

Factors associated with waiting times for persons with rheumatic conditions in multidisciplinary pain treatment facilities

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Objectives: Access to multidisciplinary pain treatment facilities (MPTF) in Canada is limited by long waiting lists. However, little is known about the factors associated with access to MPTF specifically for persons with rheumatic conditions. This study aimed to 1) determine the waiting time for services in publicly funded MPTF for persons with rheumatic conditions in the province of Quebec, Canada, as well as 2) identify the factors associated with waiting time.

Methods: This study was conducted using the Quebec Pain Registry, a large database of patients who received pain management services in MPTF. Sociodemographic and clinical variables were assessed for potential associations with waiting time. Descriptive, bivariate analyses and multiple linear regression analyses were conducted.

Results: A total of 3,665 patients with rheumatic conditions were identified within the registry. Patients had a mean age of 55±14 years and the majority were women (65.7%). The average waiting time was 241.2±308.9 days (median=126), with 34.2% of the patients waiting longer than 6 months before having a first appointment. Results indicate that longer pain duration, lower household income, pain onset following a motor vehicle accident, having fibromyalgia, being on permanent disability or unemployed and being referred by a family physician (versus specialist) were significantly associated with longer waiting times.

Conclusions: Many patients with rheumatic conditions (especially fibromyalgia) face long delays before receiving services in Quebec's MPTF. This study identified several factors associated with waiting time and emphasizes the need to improve access to pain management services.

Keywords: access, waiting time, rheumatic conditions, chronic pain, multidisciplinary pain treatment facilities

Introduction

Arthritis and other rheumatic conditions are an increasingly prevalent cause of disability worldwide and result in a substantial individual and societal burden.^{1,2} In North American and European countries, over 20% of the population has arthritis or another rheumatic condition.^{2,3} These conditions encompass a large variety of diseases and syndromes that are frequently characterized by pain and disability.⁴ Rheumatic conditions may be related to autoimmune disorders (eg, rheumatoid arthritis), be predominantly inflammatory (eg, gout), degenerative (eg, osteoarthritis) or be characterized by widespread body pain (eg, fibromyalgia).⁴

Pain is the main symptom reported by persons with rheumatic conditions,⁵ with a quarter reporting frequent and severe joint pain.⁶ Chronic pain, defined as a pain

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lasting three months or longer, is regarded as a distinct disorder in itself, in part because of the central pain mechanisms often involved in chronic pain.⁷ Multimodal pain management programs that include medical, physical and psychological interventions are often recommended for the treatment of chronic pain. In chronic pain conditions, they have been shown to reduce health care utilization and costs as well as opioid use.^{8,9} These programs have proven effective for patients with fibromyalgia and osteoarthritis by improving pain, fatigue, depressed mood, health-related quality of life, self-efficacy and physical fitness.^{10,11} These programs are often delivered in multidisciplinary pain treatment facilities (MPTF), where various health professionals provide coordinated and patient-centered treatments aimed at reducing pain and disability while empowering patients and improving their quality of life.

Unfortunately, barriers in access to chronic pain treatment in MPTF have been reported in multiple countries around the world.^{12–14} Results from a survey of MPTF conducted in 2006 in Canada, where the majority of MPTF are publicly funded, indicated waiting times for patients with any chronic pain condition extending over 6 months in 50% of the facilities.¹² Long waiting times are recognized as the main barrier to MPTF referral by family physicians.¹⁵ In addition, long delays to access services in MPTF may affect a patient's condition. A systematic review by Lynch et al concluded that a delay of six months or more before receiving chronic pain treatment was associated with a worsening of health-related quality of life and psychological symptoms for patients with various chronic pain conditions.¹⁶ Another study found a small deterioration in psychological symptoms during a waiting period of three months,¹⁷ as well as a high financial burden for patients on MPTF waiting lists.¹⁸ However, these studies on MPTF waiting lists did not focus specifically on patients with rheumatic conditions.

