

Therapeutic Cannabis Use in Kidney Disease: A Survey of Canadian Nephrologists



Kevin Gitau, Holly S. Howe, Lydia Ginsberg, Jeffrey Perl, and Jonathan Ailon

Rationale & Objective: Cannabis use may be helpful for symptom management in patients with chronic kidney disease (CKD). Knowledge, attitudes, and comfort with use of medical cannabis among kidney care providers may be limiting more widespread evaluation and use. We surveyed Canadian nephrologists regarding current prescribing habits, attitudes, and overall comfort level with cannabis products.

Study Design: We carried out a nationwide, mail-in survey focused on capturing general and practice demographics, current cannabis prescribing status, and knowledge and attitudes regarding therapeutic cannabis use in patients with CKD.

Setting & Population: This survey was distributed to every registered nephrologist in Canada.

Analytical Approach: The results of this survey are reported descriptively.

Results: Responses were received from 208 of 723 (29%) nephrologists. Only 21 (10.1%) respondents currently prescribe cannabis, with chronic pain syndromes being the most frequent reason for cannabis prescription

(95.2%). Overall, 116 (55.5%) participants reported that changes in legality of cannabis did not influence their decision to prescribe cannabis. The majority of respondents ($n = 123$; 59%) indicated that they were uncomfortable with their knowledge of the medical cannabis literature. Most respondents ($n=188$; 91%) indicated that further studies exploring the efficacy and safety of cannabis would likely influence their prescribing habits.

Limitations: Limitations of this study include possible nonresponse bias and a lack of specific data on practice considerations for specific subpopulations, such as transplant patients.

Conclusions: Only a small minority of Canadian nephrologists currently prescribe cannabis, with relatively little practice change after legalization. There is broad support amongst Canadian nephrologists for encouraging their patients to enroll in efficacy/safety studies of cannabis in the CKD population. Ultimately, given limited therapeutic options available for symptom control in CKD, this survey demonstrates the potential for nationwide practice change if cannabis efficacy and safety can be demonstrated in this population.

Visual Abstract included

Complete author and article information provided before references.

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The last 2 decades have seen a significant increase in medical cannabis use. This is especially true for individuals living with chronic diseases, where cannabis is increasingly being used for multimodal symptom relief. Evidence for therapeutic use of cannabis has been primarily established for the treatment of chronic pain, as an opioid-sparing agent, and in chemotherapy-induced nausea or vomiting.^{1,2} However, there is a widely recognized evidence gap within the literature for secondary indications, such as in the treatment of chronic disease-associated cachexia, insomnia, and anxiety.^{3,4} Furthermore, many outstanding questions remain regarding its adverse health effects, such as cognitive impairment, cardiovascular morbidity, and orthostatic hypotension.⁵ As such, there continues to be a growing interest in evaluating the use of cannabis among individuals with advanced, chronic, noncancer illnesses, such as those patients with chronic kidney failure and earlier stages of chronic kidney disease (CKD).

Individuals with CKD often have many comorbid conditions associated with a significant symptom burden affecting their quality of life. Up to two-thirds of these individuals report being afflicted with chronic pain, with up to 48% of them rating this pain as severe.⁶ Furthermore, up to 18% of patients on hemodialysis experience nausea or

vomiting.⁷ Beyond this, many patients with CKD experience symptoms such as anorexia, cachexia, and pruritus, for which cannabis may have a therapeutic role.^{4,8} As a result, up to 33% of patients with CKD in the United States will often report the use of cannabis and related products.⁹ There remains a great degree of variability in the pharmacologic compositions of different cannabis products. The most widely studied cannabinoid compounds are tetrahydrocannabinol (THC) and cannabidiol. Studies have demonstrated that cannabis products with varying concentrations of these compounds can yield different therapeutic effects for patients. A multicenter study of patients previously on opioids for severe, cancer-related pain demonstrated that cannabis extracts with THC and cannabidiol were more efficacious in treating pain than those only containing THC.¹⁰

Within the Canadian context, the passage of Bill C-45 in the Canadian House of Commons and Senate laid the groundwork for legalization of Cannabis in Canada in June of 2018.¹¹ Recreational use of cannabis became legal in Canada as of October 2018, with province-specific regulations established in the year that followed.¹¹ Given these legal changes, and the advent of retail cannabis availability, questions regarding efficacy and safety of these products in patients with CKD are timely and essential.

PLAIN-LANGUAGE SUMMARY

Cannabis is increasingly being used to treat symptoms such as chronic pain, nausea or vomiting, and severe itching. With recent cannabis legalization in Canada, our aim was to understand the degree to which kidney doctors in Canada currently prescribe and recommend cannabis to their patients. Therefore, we sent a mail-in survey to every kidney doctor in Canada. What we learned is that a majority of kidney doctors in Canada do not prescribe cannabis to their patients due to concerns about safety and effectiveness. Many of these doctors would, however, recommend that their patients participate in cannabis trials. This is important because it suggests a future opportunity to study cannabis in kidney disease patients, and possibly even use it to treat their symptoms.

