	150.322	3.556	.062
Error	4016.052	95	42.274		
Total	100368.00	99			
Corrected Total	4421.293	98			

*Significance of F value, $p<0.05$ (two-tailed).

Table 6: Between-subject results for TSK with *accepted_rejected* and *gender* as factors.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	3.138	3	1.046	2.228	.090
Intercept	914.089	1	914.089	1946.871	.000
granted_denied_insurance	.058	1	.058	.122	.727
gender	3.059	1	3.059	6.516	.012*
granted_denied_insurance * gender	.037	1	.037	.080	.778
Error	44.604	95	.470		
Total	964.120	99			
Corrected Total	47.742	98			

*Significance of F value, $p<0.05$ (two-tailed).

Table 7: Between-subjects results for PSOCQpcon with *accepted_rejected* and *gender* as factors.

Pearson Chi-Square Tests of Independence

Four (4) Pearson chi-square tests of independence were performed to determine the association between *granted_denied_insurance,* gender, and the remaining 4 nominal variables: *yescanada_nocanada, maritalstatus, yeschildren_nochildren yesemployed_noemployed*. The relationship between *granted_denied_insurance*, and each of the 4 nominal variables was non-significant (all $p>0.05$). For example *granted_denied_insurance*, *gender*, and *yescanada_nocanada* were determined to be independent of each other. Tables 8a, 8b, 8c and 8d presents Pearson Chi Square values for evaluated variables.

DISCUSSION

The present study highlights the lack of differences in demographic (e.g., age, gender, educational level, employment, marital status, etc.) and pain-related (e.g., pain-related interference, depression, anxiety, etc.) measures between groups of individuals granted *versus* denied insurance coverage. Those granted coverage were able to attend the four-week pain management Program, accessing effective treatment soon after their assessment. Those denied coverage were unable to enter the Program and receive the same potential for pain management. The above results provide evidence that individuals granted insurance coverage and individuals denied coverage for CP treatments at the Program do not differ on any clinically meaningful variables considered by the interdisciplinary team when making treatment recommendations.

Multivariate tests revealed that a) those granted *versus* denied insurance coverage did not differ significantly on collective pain-related questionnaire scores b) gender groups did not differ significantly on collective pain-related questionnaire scores and c) there was no interaction effect between insurance coverage and gender on collective pain-related questionnaire scores. This strongly implies that all patients assessed at the pain management Program and recommended for CP management were identical from a clinical standpoint, were all in need of, and should all be granted, effective interdisciplinary CP treatment.

Multiple univariate between-subjects analyses were also performed. Accordingly, due to the increased number of comparisons, Bonferoni corrections were applied to increase sensitivity and precision, and reduce the possibility of type I error.[46] By using the adjusted alpha level of 0.002 rather than 0.05, the majority of the above results would remain non-significant. As well, the significant finding of difference between insurance coverage on the PSOCQ contemplation scores ($p=0.015$), and between the genders on the TSK ($p=0.031$) and PSOCQ precontemplation scores ($p=0.012$) would now be rendered non-significant, as the p-values are greater than the adjusted alpha level of 0.002. This provides convincing evidence for the hypotheses that individuals granted insurance coverage *versus* denied coverage do not differ clinically on any pain-related or variable, as hypothesized.

Though the PSOCQcont scores in the univariate analysis significantly differ between individuals granted *versus* de-

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Gender		Value	df	Asymp. Sig (2-sided)
Male	Pearson Chi- Square	.012	1	.913
Female	Pearson Chi- Square	.783	1	.575
Total	Pearson Chi- Square	.267	1	.606

a) *yescanada_nocanada* and *granted_denied_insurance* and *gender.*

Gender		Value	df	Asymp. Sig (2-sided)
Male	Pearson Chi- Square	.242	1	.623
Female	Pearson Chi- Square	3.657	1	.056
Total	Pearson Chi- Square	2.933	1	.138

b) *yeschildren_nochildren and granted_denied_insurance and gender.*

Gender		Value	df	Asymp. Sig (2-sided)
Male	Pearson Chi- Square	.252	1	.616
Female	Pearson Chi- Square	.525	1	.469
Total	Pearson Chi- Square	.814	1	.367

c) *yesemployed_noemployed* and *granted_denied insurance* and *gender.*

Gender		Value	df	Asymp. Sig (2-sided)
Male	Pearson Chi- Square	2.090	2	.352
Female	Pearson Chi- Square	.471	2	.790
Total	Pearson Chi- Square	1.605	2	.448

d) *maritalstatus* and *granted_denied_insurance* and *gender.*

Table 8: Pearson Chi Square results for the following variables.

nied insurance coverage at the commonly accepted $p<.005$, it is important to note that the average PSOCQcont scores between individuals granted insurance coverage and those denied coverage only different by 0.26 (6.8%). In a study by Dysvik et al,[47] a 10% mean change on the PSCOQ from pre-treatment to post-treatment for CP was considered the smallest clinically important difference. Therefore, using a cut-off of 10%, the obtained mean difference of 6.8% is not clinically significant and, said alternatively, could not produce a behavioral difference between these subsets of individuals large enough to be detected by clinicians, let alone by insurance company representatives. Taking this, and the adjusted non-significant finding into account, exemplifies that individuals granted insurance coverage and those denied coverage would be equally ready to adopt a self-management approach to CP.