Considering the lack of research investigating access to services in MPTF specifically for patients with rheumatic conditions, along with the high prevalence and substantial burden associated with these conditions, this topic warrants attention. Moreover, identifying the characteristics of patients who wait longer before receiving multidisciplinary pain treatments may inform decisions on resource allocation and prioritization strategies. Accordingly, the objectives of this study were 1) to determine the waiting time to access services in publicly funded MPTF for persons with rheumatic conditions in the province of Quebec, Canada, as well as 2) to identify sociodemographic and clinical factors associated with waiting time.

Methods

Data source

This study was conducted using the data from the Quebec Pain Registry (QPR), a large research database of patients with chronic non-cancer pain who received services within five university-affiliated MPTF in Quebec, Canada's second most populous province. The sociodemographic and clinical data were collected from 2008 to 2014 via a self-administered questionnaire, a structured interview with a research nurse and a physician assessment. Consecutive ambulatory patients aged 18 years and over were enrolled in the QPR database when they were scheduled for a first visit at one of the five participating MPTF. Patients were excluded if they were unable to understand written and spoken French or English or unable to participate due to severe physical or cognitive impairments. A more detailed description of the QPR, including data collection procedures, is available elsewhere.¹⁹

Study population and selection process

The National Arthritis Data Workgroup (NADW) case definition of rheumatic conditions was used.²⁰ The NADW definition lists a set of arthritis diagnostic codes from the 9th edition of the International Classification of Diseases (ICD-9-CM)²⁰ that the Centers for Disease Control and Prevention divided into ten distinct categories: rheumatoid arthritis; fibromyalgia, myalgia and myositis; osteoarthritis and allied disorders; spondylarthropathy; gout and other crystal arthropathies; diffuse connective tissue disease (eg, systemic lupus erythematosus); carpal tunnel syndrome; soft tissue disorders, excluding back; joint pain, effusion and other unspecified joint disorders; other specified rheumatic conditions (see Additional file 1 for the list of NADW ICD-9-CM diagnostic codes).²¹ This case definition is recommended for research at the health care system level.²²

Patients with rheumatic conditions were identified within the QPR as those having either 1) received a diagnosis corresponding to a NADW rheumatic condition by the referring or MPTF's physician, 2) self-reported a comorbidity corresponding to a NADW rheumatic condition or 3) reported a pain onset caused by a NADW rheumatic condition (eg, pain onset due to ankylosing spondylitis). This combination of physician-diagnosed and self-reported rheumatic conditions aimed to include all patients with such conditions.

Variables

For objectives 1 and 2, waiting time was defined as the number of days between the receipt of the referral at the

MPTF and the initial visit to the MPTF. To answer objective 2, various sociodemographic and clinical variables available in the QPR were assessed for their association with waiting time, based on the results of previous studies on access to care in different contexts as well as the Andersen's behavioral model of health care utilization (Table 1).²³ This well-accepted theoretical model conceptualizes individual and contextual determinants of health care utilization that help understand how and why individuals access health services.²³ Thus, access to and utilization of services are explained by various predisposing characteristics, enabling resources and the need for health services.²³

Statistical analyses

Data were checked for deviations from normal distribution, and a log 10 transformation was computed for positively skewed variables to improve skewness and kurtosis. Controlling for the effects of the hospitals or clinics in which data are collected is critical to identify factors associated with waiting time. Thus, in order to control for the variability of waiting time between the five MPTF, the waiting time variable was standardized using z-scores. More specifically, a z-score was calculated for each patient from clinic A using the mean waiting time and standard deviation of clinic A; this procedure was repeated for patients of each clinic.