A recent review of the therapeutic use of cannabis in patients with all stages of CKD concluded that there remains limited evidence for its use outside of chronic pain.^{3,4} Given the paucity of evidence regarding the safety or efficacy of cannabis in CKD, understanding current attitudes and practicing patterns of nephrologists is critical. Such information would provide an understanding of the potential for nationwide clinical practice changes, as well as lay the groundwork for understanding the recruitment landscape for future clinical trials. Until very recently, the attitudes, comfort levels, and prescribing patterns of specialists integrating cannabis in their care of patients with advanced illness had been largely unexplored. Several recent survey studies have reported significant support amongst clinicians in various specialties for further exploration of therapeutic cannabis use in patients with symptoms related to chronic illness.¹²⁻¹⁵ However, only 1 study has explored prescribing attitudes toward cannabis for symptom-related management amongst nephrologists.¹⁶ Therefore, the primary objective of our study is to survey nephrologists working across Canada about their current prescribing habits, attitudes, and overall comfort level with the use of cannabis products among individuals with CKD in the context of recent changes in legal status.

METHODS

This survey was developed for distribution over 2 phases: the first for prototyping and the second for national distribution. The first phase of the survey was developed and distributed via the Qualtrics Online Survey Platform (February 2019). The second phase of the survey was paper-based and was delivered via standard mail through Canada Post to all listed practicing addresses of physicians, residents, and fellows with a registered specialty of nephrology in every provincial college of physicians and surgeons in Canada. This survey was made available in both

English and French for all participants who requested this. This survey excluded health care providers that are not nephrology clinicians, such as registered nurses, nurse practitioners, and residents or fellows training outside of nephrology. A consent form was provided to all participants with details about data collection and privacy protocols to allow for informed consent. This form explained to respondents that return mailing of the completed survey was taken as indication of implied consent for the inclusion of data for analysis. This study was reviewed and received full approval by the Research Ethics Board of St. Michael's Hospital, Unity Health Toronto (Unity Health Toronto, REB 19-177).

Phase 1

During phase 1, the sampling frame included primarily staff nephrologists (defined as those holding a clinical appointment at St. Michael's Hospital, Toronto), as well as nephrology residents and fellows (Post Graduate Year 4 and above) who treat patients with CKD. During this phase, aside from completion of the survey, participants were also asked to provide general feedback, to identify questions or answers where wording was ambiguous or unclear, and to identify questions or answers where options were redundant or repetitive. The data collected during this phase of the study were not included in the final analysis. The final survey developed after this phase had a total of 31 items ([Item S1](#)).

Phase 2

The final survey mail package included a physical copy of the survey, a consent form with instructions for survey completion, and a \$5 gift card. As part of the instructions for the survey, participants were instructed not to provide any identifying information about themselves. Participants were also provided with return postage to mail the survey back. The survey was mailed April 2020, and responses were received until October 2020.

Survey Content

This survey consisted of 7 domains: (1) demographics; (2) experience with cannabis use (either physician-prescribed or patient-initiated use); (3) current cannabis prescribing practices; (4) attitudes and beliefs regarding use of cannabis for symptom management in CKD; (5) overall safety and therapeutic concerns surrounding the use of cannabis; (6) knowledge of active pharmaceutical components in cannabis and differences in preference for different formulations; and (7) awareness regarding cannabis use patterns amongst patients in the clinician's practice. A copy of the full survey can be found in [Item S1](#). For all noncategorical questions eliciting a graded response on a concept or statement, a 5-point Likert-type scale was provided to the participant that varied from negative to positive: for example, very or extremely uncomfortable, somewhat uncomfortable, neutral, somewhat comfortable, and very or extremely comfortable. For details on specific questions administered on the survey, please refer to [Item S1](#).

Statistical Analysis

Anonymous survey data were coded into Microsoft Excel (Office 365, Microsoft Corporation). All descriptive statistics presented were analyzed using Microsoft Excel. Responses to each survey question were described by either percentages or proportions.

RESULTS

Demographics

We mailed this survey to 723 individuals beginning in April 2020 and accepted responses until October 2020. A total of 208 responses were received, representing a response rate of 28.7%. Table 1 lists the characteristics of respondents. Among respondents, 121 (58.1%) were male and 87 (41.8%) were female. Only 2 responses came from residents. The majority of respondents (n=137; 65.8%) had been practicing over 10 years, with 87 (41.3%) having been practicing for over 15 years. Approximately half of respondents (n=116; 55.7%) maintain only an

academic practice, with 53 respondents (25.4%) practicing in the community and 38 respondents (18.2%) practicing in both settings. The majority of respondents (n=159; 75.9%) reported committing either none of their professional time or less than 25% of their professional time to research.

Cannabis Prescription

Only 21 respondents (10.1%) reported currently prescribing cannabis, whereas 2 participants (0.96%) did not register a response, and the remainder (n=185; 88.9%) reported not currently prescribe cannabis. Of those prescribing cannabis, 18 respondents (85.7%) had only been doing so for less than 5 years. The most frequently cited indications for cannabis prescription were (in order) chronic pain syndromes, cachexia, and nausea or vomiting (Fig 1).

