

CANNABIS CONTENT IN PHARMACY EDUCATION IN CANADA
THE PHARMACISTS AS EDUCATORS PROJECT
HUMBER COLLEGE, APPLIED RESEARCH AND INNOVATION

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EXECUTIVE SUMMARY

Since cannabis legalization in 2018, Canadian pharmacists have had the opportunity to play a more active role in assessing and counseling patients on cannabis use. While some studies indicate increased cannabis-related content in pharmacy education (Kruger, Kruger, Bednarczyk, & Prescott, 2021), others reveal that pharmacists and students often lack cannabis knowledge, leading to unpreparedness in counseling and evaluating patients (Hwang, Arneson, & St Peter, 2016). This report explores current cannabis-related content in Canadian pharmacy programs and courses to identify gaps and areas for improvement.

The findings revealed that cannabis content in pharmacy education is highly varied in coverage and depth across a range of programs and courses. While most university programs indicated that they had coverage of cannabis content, it varied in depth. Continuing education courses provided by private organizations or pharmacy associations appear to offer the most comprehensive cannabis education. However, these courses remain optional, except for Ontario, where the Ontario College of Pharmacy requires pharmacists to complete a cannabis education course or equivalent education. The majority of these courses are also fee-based, which may discourage participation. Similar patterns are seen in the U.S., however, state colleges and pharmacy associations provide more specialized cannabis courses than Canadian institutions, and no states currently require cannabis education to practice pharmacy.

The most common cannabis topics taught in courses or programs were medical indications and therapeutic potential; pharmacology of cannabis; patient counseling and education; adverse effects and drug interactions; dosage forms and administration; cannabis laws and regulations; and evidence-based practices. In contrast, the least common topics taught were special populations using cannabis (e.g., pregnant individuals, youth, the elderly, athletes, veterans, those experiencing mental health challenges), perspectives of those with lived experience of cannabis use, harm reduction practices, and non-medical cannabis use (reasons for use, effects, and societal considerations).

The inconsistent nature of cannabis content in pharmacy education underscores the importance of improving cannabis education in pharmacy programs and continuing education courses to ensure students are well-prepared to navigate the evolving landscape of cannabis use, both medically and non-medically. To achieve this goal, pharmacy programs, courses, and provincial organizations could explore the following strategies:

- Incorporating more comprehensive cannabis education into pharmacy school curricula,
- Mandating cannabis training in all provincial jurisdictions, or
- Improving accessibility by eliminating enrollment costs and expanding bilingual course options to encourage participation.

INTRODUCTION

Since the legalization of cannabis in 2018, Canadian pharmacists have had the chance to enhance their role in assessing and counseling patients regarding cannabis use. Whereas some studies indicate an increase in cannabis-related content within pharmacy education (Kruger, Kruger, Bednarczyk, & Prescott, 2021), other findings reveal that pharmacists and pharmacy students often lack extensive knowledge on cannabis, leading to a sense of unreadiness in counseling and assessing patients (Hwang, Arneson, & St Peter, 2016). This report aims to explore and analyze the current state of cannabis-related content in pharmacy programs and continuing education courses in Canada to identify gaps and areas of improvement. The review included a scan of pharmacy schools, accredited courses, associations, and organizations in Canada, alongside relevant literature. A similar review was also conducted for U.S. pharmacy courses. The report concludes with an analysis of findings, highlighting education gaps and common topics.

CANNABIS-RELATED CONTENT IN PHARMACY PROGRAMS IN CANADA

Cannabis-related content varies widely in depth and coverage across Canadian pharmacy schools (refer to Table 1 and Table 2). It is integrated across different academic tiers, including the entry to practice undergraduate PharmD, graduate, and continuing education courses. There are no courses solely dedicated to cannabis, however, some substance use and addiction courses cover cannabis topics. While some mandatory courses have dedicated lectures or modules on cannabis, others briefly mention it within various contexts as part of a larger topic or module (e.g., medication therapy management). Lectures and presentations are the primary modes of content delivery, with some schools offering supplementary online resources like infographics, toolkits, medical cannabis prescription examples, guidelines, and more.

The type of cannabis content varied per course. The most common topics were cannabis pharmacology, medical indications and therapeutic uses, and adverse effects and drug interactions. The least common topics were perspectives of those with lived experience, non-medical use of cannabis, and harm reduction. The least common topics are also commonly found amongst elective courses, meaning that many students will not receive exposure to these subjects. For example, harm reduction is most often covered in elective or continuing education courses.

