

RESEARCH PAPER

The impact of COVID-19 on access to canine integrative medical care in Michigan, USA, and Ontario and British Columbia, Canada

Kirk A Muñoz^a, Juliet Duncan^b, Karen Clark^c, Sarah Shull^a & Jane M Manfredi^d^aDepartment of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, East Lansing, MI, USA^bProgramme director, Veterinary Anaesthesia & Analgesia Online MSc, Royal (Dick) School of Veterinary Studies, Large Animal Hospital, Easter Bush Campus, University of Edinburgh, Edinburgh, UK^cInstitute for Public Policy and Social Research, Michigan State University, College of Social Science, East Lansing, MI, USA^dDepartment of Pathobiology and Diagnostic Investigation, College of Veterinary Medicine, Michigan State University, East Lansing, MI, USA

Correspondence: Kirk A Muñoz, College of Veterinary Medicine, Michigan State University, 736 Wilson Road, East Lansing, MI 48824, USA.
E-mail: munozkir@msu.edu

Abstract

Objective To determine the effects of the COVID-19 associated restrictions on the ability of owners in Michigan (MI), USA versus Ontario (ON) and British Columbia (BC), Canada, to obtain care for their chronically painful dogs.

Study design Cross-sectional survey.

Population A total of 90 owners met the inclusion criteria for the study.

Methods An anonymous electronic survey was distributed to owners at four veterinary integrative medicine (IM) clinics during July and August 2020. Two clinics in MI and one each in ON and BC were recruited. Owners were asked about availability of IM care preceding and during COVID-19 restrictions and their opinions of the impact of COVID-19 on their dog's health. The survey asked where owners sought care for their dogs, types of chronic conditions treated, therapeutic modalities used, and if owners had a medical background. Comparisons were made within and between groups. Thematic analysis, Fisher's exact test, chi-square analyses, McNemar's and Wilcoxon signed-rank tests for paired comparisons were performed ($p < 0.05$).

Results During COVID-19 restrictions, access to IM care was better for dogs in ON and BC than in MI ($p < 0.001$). The negative effect of the pandemic restrictions to IM care on quality of life was perceived greater by owners in MI than those in ON and BC ($p < 0.001$). The owners' medical backgrounds had no effect on attempts to access care during this time ($p = 0.76$).

Conclusions and clinical relevance The results suggest that a widespread disease in humans had an adverse impact on animal welfare. Providers of veterinary care should use this experience to establish protocols to ensure continuity of care for chronically painful animals in the event of a similar situation in the future.

Keywords chronic pain, COVID-19 restrictions, dogs, essential medical service, integrative medicine.

Introduction

Integrative medicine (IM) practices are important for the management of chronic pain in both humans and veterinary species (Vickers et al. 2012; Silva et al. 2017). IM clinics provide therapy to chronically painful dogs, therapy that may not be readily available in general practices (MacFarlane et al. 2014; Barale et al. 2020; Urits et al. 2020). Access to IM care can improve quality of life (QoL) via chronic pain management (Downing 2011; Silva et al. 2017).

The COVID-19 pandemic and the subsequent pandemic-associated restrictions resulted in temporary closure of human IM clinics and also reduction in hospital-based appointments as resources were redistributed to more critical areas. This hampered people with chronic pain from accessing pain management, and also negatively impacted their health and QoL (Javed et al. 2020; Lynch et al. 2020). The pandemic-associated restrictions resulted in temporary closure of veterinary IM clinics, but the impact on animals with chronic pain is unknown. The services veterinarians could offer were limited.

depending on the severity of the restrictions. In Michigan (MI), USA, veterinarians were only permitted to attend to veterinary emergencies and to provide preventative medical care, such as vaccinations during March to June 2020 ([Michigan.gov, 2020](https://www.michigan.gov)). In Ontario (ON), Canada, veterinarians were allowed to determine the types of cases that they attended to on a daily basis. In British Columbia (BC), Canada, there were no specific restrictions stating how veterinarians should operate during this time ([Government of Canada 2020](https://www150.com)). It is not known how COVID-19 restrictions affected owners' ability to access IM care for their dogs, or any negative impacts associated with these restrictions. The types of pain modality therapies used to treat dogs with chronic pain may have been limited because some of these therapies are hospital-based and cannot be performed at home by the owners. Knowledge of the effects of the recent pandemic restrictions on care of dogs with chronic pain could provide guidance to ensure continuity of care for these dogs in the event of a future pandemic.