The majority of respondents (n=178; 84.1%) indicated that they are very uncomfortable or somewhat uncomfortable with prescribing cannabis. Half of respondents (n=105; 50.4%) indicated that they felt somewhat or very

Table 1. Characteristics of the Survey Respondents by Cannabis Prescribing Status

Demographics	All (N=208)	Prescribers (n=21)	Nonprescribers (n=185)
Gender			
Male	121 (58.1%)	15 (71.4%)	105 (56.8%)
Female	87 (41.8%)	6 (23.8%)	80 (43.2%)
Training level			
Staff Physician	206 (99%)	21 (100%)	183 (98.9%)
Fellow or Resident	2 (1%)	0 (0%)	1 (0.5%)
Number of years in practice			
0-5 years	29 (13.9%)	3 (14.3%)	26 (14.1%)
6-10 years	42 (20.1%)	2 (9.5%)	39 (21.1%)
11-15 years	50 (24.0%)	2 (9.5%)	48 (25.9%)
16+ years	87 (41.8%)	14 (66.7%)	72 (38.9%)
Location of practice			
Academic	116 (55.7%)	8 (38.1%)	108 (58.4%)
Community	53 (25.4%)	8 (38.1%)	45 (24.3%)
Both academic and community	38 (18.2%)	5 (23.8%)	31 (16.8%)
Professional research time			
No research	69 (33.1%)	6 (28.6%)	63 (34.1%)
<25% of my time	90 (43.2%)	11 (52.4%)	77 (41.6%)
25%-50% of my time	27 (12.9%)	4 (19.0%)	23 (12.4%)
50%-75% of my time	20 (9.6%)	0 (0%)	20 (10.8%)
>75% of my time	2 (1.0%)	0 (0%)	2 (1.1%)
Involvement in medical education			
Both undergraduate and postgraduate medical education	133 (63.9%)	10 (47.6%)	122 (65.9%)
Postgraduate medical education	39 (18.7%)	5 (23.8%)	34 (18.4%)
Not involved in medical education	24 (11.5%)	4 (19.0%)	19 (10.3%)
Undergraduate medical education	12 (5.7%)	2 (9.5%)	10 (5.4%)
Clinical expertise			
General nephrology	169 (81.2%)	16 (76.2%)	151 (81.6%)
Predialysis chronic kidney disease	146 (70.1%)	17 (81.0%)	126 (68.1%)
Facility-based hemodialysis	134 (64.4%)	17 (81.0%)	115 (62.2%)
Home peritoneal dialysis	101 (48.5%)	11 (52.4%)	87 (47.0%)
Transplant nephrology	49 (23.5%)	11 (52.4%)	39 (21.1%)

Note: Two respondents did not indicate their prescribing status; therefore, not all data are captured in the prescriber and nonprescriber categories. As a result, the totals in the "prescriber" and "nonprescriber" columns do not always sum to the total in the "all" column.

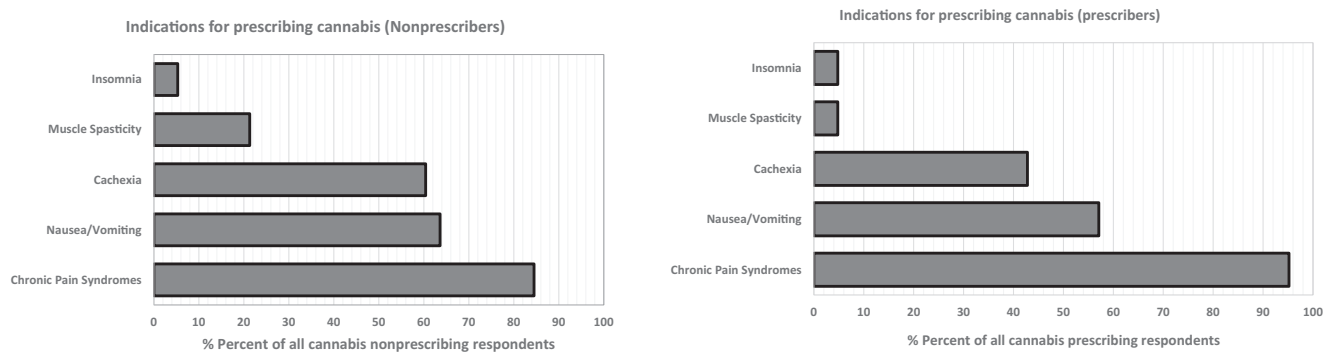


Figure 1. Most frequently cited indications for prescribing cannabis.

uncomfortable with managing complex pain syndromes in patients with CKD. However, only 33 respondents (15.8%) indicated that they were somewhat or very uncomfortable with caring for patients who use cannabis. Regardless of current prescribing patterns, 193 respondents (92.7%) indicated that they felt more comfortable deferring counseling and prescribing of cannabis to professionals with more clinical experience with its prescription.

Prescribing Attitudes

Of those not currently prescribing cannabis, the most frequently identified reasons for not prescribing were (in order) a lack of familiarity with the pharmacokinetics of cannabis, a lack of reliable pharmaceutical formulations, a lack of adequate efficacy data, and concerns regarding safety and adverse events (Fig 2). Of those indicating not currently prescribing cannabis (n=185; 88.9%), the most frequently cited indications for possibly prescribing cannabis were chronic pain syndromes (n=161; 87.0%), nausea or vomiting (n=121; 65.4%), and cachexia (n=115; 62.1%; Fig 1). Of all respondents, 116 (55.7%) reported that wide-scale legalization of cannabis in Canada had not influenced their decision to prescribe.