In order to explore the association between factors and waiting time, bivariate analyses were conducted with the transformed waiting time variable as the dependent variable. Because even negligible differences can reach statistical significance in large datasets, we considered the effect size in addition to the statistical significance as criteria for inclusion in the multiple regression analysis. Thus, variables significantly associated with waiting time ($p < 0.05$) in bivariate analyses and with a minimum effect size of either Hedges' $g > 0.2$, eta-squared (η^2) > 0.01 or R -squared > 0.02 (depending

on the type of variable) were included in the multiple regression analysis. To account for potential changes in waiting time over the years, the association between waiting time and the date of the first visit to the MPTF was also tested in bivariate analyses. This potential control variable was included in the regression analysis if it met the previously mentioned criteria of statistical significance and effect size. A standard multiple linear regression was computed by entering all independent variables in the regression at once without any backward deletion of variables.²⁴ In order to limit the number of dummy variables entered in the regression analysis, categories for certain ordinal variables (eg, household income) were merged based on recursive partitioning analyses that indicated optimal cutoffs. For nominal variables with multiple categories (eg, pain onset, principal source of income, employment status), ANOVA's post-hoc analyses were used to select relevant categories (those with significant differences with other categories) to include as dummy variables in the regression. The pairwise deletion technique was used to handle missing data. Variance inflation factor scores were checked to avoid multicollinearity. Assumptions of normality, linearity and homoscedasticity of residuals were also verified.²⁴ The bootstrapping resampling procedure (15,000 samples) was applied to test the regression model stability.²⁴ All statistical analyses were computed using SPSS Statistics™ v25.0 (SPSS Inc., Chicago, IL, USA).

Results

Study sample

Among the 8,402 Quebec Pain Registry patients, 3,665 patients (43.6%) were identified as having a NADW rheumatic condition (self-reported and/or diagnosed by a physician) and were included in the study; 62.5% of them were included based on a physician diagnosis and the rest were included based on self-report. The participants' sociodemographic characteristics are summarized in Table 2. Patients had a mean age of 55 ± 14 years and the

Table 1 Potential factors associated with waiting time, based on the Andersen's behavioral model of health care utilization

Categories	Potential factors
Predisposing characteristics	Age, sex, race/ethnicity, education level, civil status, employment status, language, region of residence (urban/rural)
Enabling resources	Household income, income sources, living conditions (eg, alone, with family), disability benefits, litigation related to disability benefits, type of referring physician
Need for health services	Category of rheumatic condition (based on the NADW definition), duration of pain (at the time of referral), pain onset, number of past or present comorbidities, self-reported diagnoses of anxiety and depression

Abbreviation: NADW, National Arthritis Data Workgroup.

Table 2 Sociodemographic characteristics of patients with NADW rheumatic conditions in MPTF (n=3665)

Variable	Mean (SD)	Missing n (%)
Age	55.3 (14.2)	7 (0.2)
	n (%)	Missing n (%)
Sex		2 (0.1)
Female	2,408 (65.7)	
Male	1,255 (34.2)	
Race/ethnicity		3 (0.1)
Caucasian	3,396 (92.7)	
Black	75 (2.0)	
Aboriginal	48 (1.3)	
Other	143 (3.9)	
First language		1 (0.03)
French	2,715 (74.1)	
English	621 (16.9)	
Other	328 (8.9)	
Education (highest completed level)		5 (0.1)
None	16 (0.4)	
Elementary	337 (9.2)	
High school	1,391 (38.0)	
College	989 (27.0)	
University	927 (25.3)	
Civil status		1 (0.03)
Single	818 (22.3)	
Married or common law	2,041 (55.7)	
Separated or divorced	563 (15.4)	
Widowed	242 (6.6)	
Living conditions		37 (1.0)
Alone	966 (26.4)	
With family	2,544 (69.4)	
Other (roommates, no stable living conditions or in institutions)	118 (3.2)	
Employment status ^a		1 (0.03)
Employed (full-time/part-time)	905 (24.7)	
On permanent disability	733 (20.0)	
On temporary disability	576 (15.7)	
Retired	915 (25.0)	
Unemployed/laid off	225 (6.1)	
Other (including student, home-maker and volunteer)	310 (8.5)	
Household income		4 (0.1)
Less than \$20,000	951 (25.9)	
\$20,000–34,999	709 (19.3)	
\$35,000–49,999	494 (13.5)	
\$50,000–64,999	350 (9.5)	
\$65,000–79,999	243 (6.6)	
\$80,000 and more	481 (13.1)	
Did not wish to answer	433 (11.8)	

(Continued)

Table 2 (Continued).