A medical background may have affected an owner's decision-making process when deciding whether to take their dog to an IM facility during the pandemic. The implications of the pandemic may be better understood by an owner with a medical background and may influence their choice to seek IM care for their pet. In humans, having a medical background made them more likely to be willing to interact with people affected by diseases, as compared with those without a medical background ([Bachmann et al. 2007](#); [Shi et al. 2020](#)).

This study investigated: 1) any changes in management of chronic pain and QoL in dogs in MI, ON and BC; and 2) any differences in pet management by owners with or without a medical background. Our hypotheses were that: 1) dogs in MI had less access to IM care during the pandemic-associated restrictions and that their QoL was more negatively affected than dogs in ON and BC; and 2) during the pandemic, owners with a medical background were more likely to continue to seek IM care for their chronically painful dogs than those without a medical background as they understood the pathophysiology associated with COVID-19.

Materials and methods

Ethical approval for the use of humans in research was granted by Michigan State University Office of Regulatory Affairs and Institutional Review Boards (approved for exemption under category exempt 2[i]). An anonymous online questionnaire was created and distributed using the Qualtrics survey platform (Qualtrics, UT, USA).

Clinic selection and survey distribution

The survey was sent to clients of two veterinary IM clinics in MI, one in ON and one in BC during July and August 2020 to capture owners' impressions of the effect of the pandemic on

their dogs while the effect of the restrictions were still present in their minds. These clinics were selected because they had a large IM animal population, were exclusively IM clinics, and were willing to send the questionnaire link via email to their clients. To maintain client confidentiality, as stipulated by the Institutional Review Board (HERC_545_20), the researchers did not have access to clients' e-mail addresses. No reminder e-mails were sent due to staff shortages at the clinics during the pandemic. Participants were allowed one response per survey and for only one dog.

Inclusion criteria

Clients were included in the study if they: 1) owned a dog with a chronically painful condition; 2) were a resident of MI, ON or BC during COVID-19 restrictions; and 3) had previously accessed treatment for their dog at one of the participating IM clinics over the past year.

Instrument design

A pilot survey was created and piloted with six individuals with and without a veterinary background. Feedback from this survey was used to improve face and content validity. The final survey consisted of 36 questions in the form of multiple choice ($n = 13$), multiple choice with open-ended questions ($n = 6$), matrix questions ($n = 2$), select all that apply ($n = 8$) and open-ended questions ($n = 7$) ([Appendix SA](#)). There were two sections in the survey: 1) a demographic section asking respondent's age, if they were the dog's primary caretaker, level of education, if they had a medical background and country of residence; and 2) an IM care section where participants were asked if they owned a dog with chronic pain, the diagnosis of the chronic pain condition of the dog, and information about the availability and type of IM care provided to the dog before and during COVID-19 restrictions. Specifically, the questionnaire asked how the restrictions affected their ability to access care from their IM clinic, availability of IM treatment modalities pre-pandemic and during the time of the restrictions, and the frequency of these treatments. The IM treatment modalities included in the survey were acupuncture, electroacupuncture, transcutaneous electrical nerve stimulation (TENS), laser, massage, underwater treadmill, non-steroidal anti-inflammatory agents (NSAIDs), environmental modification and therapeutic exercise. Owners' use of a pain scale to assess the status of their dog was also investigated. The questionnaire also asked if additional steps were taken, such as purchasing over-the-counter products to help manage their dog's pain during COVID-19 restrictions. Owners' perception of their dog's ability to walk, their appetite and overall impression of their dog's health during COVID-19 restrictions were also investigated. Questions asking if respondents owned a dog, lived in the USA or Canada, and if their dog had been diagnosed with a chronic

condition that may cause pain were mandatory, all other questions were optional.

Statistical analysis

Data was analyzed using NCSS 2019 (NCSS LLC, UT, USA). Using a predicted IM veterinary patient population of 900, a confidence level of 95% and a 10% margin of error, the estimated survey sample size was 87 (Qualtrics). Based on looking for significant differences in the use of various treatment modalities, a power of 80%, large effect size ($w = 0.5$), and alpha of 0.05 yielded an ideal sample size of 30 per country (G*Power 3.1.9.2; Heinrich Heine University Germany). Comparisons within and between groups were done using cross-tabulations, chi-square test, Fisher's exact test, and McNemar's and Wilcoxon signed-rank tests for paired comparisons. Normality was assessed by means of the Shapiro-Wilk test of normality. Numbers were reported, allowing for the calculations of frequencies, and median with 25th and 75th quartiles (interquartile range) were reported for nonparametric data. Statistical significance was set at $p < 0.05$.