Overall, 123 respondents (59.1%) indicated that they felt somewhat or extremely uncomfortable with the medical cannabis literature as it pertains to symptom management. Respondents identified patient clinical experience, the medical literature, and other physicians' advice as the factors most likely to increase their likelihood of prescribing (Fig 3). For the majority of prescribing respondents (85.7%), patient clinical experience was the most frequently identified factor that led to an increase in their likelihood of prescribing. In addition, the potential for adverse events, including mental illness (n=156; 75%), cognitive side effects (n=167; 80.2%), addictions (n=103; 49.5%), and gastrointestinal symptoms (n=118; 56.7%), was identified as a factor that might somewhat or extremely decrease their likelihood of prescribing cannabis amongst both prescribers and nonprescribers (Fig 4). However, 81 respondents (38.9%) reported that adverse reactions in their patients had not changed their likelihood of prescribing cannabis, and a similar number (n=79; 37.9%) of respondents reported that they had not had any patients report adverse reactions related to cannabis use (Fig 5). Most respondents (n=138; 66.3%) felt that cannabis may have significant benefits for

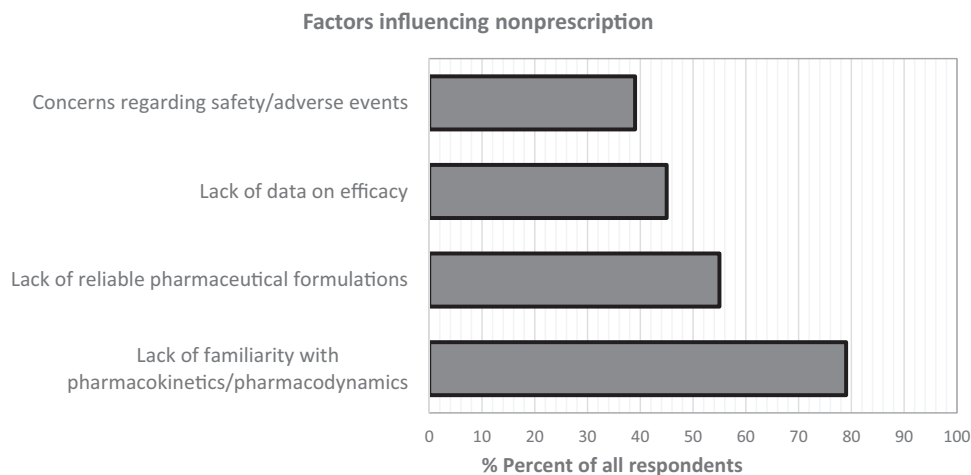


Figure 2. Factors influencing nonprescription of cannabis amongst nonprescribers.

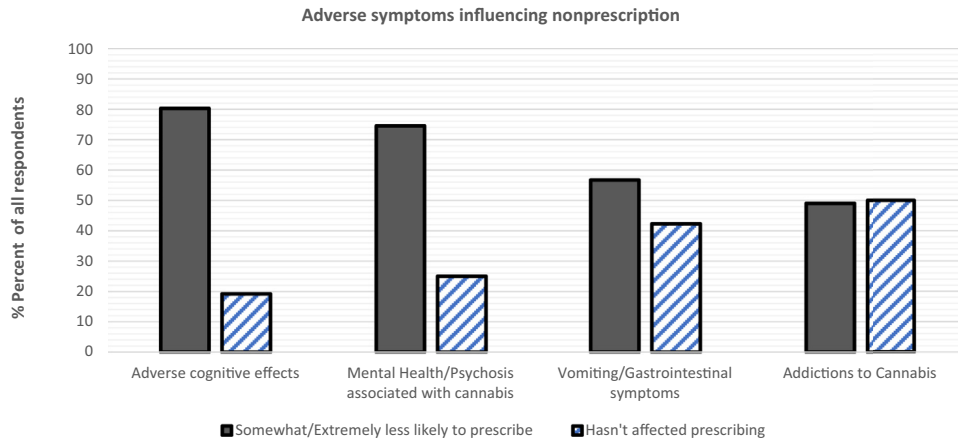


Figure 3. Factors affecting prescribing of cannabis for both prescribers and nonprescribers. Abbreviation: CME, continuing medical education.

specific indications. Overall, 139 respondents (66.8%) somewhat or strongly agreed that nephrologists should become more knowledgeable with use and prescription of cannabis, whilst 182 respondents (87%) somewhat or strongly agreed that clinical training about medical cannabis should be incorporated into medical education. Of all respondents, 188 (90.3%) reported that further studies exploring the efficacy and safety of cannabis use in patients with CKD might change their prescribing habits in future, whilst 196 respondents (94.2%)

indicated that they would recommend that patients in their practice enroll in future cannabis-related clinical trials for patients with CKD.