Variable	Mean (SD)	Missing n (%)
Principal source of income		7 (0.2)
Retirement pension or personal savings	1,214 (33.1)	
Employment wages or salary	798 (21.8)	
Social assistance or employment insurance benefits	481 (13.1)	
Disability benefits from government agency	454 (12.4)	
Other disability payments	382 (10.4)	
Other sources of income	329 (9.0)	
Outstanding litigation related to claim		7 (0.2)
No	204 (5.6)	
Yes	225 (6.1)	
Not applicable	3,229 (88.1)	

Note: ^aThis multiple-choice variable was recoded into a mutually exclusive variable. In cases of multiple answers, priority was given to the “employed” category and then to the “on disability”, “retired” and “unemployed” categories.

Abbreviations: NADW, National Arthritis Data Workgroup; MPTF, multidisciplinary pain treatment facilities; SD, standard deviation.

majority were women (65.7%), Caucasian (92.7%) and married or living in common law (55.7%). Twenty percent were on permanent disability and 45.2% had an annual household income of less than \$35,000 CDN.

The clinical characteristics of patients are presented in [Table 3](#). Patients had a mean pain duration of 7.4±9.0 years (mean±standard deviation) and a median of 4.0 years (interquartile range=2–10). A substantial proportion of patients self-reported a diagnosis of depression (45.4%) or anxiety (41.1%). Thirty-four percent of patients waited longer than 6 months before having a first appointment at an MPTF and 62.3% waited longer than 2 months. There were 435 patients with missing waiting time data; this group did not differ from the rest of the sample in terms of age, sex, diagnosis, pain duration and type of referring physicians ($p>0.05$).

For the overall sample of patients with NADW rheumatic conditions, the mean waiting time was 241.2±308.9 days (median=126; interquartile range=50–297) ([Table 4](#)). Patients with fibromyalgia (with or without other rheumatic conditions) represented 38.1% of the sample. The proportions of patients with rheumatoid arthritis only or osteoarthritis only were 1.3% and 21.0%, respectively.

Determinants of waiting time

For bivariate and regression analyses, two positively skewed variables (waiting time and pain duration) were log transformed. As previously described, the log-

Table 3 Clinical characteristics of patients with NADW rheumatic conditions in MPTF (n=3665)

Variable	n (%)	Mean (SD)	Missing n (%)
Pain duration (years)		7.4 (9.0)	4 (0.1)
Pain onset circumstance			4 (0.1)
Following illness	926 (25.3)		
Multiple circumstances	814 (22.2)		
Other circumstances	520 (14.2)		
No precise event	517 (14.1)		
Accident at work	384 (10.5)		
Motor vehicle accident	269 (7.3)		
Following surgery	231 (6.3)		
Self-reported comorbidities ^a			
Depressive disorders	1,664 (45.4)		3 (0.1)
Anxiety disorders	1,505 (41.1)		2 (0.1)
Hypertension	1,331 (36.3)		2 (0.1)
Dyslipidemia (hypercholesterolemia)	1,170 (31.9)		2 (0.1)
Chronic snoring	1,138 (31.1)		2 (0.1)
Bruxism	905 (24.7)		3 (0.1)
Restless leg syndrome	740 (20.2)		2 (0.1)
Asthma	719 (19.6)		2 (0.1)
Hypothyroidism	575 (15.7)		2 (0.1)
Diabetes	487 (13.3)		2 (0.1)
Angina/heart attack	376 (10.3)		2 (0.1)
Chronic obstructive pulmonary disease	171 (4.7)		2 (0.1)
Stroke (cerebral vascular accident)	145 (4.0)		2 (0.1)
Heart failure	109 (3.0)		2 (0.1)
Number of comorbidities		3.0 (2.0)	4 (0.1)
Type of referring physician			161 (4.4)
Family physician	1,489 (40.6)		
Medical specialist	2,015 (55.0)		
Waiting time (discrete categories)			435 (11.9)
Less than a month	514 (14.0)		
1–2 months	433 (11.8)		
2–6 months	1,029 (28.1)		
6–12 months	617 (16.8)		
More than 12 months	637 (17.4)		

Note: ^aPatients could provide more than one answer.