Results

Some respondents chose not to provide responses to all of the questions, and as such all data available were analyzed. A total

Table 1 Demographic profile of owners of dogs with chronic pain living in Michigan (MI), USA, and Ontario (ON) and British Columbia (BC), Canada responding to a survey conducted in July–August 2020 evaluating access to integrated care management preceding and during COVID-19 restrictions

Demographic	State/Province		<i>p</i>
	MI	ON and BC	
Primary caretaker (n)	53	30	
Yes	96%	97%	0.92
No	4%	3%	
Age (n)	56	31	
21–29	5%	3%	0.45
30–39	23%	26%	
40–49	16%	26%	
50–59	27%	32%	
60+	29%	13%	
Education (n)	56	30	
College or less	29%	37%	0.31
Bachelor's degree	16%	23%	
Post-graduate degree	27%	10%	
Professional degree	29%	30%	
Medical background (n)	56	30	
Yes	36%	20%	0.13
No	64%	80%	
Type of medical background (n)	16	5	
Veterinary	44%	20%	0.34
Human	56%	80%	

of 90 owners met the inclusion criteria, with 82 owners completing 50% or more of the survey, and 74.4% (67 owners) fully submitting the survey. Of these owners, 59 were located at two geographic locations in MI, and 31 at locations in ON and BC. The data for both locations in MI, and for locations in ON and BC, were analyzed together. The number of survey links sent to clients from the IM clinics was not available, so a response rate could not be determined.

Demographic data

There were no significant differences between MI *versus* ON and BC when age ($p = 0.45$), primary caretaker ($p = 0.92$) and level of education ($p = 0.31$) were analyzed (Table 1).

IM care data

Osteoarthritis was the most common chronic disease in dogs in MI (62%, 32/52) and in ON and BC (61%, 17/28). Neuropathies, cruciate ligament disease, degenerative myopathy and geriatric onset laryngeal paralysis and polyneuropathy were reported by < 23% of owners surveyed. There were no significant differences found between the locations studied when comparing the diseases reported ($p = 0.91$).

Before the pandemic, dogs with chronic pain were treated at an IM clinic, by a primary care veterinarian, or by both, and this distribution was not different between MI *versus* ON and BC ($p = 0.96$) (Table 2). More owners from ON and BC *versus* those in MI indicated that access to IM care continued to be available during the pandemic ($p < 0.001$; Table 2). The source (veterinarian only or IM clinic) of medical care obtained by owners for their dogs during the pandemic was not different between the survey locations ($p = 0.34$; Table 2).

Access to therapeutic modalities

Owners in MI reported that their dogs were less able to receive acupuncture ($p = 0.03$), electroacupuncture ($p = 0.03$), laser ($p < 0.0001$), massage therapies ($p = 0.004$), and underwater treadmill ($p < 0.0001$) treatments during the restrictions, compared with before the pandemic (Table 3). The pandemic did not affect provision of NSAIDs ($p = 1.0$), environmental modifications ($p = 0.63$) or exercise ($p = 0.13$) for pain management (Table 3).

Owners in ON and BC reported that during the restrictions, access to acupuncture ($p = 0.03$) and underwater treadmill ($p = 0.004$) therapies for their dogs was less (Table 3). The restrictions had no effect on the ability to obtain electroacupuncture ($p = 1.0$), TENS ($p = 0.50$), therapeutic massage ($p = 0.50$), NSAIDs ($p = 1.0$) and environmental modification ($p = 1.0$) for their dogs (Table 3).