Cannabis Use Amongst Patients

Two-thirds of respondents (n=131; 63.4%) reported that at least 1 patient in their practice currently used cannabis, with nearly half of those respondents (n=61; 29.3%) reporting that at least 5 patients in their practice use cannabis.

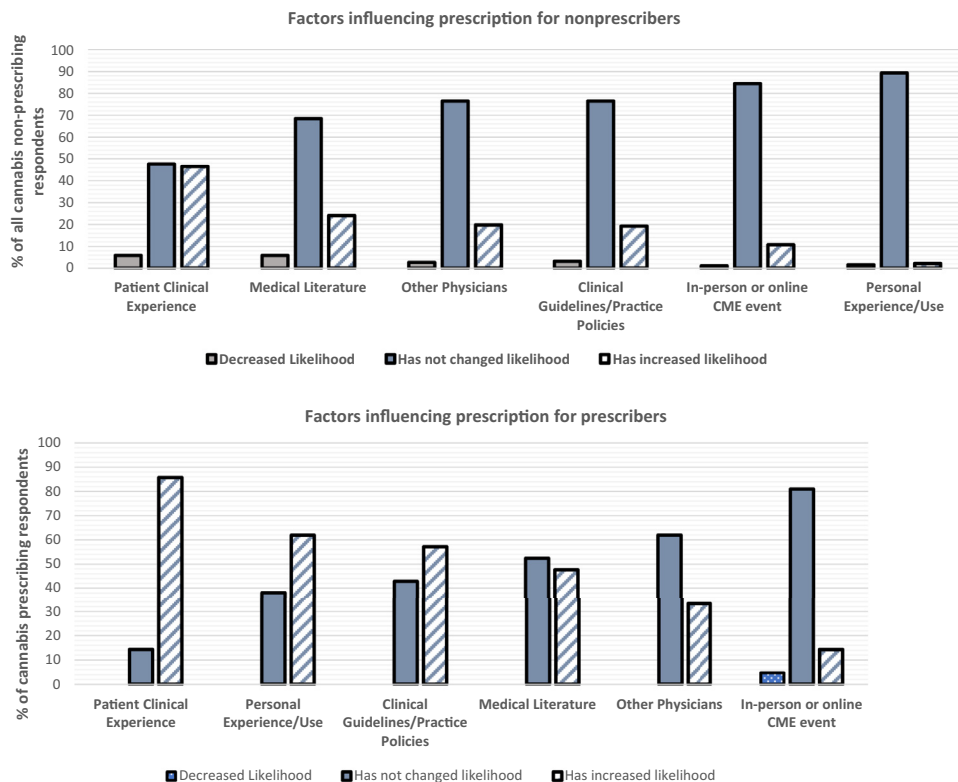


Figure 4. Adverse effects that have influenced likelihood of prescribing cannabis for prescribers and nonprescribers.

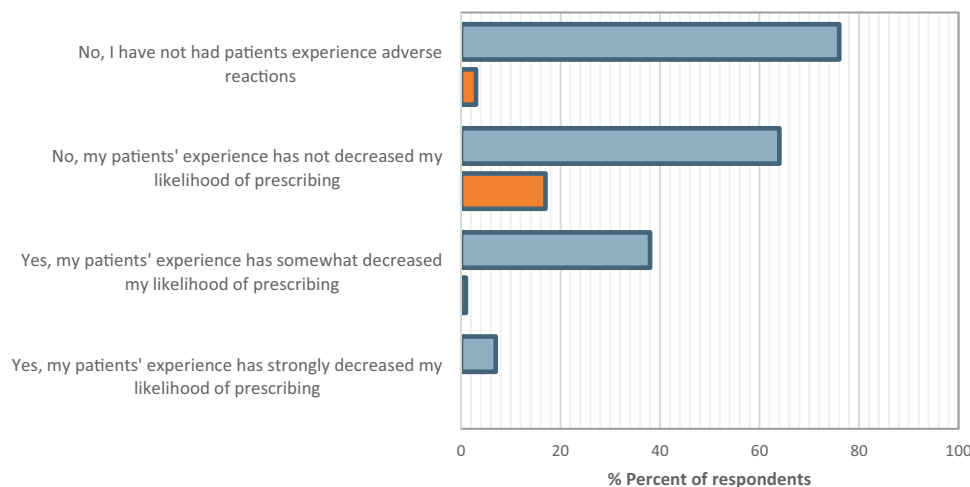


Figure 5. Effect of adverse patient events on likelihood of prescribing cannabis.

Familiarity With Cannabis Pharmacology

Of 21 current cannabis prescribers, 9 respondents (39.1%) reported access to a reliable cannabis distributor with reliable, medical-grade cannabis, and only 3 (14.2%) had a cannabis strain or pharmaceutical formulation that they recommended to patients. Amongst all respondents, cannabis oils (n=51; 24.5%) and edibles (n=27; 12.9%) were the predominant methods of cannabis usage endorsed during patient counseling. Only a small minority of respondents recommended vaporization (n=5; 2.4%) or smoking (n=7; 3.3%) as methods of ingestion.