Abbreviations: NADW, National Arthritis Data Workgroup; MPTF, multidisciplinary pain treatment facilities; SD, standard deviation.

transformed waiting time was then standardized based on the mean and standard deviation of each MPTF. Based on bivariate analysis, seven variables were retained for the regression analysis (Table 5). Of these seven variables

entered in the standard multiple regression, six remained significantly positively associated with waiting time: longer pain duration, lower household income, pain onset following a motor vehicle accident, having fibromyalgia, being on permanent disability or unemployed and being referred by a family physician. The standard multiple regression resulted in a multiple *R* of 0.308 (*F* (8, 2797) =36.569; *p*<0.001) and an *R*² of 0.095.

Discussion

This study examined access to services in MPTF for persons with NADW rheumatic conditions and identified several significant sociodemographic and clinical factors associated with waiting time. A considerable proportion (44%) of patients receiving services in MPTF had a NADW rheumatic condition (self-reported or physician-diagnosed). Most of these patients had to wait a long period of time to access services in MPTF, with a third of them waiting over 6 months. This is consistent with the findings of another study conducted with patient data from the Quebec Pain Registry, which found a proportion of 35% of the patients waiting more than 6 months before their initial MPTF visit.¹⁹ That study included patients with all types of pain conditions, suggesting that the average waiting time for patients with rheumatic conditions may be relatively similar to that of other conditions. As waiting time data for patients with non-rheumatic condition was not available in our study, further comparison between patients with or without rheumatic conditions was not possible.

In our study, the median waiting time was just over 4 months, slightly shorter than the median waiting time of 6 months reported for Canadian MPTF (for any chronic pain condition) in 2006.¹² However, the differences in populations, settings and methodology (Peng et al used a survey methodology) prevent direct comparison between the two studies.

Nevertheless, these delays considerably exceed the International Association for the Study of Pain's benchmarks for chronic pain treatment, which recommend a 1-month delay for urgent or semi-urgent conditions and 2 months for routine conditions.²⁵ Sixty-two percent of our sample did not meet this recommendation. As a result of waiting for chronic pain treatment, patients may experience a deterioration of their health-related quality of life and psychological well-being.^{16,17}

Other studies from Canada, Europe and Australia report long waiting times for rheumatology care,²⁶ for rehabilitation services for persons with rheumatic conditions²⁷ and for pain

Table 4 Waiting time to access services in MPTF based on presentation of rheumatic conditions (NADW diagnostic categories)

NADW rheumatic conditions	n (%)	Mean (SD)	Median (interquartile range)	Missing n
Any rheumatic condition	3,665 (100)	241.2 (308.9)	126 (50–297)	435
Joint pain and other unspecified joint disorders	776 (21.2)	198.2 (266.3)	98 (37–241)	83
Fibromyalgia	774 (21.1)	265.1 (347.3)	140 (66–323)	96
Osteoarthritis	771 (21.0)	222.1 (270.2)	132 (50–286)	103
Soft tissue disorders	250 (6.8)	169.0 (226.5)	90 (43–196)	32
Fibromyalgia and osteoarthritis	192 (5.2)	367.5 (385.5)	222 (72–539)	21
Fibromyalgia and other rheumatic conditions ^a	432 (11.8)	316.1 (356.1)	161 (65–447)	49
Rheumatoid arthritis	47 (1.3)	239.2 (295.5)	123 (52–244)	6
Other rheumatic conditions ^a	423 (11.5)	219.7 (292.4)	114 (38–272)	45

Note: ^aOther NADW rheumatic conditions included: spondylitis/spondylitis and allied disorders, carpal tunnel syndrome, diffuse connective tissue disease, gout and other crystal arthropathies, other specified rheumatic conditions.