Prior to the pandemic, there was a significant difference in prescribed treatments for dogs with chronic pain between MI

Table 2 Responses to a survey conducted in 2020 in Michigan (MI), USA, and Ontario (ON) and British Columbia (BC), Canada from owners of dogs with chronic pain describing access to integrative medical care (IM) before and during COVID-19 restrictions, and assessing differences among owners with or without medical backgrounds

Item	State/Province		p	Medical background		p
	MI	ON and BC		Yes	No	
Pre-COVID-19 restrictions: where care was received (n)	52	29		24	57	
IM practice only	69%	72%		63%	74%	
Veterinarian only	4%	3%	0.96	4%	4%	0.59
Other	27%	24%		33%	23%	
During COVID-19 restrictions: able to access IM care (n)	53	29		25	57	
Yes	23%	79%		44%	42%	
No	42%	3%	<0.001*	32%	26%	0.76
Did not attempt to access care	36%	17%		24%	32%	
During COVID-19 restrictions: where care was received (n)	10	21		10	21	
IM practice only	100%	81%		80%	90%	
Veterinarian only	0%	5%	0.34	0%	5%	0.34
Other	0%	14%		20%	5%	

*Significant difference between geographic locations ($p < 0.05$).

Table 3 Responses to a survey conducted in 2020 in Michigan (MI), USA and Ontario (ON) and British Columbia (BC), Canada of owners of dogs with chronic pain describing access to specific treatments before and during COVID-19 restrictions. The survey questions requested respondents to select one answer (yes or no) for use of each of the listed treatments before and during COVID-19 restrictions. Data are presented as Yes/No or as % of the number of respondents for that treatment

Use of treatments	MI				n	p	ON and BC				n	p
	No	No	Yes	Yes			No	No	Yes	Yes		
Prior to restrictions												
During restrictions												
Acupuncture	63%	0%	22%	15%	27	0.03*	15%	0%	30%	55%	20	0.03 [†]
Electroacupuncture	68%	0%	27%	5%	22	0.03*	67%	0%	0%	33%	12	1.0
TENS	82%	0%	18%	0%	22	—	50%	0%	13%	38%	16	0.5
Laser	13%	0%	58%	29%	31	<0.0001*	0%	0%	32%	68%	22	—
Massage	6%	0%	25%	69%	36	0.004*	53%	0%	13%	33%	15	0.5
Treadmill	13%	0%	73%	13%	30	<0.0001*	11%	0%	47%	42%	19	0.004 [†]
NSAID	22%	0%	3%	75%	36	1.00	16%	5%	5%	74%	19	1.00
Env modification	32%	11%	4%	54%	28	0.63	43%	0%	7%	50%	14	1.00
Exercise	5%	0%	10%	85%	39	0.13	0%	0%	0%	100%	20	—

Env, environmental; n, number of respondents; NSAID, non-steroidal anti-inflammatory drug; TENS, transcutaneous electrical nerve stimulation.

*Significantly different prior to versus during COVID-19 in MI, USA ($p < 0.05$).

[†]Significantly different prior to versus during COVID-19 in ON and BC, Canada ($p < 0.05$).

versus ON and BC, with fewer dogs in MI treated with acupuncture ($p = 0.004$) and TENS ($p = 0.04$) than those in ON and BC (Table 4). Owners reported that before the pandemic more dogs in MI received massage therapy than dogs in ON and BC ($p < 0.0001$; Table 4). There were no significant differences between the dogs in MI versus ON and BC for the other modalities mentioned (all $p \geq 0.05$; Table 4).

Responses between MI versus ON and BC during the time of the restrictions were as follows for the modalities studied: acupuncture ($p < 0.0001$), electroacupuncture ($p = 0.04$), TENS ($p < 0.001$), laser ($p = 0.003$), massage ($p = 0.02$) and underwater treadmill ($p = 0.02$) therapies. Fewer of these IM

therapies were administered to dogs in MI than in ON and BC, with the exception of massage therapy for which more dogs in MI were treated than in ON and BC. No significant differences between MI versus ON and BC were reported for other modalities during COVID-19 restrictions (all $p > 0.05$; Table 4).

Overall, the median number of treatments that owners in the geographic locations studied used for their dogs during the pandemic was lower than that before COVID-19 ($p < 0.0001$; Table 5). Analysis of the median numbers of treatments that were available to dogs in MI, and in ON and BC, showed a significant decrease in access to hospital-based care in MI ($p < 0.0001$), and in ON and BC ($p < 0.0001$), and also in

Table 4 Comparison of use of treatments prior to and during the COVID-19 restrictions in Michigan (MI), USA and Ontario (ON) and British Columbia (BC), Canada. The count for each treatment is based on the number of respondents to a survey in July–August 2020 who provided a response; therefore, the number of people answering each treatment varies. Used 1+ week indicates dogs with one or more treatments per week