DISCUSSION

In this pan-Canadian survey, we attempted to ascertain the prescribing patterns, knowledge, and attitudes of nephrologists with regards to cannabis in patients with CKD. The results of this survey demonstrate that the overwhelming majority of respondents do not currently prescribe cannabis as part of their routine clinical practice, citing a lack of familiarity with pharmacokinetics and a lack of reliable formulations as factors influencing nonprescription. For the overwhelming majority of prescribing respondents, the patient's clinical experience with cannabis was the factor most identified as increasing their propensity to prescribe cannabis. A majority of respondents had patients in their practice who were either currently being treated with cannabis or who had requested a prescription for cannabis in the past year. Most respondents indicated support for nephrologists becoming more knowledgeable regarding the use and prescription of cannabis for symptom control, and for the incorporation of clinical training about medical cannabis in medical education curricula. Nearly all respondents indicated that further studies exploring the efficacy and safety of cannabis use in patients with CKD may change their likelihood of prescribing cannabis in the future. Similarly, nearly all respondents indicate that if appropriate, they would

recommend their patients enroll in clinical trials evaluating the efficacy and safety of cannabis.

To our knowledge, only 1 other study has attempted to survey practicing nephrologists in an attempt to understand their general practice patterns and attitudes around the use of cannabis.¹⁶ Similarly to this study, only a small minority of respondents in that study had prescribed medical cannabis in their practices. In that study, individual symptoms were identified as independent predictors of the likelihood of prescribing cannabis, with pain, nausea or vomiting, and a lack of appetite being identified as the symptoms most likely to increase a respondent's propensity for prescribing cannabis. This mirrors the results reported in this present study of the most frequent indications for cannabis prescription. Similarly, many respondents of that survey indicated a preference toward referring patients to other health care providers with greater expertise. The most frequently identified reasons for nonprescription were a lack of evidence with regards to efficacy and safety outcomes and unfamiliarity with dosing, as well as concerns of adverse patient outcomes, in keeping with the results of this survey. Other prior studies exploring health provider attitudes towards cannabis prescriptions have similarly identified that only a minority of providers routinely prescribe cannabis.^{12,13,17} However, many of these surveys were performed in jurisdictions where there remain legal restrictions around cannabis use.

There are several aspects of this present study that make it unique within the literature. To our knowledge, this is the first study that systematically surveyed all registered practicing nephrologists in Canada about their varied patterns of practice and attitudes regarding cannabis. The prior Canadian study of this topic focused on surveying members of the Canadian Society of Nephrology, an organization to which many Canadian nephrologists (particularly nonacademic nephrologists) are not registered members, and our sample was enriched with nonacademic, practicing nephrologists. This present

survey also had a focus of exploring factors that may influence the likelihood of prescribing cannabis. Specifically, this survey sought to explore the effects of legalization, as well as patient- and physician-specific experiences that might influence the likelihood of prescribing cannabis. Furthermore, this survey also explored the specific practices of physicians who are currently prescribing cannabis, including familiarity and comfort with specific pharmacologic formulations or distributors. Lastly, this survey also explored nephrologists' awareness about cannabis use in their patients.

Several important themes are apparent in these results, which we believe have clinical, educational, and academic implications. Firstly, most Canadian nephrologists do not currently prescribe cannabis, and its recent legalization for recreational use has not changed prescribing habits for most providers. Furthermore, the majority of respondents to this survey indicated support for increased integration of education regarding cannabis in both nephrology and the wider medical education curriculum. Lastly, the overwhelming majority of respondents indicated that future investigations into the efficacy and safety of cannabis use in patients with CKD may change their current patterns of practice, and a majority of respondents would recommend their patients enroll in such studies.

The use of cannabis has been established for several indications, including chronic pain, nausea or vomiting, and insomnia. Furthermore, cannabis has been shown to be an effective opioid-sparing agent, with the ability to reduce opioid overdoses.¹⁸⁻²⁰ This is particularly important in patients with CKD, where opioid use has been associated with increased risks of death, hospitalization, and dialysis discontinuation.²¹ Several systematic reviews have examined the evidence for cannabis use for various indications.^{1,22,23} Although these reviews demonstrated that cannabis use led to a mild to moderate reduction in chronic pain, all of the randomized controlled trials in these meta-analyses excluded patients with chronic kidney failure and earlier stages of CKD. The 1 indication identified whereby evidence exists in the chronic kidney failure population is in uremic pruritus. A small study of patients on hemodialysis (n=21) demonstrated significant symptom improvement when treated with topical cannabinoids, with 31% of patients reporting resolution of pruritus and 81% of patients reporting resolution in xerosis.²⁴ Beyond this, evidence for cannabis use for symptom control exists primarily outside of the CKD population.^{2,25}

From a patient perspective, there is significant interest in enrolling in prospective trials focused on assessing the efficacy and safety of cannabis for control of symptoms. In 1 study of patients with chronic pain in the United States, there was near universal willingness (85% of respondents) amongst respondents to be involved in trials focused on symptom management, with most indicating that they would be willing to be enrolled in such a study for up to 1 year.²⁶