Abbreviations: MPTF, multidisciplinary pain treatment facilities; NADW, National Arthritis Data Workgroup; SD, standard deviation; CI, confidence interval.

Table 5 Factors associated with waiting time: results of the standard multiple regression^a

	Unstandardized B coefficients	Bootstrap B 95% CI		Standardized β coefficients	P-value
Pain duration (log transformed)	0.299	0.252	0.361	0.197	<0.001
Medical specialist referral ^b	-0.249	-0.317	-0.174	-0.123	<0.001
Fibromyalgia	0.127	0.026	0.171	0.062	0.001
Household income ^c					
\$35,000–80,000	-0.109	-0.198	-0.033	-0.051	0.010
>\$80,000	-0.214	-0.338	-0.125	-0.076	<0.001
On permanent disability or unemployed	0.127	0.038	0.208	0.056	0.004
Pain onset following motor vehicle accident	0.198	0.034	0.307	0.052	0.004
Receiving social assistance ^d	0.063	-0.117	0.135	0.020	0.323

Notes: ^aStandard multiple regression with log-transformed standardized waiting time: $R^2=0.095$; adjusted $R^2=0.092$; $p<0.001$; ^breference category: family physician; ^creference category: household income <\$35,000; ^dreference category: any other source of income.

Abbreviation: CI, confidence interval.

management services for persons with chronic pain conditions.^{13,14} Many authors have suggested improving triage processes and increasing supply of services to meet the growing demand for pain services.¹⁴ Strategies targeting referral prioritization processes and addressing waiting list bottlenecks are warranted. Another potential avenue for improvement is to increase access to multidisciplinary teams able to manage chronic pain conditions within rheumatology departments or at the primary care level, which could be better suited for patients with rheumatic conditions who may not need highly specialized pain interventions.²⁸ Supporting primary care physicians and rheumatologists by providing prompt recommendations and advice from chronic pain specialists is another strategy to consider.²⁹ The use of technology and social media (eg, online support groups, pain management videos and blogs)³⁰ as well as self-management

interventions³¹ have also raised interest as innovative ways to reduce patients' burden while waiting for MPTF.

The variables identified in the multiple regression analysis accounted for only 9.5% of the variance of the waiting time, reflecting the importance of other potential organizational factors that were not available in our study, such as prioritization processes and eligibility criteria. MPTF prioritization processes are reported to vary between facilities and include different prioritization criteria such as pain characteristics and psychological status.³² Eligibility criteria may also influence waiting times by limiting the number of referrals. For example, after recent changes in eligibility criteria in one of the included MPTF, patients with fibromyalgia are no longer eligible for treatment and are redirected for management in primary care. This practice, however, may not reflect the current situation in other pain clinics. Other

organizational factors potentially associated with waiting time include the volume of referrals received and the volume of patients seen at the MPTF³² as well as the type of setting (university-affiliated versus district hospitals) in the case of orthopedic surgery.³³ Had they been available, such data would likely have accounted for an additional percentage of the variance of the waiting time.

Nevertheless, the multiple regression analysis identified several factors associated with waiting time pertaining to the different categories of determinants described in the Andersen's model.²³ As opposed to other studies conducted on access and health care utilization with the Andersen's model,³⁴ no predisposing characteristic of patients with rheumatic conditions was associated with waiting time. However, several factors related to enabling resources were significantly associated with waiting time. Patients who were on permanent disability or unemployed waited longer than patients with other employment status (ie, employed, retired, temporary disability, other). This is consistent with the results of other studies on waiting time for specialty care or elective surgery^{33,35} and may be explained by an explicit or an implicit prioritization criterion being the potential for return to work. Another factor associated with waiting time was the type of referring physician, with patients referred to MPTF by a family physician waiting longer compared to those referred by medical specialists. This may reflect the need to improve the care pathway from primary care to specialized pain management services. The impact of physicians' characteristics on health services access has also been noted by other researchers.³⁶ For example, physicians' gender, age and location have been associated with waiting time for specific medical specialties in Ontario.³⁶