Clinical significance can also be determined by calculating Cohen's d, a measure of effect size.[46,48] Effect size is a statistic that gives a meaningful indication of how large the difference is between two statistically different means.[46] Using the average PSOCQ contemplation subscale scores and standard deviations for individuals granted insurance coverage and those denied coverage, a Cohen's d value of 0.5 was obtained. This indicates a medium effect size statistically.[46,48,49] However, as previously mentioned, this is not clinically important and the POSCQcont scores for both groups were in the average range for the program.

These clinically non-significant findings are contrary to the existing literature suggesting that individuals granted insurance coverage are more motivated to help themselves get better than those denied it, which might have swayed insurance company decisions to grant them coverage.[17] Given that the groups do not differ on any variables including those that are motivation-related, it would be plausible to suggest that insurance companies likely evaluate CP treatment claims using systems-related criteria (e.g., administrative or financial) *versus* patient need-related criteria.

Although not a main focus of this study, 2 other univariate analysis yielded significant results for the main effect of *gender*. Males scored significantly higher ($p<0.05$) than females on the PSOCQpcon subscale and the TSK with medium (d=.53) and small to medium (d=0.44) effect sizes, respectively. Both findings are consistent with the majority of existing literature that has examined gender differences in the PSOCQpcon subscale or TSK scores.[31,50-53] Moreover, the significant gender differences found on the PSOCQpcon and TSK further suggest that males may hold stronger beliefs that pain is a medical problem and exhibit more pain-related fear of movement correspondingly, compared to females.[31,54] However, when Bonferoni corrections were applied, the gender differences on the PSOCQ pre-contemplation subscale and TSK were no longer significant. Therefore, these differences may not be statistically or clinically significant and, consequently, may not be applied to clinical situ-

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ations (i.e., be used to tailor CP treatment according to gender).

Even in the developed nation of Canada, CP is undertreated.[55] This can be attributed to the large treatment disparity that exists between groups that can financially afford timely access to effective care, and those that cannot. A study by Peng et al[56] found that publicly funded clinics across Canada had treatment wait-times upwards of 1 year at 30% of clinics, with a range up to 5 years. These unreasonably high wait-times can have destructive results. For example, a recent systematic review by Lynch et al[55] found that patients experience significant worsening in health-related quality of life measures and psychological well-being when waiting for CP treatment for ≥6 months. Therefore, it may be in the patients' best health interest to seek timely and effective care that is provided by privately financed pain clinics.

When insurance companies receive CP treatment plan proposals from the Program, they first determine whether or not claimants will exceed their entitled $50,000 in medical and rehabilitation benefits if they were to enter the Program. Often, potential patients seeking CP relief have used the majority of their entitled funds for various medical and rehabilitation services not covered by Ontario Health Insurance Plan (OHIP) (e.g., various medical assessments and evaluations, physiotherapy, massage therapy, acupuncture, etc.) before considering an interdisciplinary Program. Consequently, these individuals would not have sufficient funds remaining to cover the approximate $11,900 in treatment costs. Unfortunately, these individuals cannot enter treatment, despite being equal in demographic and pain-related characteristics as those granted insurance coverage.

It is important to remember that all participants showed levels of anxiety, depression, catastrophizing and pain-related interference, recent bothersome symptoms, pain-related fear of movement, pain acceptance, and pain stages of change that would cause difficulties with functioning and therefore warrant clinical attention. Thus, the separation of the groups made by the insurance companies was truly artificial from a clinical perspective and not based on any tangible clinical or demographic reasons. This is important to communicate to insurance companies and other stakeholders (e.g., lawyers and other patient advocates), as it implies that individuals recommended for CP treatment require it to the same extent by clinical standards. It also stresses that those recommended be granted sufficient financial coverage to learn CP management techniques.

CONCLUSIONS

At the Michael G. DeGroote Pain Clinic of Hamilton Health Sciences, many individuals with chronic pain are denied insurance coverage for the interdisciplinary pain management Program for unspecified reasons. This study attempted to delineate the similarities and/or differences between individuals granted *versus* denied insurance using MANOVA and Pearson chi-square tests of independence. Results showed that the groups did not differ statistically or clinically, suggesting that a) the division of groups established by insurance companies was artificial from a clinical perspective; and b) insurance companies likely evaluate treatment claims using systems-related rather than patient need-related criteria, which is important to communicate to insurance companies and other stakeholders.

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CONFLICTS OF INTEREST

The authors declare that there is no conflicts of interest regarding the information discussed in this manuscript.

DISCLAIMER

The information presented reflect the views of the authors and not of McMaster University or Hamilton Health Sciences.

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