This survey has several notable strengths and limitations. This study attempted to systematically survey all registered practicing nephrologists or nephrology fellows throughout Canada, with a response rate of 29% and with a larger pool of respondents than previous surveys. However, given the potential size of the presumed respondent pool, it is difficult to mitigate nonresponse bias, and this is a significant potential risk in this study. Unfortunately, due to privacy considerations, regional demographics were not collected as part of the survey, limiting our ability to comment on potential regional variations in practice. This survey was primarily focused on nephrologists, as they often provide a significant amount of primary care for patients with CKD; however, these patients often receive concurrent care from other health care providers, including primary care physicians and nurse practitioners who may also address the issue of cannabis prescription over the course of care. This survey also did not explore cannabis considerations in specific kidney disease subpopulations, such as pre- or posttransplant patients. Specifically, concerns about a patient's transplant candidacy, as well as pharmacologic interactions between cannabis and various immunosuppressive medications, such as tacrolimus, were not addressed.²⁷⁻²⁹ This survey was also limited in assessing respondents' preferences for cannabis formulations with varying THC and cannabidiol compositions, as well as specific preferences for various vendors and distributors. However, the results of this survey demonstrate that only a small minority of respondents had established specific practice preferences. Overall, further studies focused on efficacy and safety, as well as the patient experience across the kidney disease continuum, would likely help address many of these questions. This survey reinforces the importance of these future studies. Currently, the Dialysis Symptom Control-Pruritus Outcome Trial (DISCO-POT) Study is recruiting patients to assess the efficacy and safety of nabilone for treating pruritus in dialysis patients.³⁰ Further trials evaluating oral THC or cannabidiol are also planned by the same group.

In summary, despite the legalization of cannabis, only a small minority of Canadian nephrologists routinely prescribe cannabis for symptom control in patients with CKD. However, the overwhelming majority of nephrologists are receptive to changing their practice should further evidence demonstrate both safety and efficacy of cannabis use in this population. The majority of nephrologists expressed a willingness to enroll their patients in such studies. Given the potential benefits of cannabis relative to other current symptom management strategies, the kidney care community should embrace this untapped therapeutic area via further prospective evaluation of cannabis in patients with CKD. If proven efficacious, there is great potential for improving symptom management in a population with a high symptom burden and significant impairments in quality of life.

SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Item S1. Cannabis attitudes and prescription patterns among nephrologists survey.

ARTICLE INFORMATION

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REFERENCES

- Whiting PF, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: a systematic review and meta-analysis. *JAMA*. 2015;313(24):2456-2473.
- Smith LA, Azariah F, Lavender VT, Stoner NS, Bettiol S. Cannabinoids for nausea and vomiting in adults with cancer receiving chemotherapy. *Cochrane Database Syst Rev*. 2015;11(11):CD009464.
- Ho C, Martinusen D, Lo C. A review of cannabis in chronic kidney disease symptom management. *Can J Kidney Health Dis*. 2019;6:2054358119828391.
- Rein JL, Wyatt CM. Marijuana and cannabinoids in ESRD and earlier stages of CKD. *Am J Kidney Dis*. 2018;71(2):267-274.
- Jones RT. Cardiovascular system effects of marijuana. *J Clin Pharmacol*. 2002;42(suppl 1):58S-63S.
- Wu J, Ginsberg JS, Zhan M, et al. Chronic pain and analgesic use in CKD: implications for patient safety. *Clin J Am Soc Nephrol*. 2015;10(3):435-442.
- Asghari MR, Asghari F, Ghods AA, Ghorbani R, Hoshmand Motlagh N, Rahaei F. Incidence and severity of nausea and vomiting in a group of maintenance hemodialysis patients. *J Ren Inj Prev*. 2017;6(1):49-55.
- Davison SN, Davison JS. Is there a legitimate role for the therapeutic use of cannabinoids for symptom management in chronic kidney disease? *J Pain Symptom Manage*. 2011;41(4):768-778.
- Bundy JD, Bazzano LA, Xie D, et al. Self-reported tobacco, alcohol, and illicit drug use and progression of chronic kidney disease. *Clin J Am Soc Nephrol*. 2018;13(7):993-1001.
- Johnson JR, Burnell-Nugent M, Lossignol D, Ganae-Motan ED, Potts R, Fallon MT. Multicenter, double-blind, randomized, placebo-controlled, parallel-group study of the efficacy, safety, and tolerability of THC:CBD extract and THC extract in patients with intractable cancer-related pain. *J Pain Symptom Manage*. 2010;39(2):167-179.
- Crépault JF. Cannabis legalization in Canada: reflections on public health and the governance of legal psychoactive substances. *Front Public Health*. 2018;6:220.
- Zylla D, Steele G, Eklund J, Mettner J, Arneson T. Oncology clinicians and the Minnesota Medical Cannabis Program: a survey on medical cannabis practice patterns, barriers to enrollment, and educational needs. *Cannabis Cannabinoid Res*. 2018;3(1):195-202.
- Sideris A, Khan F, Boltunova A, Cuff G, Gharibo C, Doan LV. New York physicians' perspectives and knowledge of the State Medical Marijuana Program. *Cannabis Cannabinoid Res*. 2018;3(1):74-84.
- Takakuwa KM, Shofer FS, Schears RM. The practical knowledge, experience and beliefs of US emergency medicine physicians regarding medical cannabis: a national survey. *Am J Emerg Med*. 2020;38(9):1952-1954.
- Carlini BH, Garrett SB, Carter GT. Medicinal cannabis: a survey among health care providers in Washington state. *Am J Hosp Palliat Care*. 2017;34(1):85-91.
- Collister D, Tennankore K, Davison SN, Wald R, Rabbat C, Walsh M. Nephrologist views regarding cannabinoid use in advanced chronic kidney disease and dialysis: a survey. *J Pain Symptom Manage*. 2021;61(2):237-245.e2.
- Kaplan L, Klein T, Wilson M, Graves J. Knowledge, practices, and attitudes of Washington state health care professionals regarding medical cannabis. *Cannabis Cannabinoid Res*. 2020;5(2):172-182.
- Shi Y. Medical marijuana policies and hospitalizations related to marijuana and opioid pain reliever. *Drug Alcohol Depend*. 2017;173:144-150.
- Bradford AC, Bradford WD. Medical marijuana laws reduce prescription medication use in Medicare Part D. *Health Aff (Millwood)*. 2016;35(7):1230-1236.
- Bachhuber MA, Saloner B, Cunningham CO, Barry CL. Medical cannabis laws and opioid analgesic overdose mortality in the United States, 1999-2010. *JAMA Intern Med*. 2014;174(10):1668-1673.
- Kimmel PL, Fwu CW, Abbott KC, Eggers AW, Kline PP, Eggers PW. Opioid prescription, morbidity, and mortality in United States dialysis patients. *J Am Soc Nephrol*. 2017;28(12):3658-3670.