Household income was another enabling resource significantly associated with waiting time; lower income patients waited longer before their first visit to the MPTF. This finding is in line with that of other studies reporting barriers in access to various health services for persons of lower socio-economic status, even in publicly funded health systems.^{37,38} Underlying explanations of this finding may involve potential implicit biases in the prioritization of referrals regarding socio-economic status.³⁹ This might also be partially explained by the association between lower rate of attendance and lower socio-economic status found in previous studies.⁴⁰ Other studies, however, suggest income is not associated with waiting time.^{41,42} The differences in type of health services (eg, surgery, rehabilitation, medical specialist consultation), settings (eg, outpatient or inpatient hospital departments, primary care setting) and

study methodologies make comparisons between studies difficult to interpret. Nonetheless, the possible inequity of access to services in MPTF based on income raises important ethical issues, especially if it has an impact on health outcomes.⁴³ In a study by Harrington et al on access to medical specialists, persons with lower income were significantly more likely to report that their life had been affected by the waiting time compared to higher-income individuals.⁴⁴ The World Health Organization advocates that equitable access to services is a key principle of universal health coverage.⁴⁵

The need for health care is also considered to have an influence on access and health care utilization. Need factors associated with longer waiting time included presenting a fibromyalgia condition, having a longer duration of pain and having a pain onset following a motor vehicle accident. Qian et al⁴⁶ also found a trend towards shorter rheumatology waiting times for patients with inflammatory arthritis such as rheumatoid arthritis compared to conditions such as fibromyalgia. Patients with fibromyalgia represent more than a third of our sample, similar to the proportion found in a previous study,⁴⁷ in which 43% of the patients with rheumatic conditions referred to an MPTF in Quebec had a diagnosis of fibromyalgia. This large number of patients with fibromyalgia may illustrate the challenges in treating this condition in primary or secondary care, leading to frequent MPTF referrals. Regarding the duration of pain, other studies also reported longer waiting times to access health services for patients with more chronic musculoskeletal conditions.^{48,49} As for the pain onset following a motor vehicle accident, we did not find any literature to support this finding.

Limitations

This study has some limitations. First, our analyses were limited to the data available. As previously mentioned, it is possible that unavailable variables such as the pain characteristics at the time of referral, the volume of referrals in each MPTF or the prioritization processes could have been associated with waiting time. It would be interesting for future studies to conduct a complete assessment of the patients at the time of referral and also take into account organizational factors (volume of referrals, staff composition, etc.) pertaining to each MPTF. Second, the procedure we used to select patients with rheumatic conditions was not limited to the primary diagnosis and most likely included some patients with rheumatic conditions who were primarily referred for a non-rheumatic condition, which could have affected the waiting times

for those patients. In the absence of consensus in the literature, we opted for a procedure that would favor a higher sensitivity (likely at the expense of specificity) by selecting patients based on any diagnoses, self-reported comorbidities and pain onsets that matched the NADW case definition. Despite its limitation, self-reported diagnosis is often used in health services research to identify patients from an administrative database.⁵⁰ The NADW case definition was also retained for this study because it had the highest sensitivity compared to two other ICD-9-CM-based definitions of rheumatic conditions,⁵⁰ which allowed to maximize case detection. Third, the number of missing data, especially for the waiting time variable, may have altered the analysis. However, no differences were found in the main sociodemographic and clinical variables between the group with missing waiting time data and the rest of the sample. Lastly, our study is subject to limitations inherent to most patient registry studies, including potential inaccuracy of self-reported data, coding errors or inconsistency in the data collection procedures.