Treatment	Use prior to COVID-19 restrictions				Use during COVID-19 restrictions		
	Use	MI	ON and BC	<i>p</i>	MI	ON and BC	<i>p</i>
Acupuncture	Total number	36	27		33	21	
	Did not use	50%	15%	0.004*	88%	43%	<0.0001 [†]
	Used 1+ week	50%	85%		12%	57%	
Electroacupuncture	Total number	28	17		30	15	
	Did not use	71%	53%	0.21	97%	73%	0.04 [†]
	Used 1+ week	29%	47%		3%	27%	
Transcutaneous electrical nerve stimulation	Total number	28	17		30	18	
	Did not use	82%	53%	0.04*	100%	61%	< 0.001 [†]
	Used 1+ week	18%	47%		0%	39%	
Laser	Total number	45	27		33	22	
	Did not use	13%	0%	0.05	73%	32%	0.003 [†]
	Used 1+ week	87%	100%		27%	68%	
Massage	Total number	44	18		38	16	
	Did not use	7%	50%	<0.0001*	34%	69%	0.02 [†]
	Used 1+ week	93%	50%		66%	31%	
Underwater treadmill	Total number	44	26		32	19	
	Did not use	11%	8%	0.62	88%	58%	0.02 [†]
	Used 1+ week	89%	92%		13%	42%	
Non-steroidal drugs, e.g., carprofen, meloxicam, galliprant	Total number	43	24		39	19	
	Did not use	21%	17%	0.67	28%	21%	0.56
	Used 1+ week	79%	83%		72%	79%	
Environmental modification	Total number	34	18		35	16	
	Did not use	41%	44%	0.82	46%	56%	0.49
	Used 1+ week	59%	56%		54%	44%	
Exercise	Total number	48	26		43	22	
	Did not use	4%	4%	0.95	21%	5%	0.083
	Used 1+ week	96%	96%		79%	95%	

*Significantly different in MI versus ON and BC ($p < 0.05$).

[†]Significantly different in MI versus ON and BC ($p < 0.05$).

nonhospital-based treatments in MI ($p = 0.03$), and in ON and BC ($p = 0.0003$) (Table 5).

Products purchased by owners during COVID-19 restrictions

Some owners reported purchasing the following purported pain-reducing products from pet shops: cannabinoid-based products, equipment and/or supplements to contribute to pain management. More owners in MI (17/51) versus ON and BC (4/26) purchased any of these products for their dogs ($p = 0.03$). The types of products purchased were not different in the geographic locations ($p = 0.46$).

Pain scoring

No pain scales were used by the majority of respondents. There was no significant difference in non-use of pain scales between owners in MI (45/52) versus ON and BC (27/30) ($p = 0.89$). Of

respondents using a pain score, three used the Helsinki chronic pain index system, but the others did not remember what system they used (Hielm-Bjorkman et al. 2009).

Quality of life factors

When assessing their dog's ability to walk during the restrictions versus pre-COVID-19, there was no significant difference noted between MI versus ON and BC ($p = 0.19$; Table 6). A non-statistically significant difference was observed in responses describing deterioration in the ability of dogs to walk during the restrictions (49%, 26/53) in MI versus (31%, 8/26) in ON and BC.

Owners assessed their dog's appetite during the restrictions compared with pre-COVID-19, and more owners thought that their dog's appetite did not change in all locations compared with owners who saw a decrease in their dog's appetite. There was no significant difference in appetite during the restrictions in MI versus ON and BC ($p = 0.26$; Table 6).

Table 5 Responses to a survey conducted in July–August 2020 of owners of dogs with chronic pain in Michigan (MI), USA and Ontario (ON) and British Columbia (BC), Canada about access to integrative medical (IM) care prior to and during the COVID-19 pandemic restrictions. Treatments requiring a health professional were acupuncture, electroacupuncture, transcutaneous electrical nerve stimulation, laser and underwater treadmill. Treatments without a health professional were massage, non-steroidal anti-inflammatory drugs, environmental modification and exercise. Data are presented as median (interquartile range)

Treatments	MI			ON and BC			Overall		
	Prior to COVID-19 restrictions	During COVID-19 restrictions	p	Prior to COVID-19 restrictions	During COVID-19 restrictions	p	Prior to COVID-19 restrictions	During COVID-19 restrictions	p
Number of treatments used	5 (4–6)	2 (1–4)	< 0.0001*	5 (4–6)	3 (2–5)	<0.0001†	5 (4–6)	2.5 (1–4)	<0.0001‡
Treatments requiring health professional	3 (2–4)	0 (0–1)	<0.0001*	3 (3–4)	1.5 (0–3)	<0.0001†	3 (2–4)	1 (0–2)	<0.0001‡
Treatments not requiring health professional	2 (1–3)	1 (0–2)	0.03*	2 (1–2)	1.5 (1–2)	0.03†	2 (1–3)	1 (0–2)	0.0003‡

*Significant difference between prior to and during pandemic restrictions in MI ($p < 0.05$).