22. Andrae MH, Carter GM, Shaparin N, et al. Inhaled cannabis for chronic neuropathic pain: a meta-analysis of individual patient data. *J Pain*. 2015;16(12):1221-1232.
23. Nugent SM, Morasco BJ, O'Neil ME, et al. The effects of cannabis among adults with chronic pain and an overview of general harms: a systematic review. *Ann Intern Med*. 2017;167(5):319-331.
24. Szepletowski JC, Szepletowski T, Reich A. Efficacy and tolerance of the cream containing structured physiological lipids with endocannabinoids in the treatment of uremic pruritus: a preliminary study. *Acta Dermatovenerol Croat*. 2005;13(2):97-103.
25. Haney M, Rabkin J, Gunderson E, Foltin RW. Dronabinol and marijuana in HIV(+) marijuana smokers: acute effects on caloric intake and mood. *Psychopharmacology*. 2005;181(1):170-178.
26. Bachhuber MA, Arnsten JH, Starrels JL, Cunningham CO. Willingness to participate in longitudinal research among people with chronic pain who take medical cannabis: a cross-sectional survey. *Cannabis Cannabinoid Res*. 2018;3(1):45-53.
27. Moadel D, Chism K. Medical marijuana-induced tacrolimus toxicity. *Psychosomatics*. 2019;60(6):603-605.
28. Hauser N, Sahai T, Richards R, Roberts T. High on cannabis and calcineurin inhibitors: a word of warning in an era of legalized marijuana. *Case Rep Transplant*. 2016;2016:4028492.
29. Leino AD, Emoto C, Fukuda T, Privitera M, Vinks AA, Alloway RR. Evidence of a clinically significant drug-drug interaction between cannabidiol and tacrolimus. *Am J Transplant*. 2019;19(10):2944-2948.
30. Bangdiwala SI, Britz-Mckibbin Philip, Busse JW, et al. Dialysis Symptom Control-Pruritus Outcome Trial (DISCO-POT). Accessed November 29, 2021. <https://clinicaltrials.gov/ct2/show/NCT05180968>

What is the attitude of Canadian nephrologists toward using cannabis in patients with kidney disease?



METHODS



723 Canadian nephrologists



Nationwide mail-in survey

- ▶ Practice demographics
- ▶ Cannabis prescribing status
- ▶ Knowledge / attitudes on therapeutic cannabis

RESULTS

29% response rate (208/723)

CANNABIS PRESCRIPTION



88.9% Do not prescribe cannabis

10.1% Cannabis prescriber

1.0% No response to question

WHY PRESCRIBE?



Chronic pain syndromes



Cachexia



Nausea or vomiting

WHY NOT PRESCRIBE?



Unfamiliar with pharmacokinetics



Lack of reliable formulations



Lack of adequate efficacy data



Safety and adverse effect concerns

56%

Changes in legality of cannabis did not influence decision to prescribe

59%

Uncomfortable in their knowledge on medical cannabis literature

91%

Further efficacy and safety studies will likely influence prescribing habits

Conclusion: Only a small proportion of Canadian nephrologists currently prescribe cannabis, and there was relatively little practice change after legalization. Given limited therapeutic options available for symptom control in CKD, this survey demonstrates the potential for nationwide practice change if cannabis efficacy and safety can be demonstrated in this population.

Reference: Gitau K, Howe HS, Ginsberg L, et al. Therapeutic cannabis use in kidney disease: a survey of Canadian nephrologists. *Kidney Medicine*, 2022.

Visual Abstract by Carlo Trinidad MD

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