Conclusion

Patients with NADW rheumatic conditions face long delays before accessing services in MPTF, during which their condition may deteriorate. Although a substantial amount of the variance in waiting time remains unexplained, this study identified various factors associated with waiting time. Some of the findings, notably that persons with lower household income waited longer before the initial visit, raise important issues. Longer waiting times for patients referred by a family physician suggest the need to improve the care pathway from primary care to specialized pain management services. In addition, improvement in the provision of services for patients with fibromyalgia seems necessary considering they represent a large proportion of patients referred to MPTF and that they wait a longer period of time before receiving services. Research on service provision and health care trajectory for patients with fibromyalgia from primary to tertiary care is warranted. Finally, the results of this study clearly indicate the magnitude of the challenge for persons with NADW rheumatic conditions to receive services in MPTF and emphasize the need for strategies to improve equitable and timely access to services, including better resource allocation, waiting list management and prioritization of referrals.

Ethics approval

Ethics approval for this study was obtained from the Institut de réadaptation en déficience physique de Québec

(IRDPO) Ethics Committee (#EMP-2015-449). Consent to participate was initially obtained upon enrollment in the Quebec Pain Registry and the current study did not require additional consent.

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Disclosure

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Supplementary material

Table S1 Categories of rheumatic conditions corresponding to the National Arthritis Data Workgroup (NADW) ICD-9-CM diagnostics codes

Rheumatic conditions categories	NADW ICD-9-CM diagnostics
Osteoarthritis and allied disorders	Osteoarthritis and allied disorders (715)
Rheumatoid arthritis	RA and other inflammatory polyarthropathies (714)
Gout and other crystal arthropathies	Gout (274) Crystal arthropathies (712)
Spondylosis/spondylitis and allied disorders	AS/inflammatory spondylopathies (720) Spondylosis and allied disorders (721) Reiter's Disease (99.3) Psoriatic arthropathy (696.0)
Diffuse connective tissue disease	Diffuse connective tissue disease (710)
Fibromyalgia, myalgia and myositis	Myalgia and myositis unspecified (729.1)
Carpal tunnel syndrome	Carpal tunnel syndrome (354.0)
Soft tissue disorders	Peripheral enthesopathies and allied disorders (726) Other disorders of synovium/tendon/bursa (727) Disorders of muscle/ligament/fascia (728.0–728.3, 728.6–728.9) Rheumatism, unspecified and fibrositis (729.0) Fascitis, unspecified (729.4)
Joint pain, effusion and other unspecified joint disorders	Other unspecified arthropathies (716.1, 716.3–716.6, 716.9) Other and unspecified joint disorders (719.0, 719.4–719.9)
Other specified rheumatic conditions	Arthritis associated with infections (711) Arthropathy associated with disorders classified elsewhere (713) Specified arthropathies (716.0, 716.2, 716.8) Specified joint disorders (719.2, 719.3) Polymyalgia rheumatica (725) Syphilis of muscle (95.6) Syphilis of synovium/tendon/bursa (95.7) Gonococcal infection of joint (98.5) Behcet's syndrome (136.1) Other disorders purine/pyrimidine metabolism (277.2) Allergic purpura (287.0) Cauda equina syndrome (344.6) Brachial plexus/thoracic outlet lesions (353.0) Tarsal tunnel syndrome (355.5) Polyneuropathy in collagen vascular disease (357.1) Rheumatic fever w/o heart disease (390) Rheumatic fever w/heart disease (391) Cerebral arteritis (437.4) Raynaud's syndrome (443.0) Polyarteritis nodosa and allied conditions (446) Arteritis, unspecified (447.6)

Note: Centers for Disease Control and Prevention. *National Arthritis Data Workgroup ICD-9-CM diagnostic codes for arthritis and other rheumatic conditions*. Atlanta, GA: CDC; 2004. Available from: http://www.cdc.gov/arthritis/data_statistics/pdf/arthritis_codes_2004.pdf.¹

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