†Significant difference between prior to and during pandemic restrictions in ON and BC ($p < 0.05$).

‡Use of treatments significantly decreased during the pandemic restrictions overall in both locations ($p < 0.05$).

When assessing the owners’ overall perception of the impact of the restrictions on their dog’s health compared with pre-COVID-19, more owners in ON and BC thought that their dog’s health was not affected during the restrictions compared with those who thought it worsened ($p < 0.0001$; Table 6).

Owners with or without a medical background

There was no significant difference between geographic locations with respect to the number of owners with a medical background ($p = 0.13$; Table 1). For owners with a medical background, there was no significant difference between knowledge of veterinary or human medicine ($p = 0.34$; Table 1). There were no significant differences between MI versus ON and BC, in owners with and without a medical background with respect to attempting to access IM care for their dogs during the restrictions ($p = 0.76$), and where their dogs received IM care prior to the COVID-19 pandemic and during the time of the restrictions (all $p > 0.05$; Table 2).

Discussion

During the government-imposed restrictions, owners of dogs with chronic pain who responded to this study in MI reported restricted access to care, less modality-based care, and a perceived overall negative impact of COVID-19 on their dogs health compared with owners in ON and BC.

Owners in MI were less likely during COVID-19 restrictions to obtain the IM care recommended for their dogs. The IM treatments that were hospital-based were less available in MI versus ON and BC, and overall, the number of treatments for IM care decreased during the time of the restrictions for dogs in all locations. It is probable that utilization of nonhospital-based care helped to provide analgesia for these dogs until the restrictions were lifted and access to hospital treatments were again available. Although overall MI owners thought that the QoL of their dogs was diminished, responses indicated no significant changes in appetite or ability to walk during the pandemic, or when compared with responses from owners in ON and BC.

Medical conditions requiring IM care in the present study appear similar to those in previous reports (Selmer & Shiau 2019). Anderson et al. (2020) reported osteoarthritis to be a major cause of chronic pain in dogs, similar to the present study, and affects about 20% of the adult canine population (Johnston 1997; Clements et al. 2006). Although the present study did not evaluate the number of dogs affected by osteoarthritis, it was the most common condition reported by owners in MI (62%) and in ON and BC (61%). Neuropathy/intervertebral disc disease was less prevalent in MI, and ON and BC (23% and 21%, respectively).

The survey responses indicated that owners believed that IM care was of benefit to their dogs, and that the decreased access

Table 6 Responses to a survey conducted in July–August 2020 of owners of dogs with chronic pain in Michigan (MI), USA and Ontario (ON) and British Columbia (BC), Canada about owners' perceptions of the effect of the COVID-19 pandemic restrictions on the dogs' behavior and health

Health measures	Responses	MI	ON and BC	<i>p</i>
Ability to walk	Number of responses	53	26	0.19
	Improved	11%	8%	
	No change	40%	62%	
	Worse	49%	31%	
Appetite	Number of responses	53	29	0.26
	Decreased	11%	3%	
	Increased	9%	3%	
	No change	79%	93%	
Impact on dog's health	Number of responses	50	25	<0.0001*
	No	30%	76%	
	No change	8%	8%	
	Yes	62%	16%	

*Significant difference between MI versus ON and BC ($p < 0.05$).

to IM care during the pandemic had a negative effect on the perceived health of their dogs. These findings were similar to reports that people benefitted from IM treatment and that when the pain clinics closed, people were unable to obtain the same care that they were receiving prior to the pandemic (Puntillo et al. 2020). Puntillo et al. (2020) reported that during COVID-19 many human pain clinics worldwide were not available because they were considered nonessential, and resources were reallocated to intensive care units. Modalities commonly used to manage chronic pain in dogs in MI, ON and BC were also reportedly used in the human health care system (Glazov et al. 2016). Studies of humans with chronic pain confirm that incorporation of IM care into pain management results in significant improvement in symptoms, such as reduced pain, walking better, less anxiety, less depression associated with chronic pain and a better QoL (Chen & Michalsen 2017; El-Tallawy et al. 2020). Although there was no statistical significance, more owners in MI (49%) versus in ON and BC (31%) thought that their dog's ability to walk worsened during the pandemic.

More owners in MI reported less access to IM care for their dogs during the restrictions. One of the IM clinics in MI was closed from March 2020 until early-June 2020, thereby delaying access to IM care in comparison with clinics in ON and BC that continued to provide IM care to their clients. Furthermore, the IM clinics in ON and BC were permitted to attend to cases at their own discretion (Government of Canada 2020), whereas the types of veterinary services permitted during the restrictions in MI were limited to emergencies and preventive care. Reduced access to hospital-based care, such as acupuncture, laser therapy, underwater treadmill, massage therapy, electroacupuncture and TENS was perceived by owners to be associated with an overall decrease in the QoL of

dogs in MI more so than those in ON and BC. The following treatment modalities did not require owners to go to an IM clinic and were therefore not affected by the restrictions: NSAIDs, environmental modifications and therapeutic exercise. Owczarczak-Garstecka et al. (2021) reported that owners continued walking their dogs during the restrictions even if they were symptomatic for COVID-19.

Owners in ON and BC reported that the welfare of their dogs was less affected by the pandemic than in MI. The only treatments that decreased during this time were acupuncture, laser and underwater treadmill therapies. It is unclear why these services were reduced as none of the other hospital-based treatments, such as electroacupuncture, TENS and therapeutic massage, were affected. A possible reason for diminished or no access to these particular services could be reduced staffing at the clinics; however, this was not investigated in the present study. The IM clinic in BC chose to close for 10 weeks during the pandemic which may have resulted in some dogs with less hospital-based care.

Many human studies have investigated the impact of nonmedical factors, such as gender, race, age, QoL, individual's expectations and socioeconomic status on physicians' medical decisions (Hajjaj et al. 2010; Brabers et al. 2017). The present study found no association between the presence of a medical background and an owner's decision to seek IM care for their dog during COVID-19 restrictions. Dogs are often considered as part of the family, and it is plausible that owners who participated in this survey would have wanted the best possible care for their dog (Walsh 2009; Applebaum et al. 2020). We hypothesized that owners with medical training would better understand the medical terminology and feel more confident following the recommended precautions while they attempted to obtain IM care for their dogs; however, this

did not appear to hold true. The present study was not designed to elucidate the reasons behind owners' decisions, but it did show that owners acted similarly when seeking IM care for their dogs.

To obtain data while the effect of the restrictions were still at the forefront of owners' thoughts, it was necessary to survey owners as close as possible to when the restrictions were in effect. The time taken to secure the necessary ethical approvals, enroll clinics and distribute the survey limited the number of IM clinics and clients involved in the study. Client confidentiality practices prevented access by the authors to clients' e-mail addresses; therefore, follow-up on survey responses was not possible. Staff shortages in the participating IM clinics prevented sending the survey link to their clients more than once. Surveys have inherent limitations, one being respondent bias, in that only owners with an interest in the topic may have participated in the survey. There is the possibility of anthropomorphism affecting the perceived QoL of the dogs by the owners' given the larger numbers of older owners in the population studied, who may also suffer from chronic pain (Anderson & Loeser 2010). Confounding factors of the study data collected include a limited sample size in some areas, the inability to remind clients to complete the survey, societal differences between MI *versus* ON and BC, owners relying on their perception rather than a scoring system to determine the level of pain and QoL of their dogs, differences in breeds and ages of the dogs, the body condition scores of the dogs and normal effects of aging.

Conclusions

The results of this survey suggest that a widespread disease in humans has an impact on animal welfare and that the implications should be studied further in the light of our experiences with the COVID-19 pandemic. Providers of veterinary care should use this experience to establish protocols to help ensure continuity of care of chronically painful animals in the event of a similar situation in the future. Further studies using additional objective methods to assess the effect of a lack of IM care on the QoL of dogs with chronic pain should be performed.

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Authors' contributions

KAM, JD and JMM: study design, data collection, preparation of manuscript. KC: statistical analysis, manuscript preparation.

SS: data collection, manuscript review. All authors read and approved the final version of the manuscript.

Conflict of interest statement

The authors declare no conflict of interest.

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Supporting Information

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Appendix SA. Survey.