Table 1. Cannabis Content in Canadian Pharmacy Programs* -

School	Program	Course	Format	Topics Covered
University of British Columbia	PharmD	N/A	N/A	<ul style="list-style-type: none"> No cannabis content
University of Alberta	PharmD	Intro to Pharmacology 1 (Year 1, required course)	Lecture	<ul style="list-style-type: none"> Pharmacology of cannabis
		Pharmacotherapy 5 (Year 2, required course)	Lecture	<ul style="list-style-type: none"> Medical indications and therapeutic potential (topic of discussion in nausea and vomiting)
		Toxicology, Drug Abuse, and Pharmacology (Year 3, required course)	Lecture	<ul style="list-style-type: none"> Cannabis use disorder Harm reduction
		Pharmacotherapy 6 (Year 3, required course)	Lecture	<ul style="list-style-type: none"> Medical indications and therapeutic potential (topic of discussion in musculoskeletal conditions)
		Pharmacotherapy 7 (Year 3, required course)	Lecture	<ul style="list-style-type: none"> Medical indications and therapeutic potential (topic of discussion in cancer supportive care)
		Pharmacotherapy 8 (Year 3, required course)	Lecture	<ul style="list-style-type: none"> Medical indications and therapeutic potential (topic of discussion in cannabinoids and endocannabinoid system)
University of Saskatchewan	PharmD	Pharmacology and Physiology II (year 1, required course)	Lecture	<ul style="list-style-type: none"> Pharmacology of cannabis (1hr)
		Pharmacotherapy (year 3, required course)	Lecture	<p>Four hours of content covering:</p> <ul style="list-style-type: none"> Cannabis laws and regulations History and epidemiology of cannabis Pharmacology of cannabis Non-medical use of cannabis
University of Manitoba	PharmD	Clinical Therapeutics 2 (year 2, required course)	Lecture	<ul style="list-style-type: none"> Medical indications and therapeutic potential (topic of discussion in anxiety and insomnia)
		Clinical Therapeutics 3 (year 3, required course)	Lecture	<ul style="list-style-type: none"> Medical indications and therapeutic potential (topic of discussion in neuropathic pain and schizophrenia)
		Toxicology of Medications and Drugs of Abuse (year 3, required course)	Lecture	<p>One lecture covering the following topics:</p> <ul style="list-style-type: none"> Adverse effects and drug interactions Cannabis laws and regulations Dosage forms and administration History and epidemiology of cannabis Medical indications and therapeutic potential Pharmacology of cannabis Non-medical use of cannabis

Waterloo University	PharmD	Substance Abuse and Chemical Dependency (year 3, elective course)	Lecture	Cannabis content is covered as needed in course; topics may include: <ul style="list-style-type: none"> • Cannabis use disorder • Patient counseling and education • Pharmacology of cannabis
	MPharm	Substance Use in Primary and Community Care (elective course)	Lecture	Cannabis content is covered as needed in course; topics may include: <ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis use disorder • Patient counseling and education • Pharmacology of cannabis
University of Toronto	PharmD	Neuropsychiatry (year 3, required course)	Lecture	Cannabis content is combined with tobacco/nicotine use disorder as part of a two-hour lecture and a three-hour workshop. Topics include: <ul style="list-style-type: none"> • Cannabis use disorder • Harm reduction • Patient counseling and education • patient monitoring and management • Pharmacology of cannabis
		Mental Health and Addictions (year 3, elective course)	Lecture	Two-hour lecture on cannabis with approximately 100 students per class <ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis legalization • Cannabis use disorder • Evidence-based practices • Harm reduction • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis • Pharmacology of cannabis • Non-medical use of cannabis
University of Ottawa**	PharmD	N/A	N/A	Unknown.
Université de Montréal	PharmD	N/A	N/A	Unknown.

Université Laval	PharmD	Nervous System Drugs II (year 2, required course)	Lecture/Lab	One module on cannabis and the following topics: <ul style="list-style-type: none"> • Adverse effects and drug interactions • Dosage forms and administration • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis
Dalhousie University	PharmD	Special Considerations in Pharmacotherapeutics: Substance Use Disorders (year 2, required course)	Lecture	<ul style="list-style-type: none"> • Ethical and legal considerations • Patient counseling and education • Patient substance use assessment and management • Perspectives of those with lived experience of substance use • Pharmacotherapeutics
Memorial University of Newfoundland	PharmD	Pharmacotherapy III (year 3, required course)	Lecture	Topics covered in chronic pain section of course: <ul style="list-style-type: none"> • Adverse reactions and drug interactions • Dosage forms and administration • Evidence-based practices • Medical indications and therapeutic potential
		Pharmacology III (year 4, required course)	Lecture	<ul style="list-style-type: none"> • Pharmacology of cannabis
		Pharmacotherapy V (year 4, required course)	Lecture	<ul style="list-style-type: none"> • Cannabis harm reduction • Cannabis use disorder

* The reported information might not fully reflect current realities due to course revisions, different instructors, and incomplete responses.

** Due to the program's recent establishment in 2023, it remains uncertain if the program incorporates cannabis content.

Table 2. Cannabis Content in Continuing Education Courses offered by Canadian Schools of Pharmacy -

School	Program	Format	Hours	Topics Covered
University of British Columbia	Cannabis Education for Health Care Providers Course	Online module	1.5 hours	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Cannabis use disorder • Dosage forms and administration • Evidence-based practices • Medical indications and therapeutic potential • Patient counseling and education

				<ul style="list-style-type: none"> • Pharmacology of cannabis • Non-medical use of cannabis
	Cannabis in Primary Care Webinar	Live webinar (one-time event)	Unknown	<ul style="list-style-type: none"> • Cannabis pharmacotherapy • Medical cannabis prescriptions • Safety and harm reduction
Memorial University of Newfoundland	Working Professional PharmD	Part-time hybrid program	55 credit hours	<p>Cannabis topics covered in a module on chronic pain in Pharmaceutical Care III:</p> <ul style="list-style-type: none"> • Adverse reactions and drug interactions • Dosage forms and administration • Evidence-based practices • Medical indications and therapeutic potential
Memorial University of Newfoundland	Seminar on Medical Cannabis (for pharmacists and healthcare providers)	Live Webinar (one-time event)	2 hours	<p>Presentations on cannabis that cover the following topics:</p> <ul style="list-style-type: none"> • Adverse effects and drug interactions • Barriers to accessing medical cannabis • Cannabis use disorder • Dosage forms and administration • Evidence-based practices • Harm reduction • Medical indications and therapeutic potential • Patient counseling and education • patient monitoring and management • Pharmacology of cannabis
University of British Columbia	Cannabis Education for Health Care Providers Course	Online module	1.5 hours	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Cannabis use disorder • Dosage forms and administration • Evidence-based practices • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis • Non-medical use of cannabis
	Cannabis in Primary Care Webinar	Live webinar (one-time event)	Unknown	<ul style="list-style-type: none"> • Cannabis pharmacotherapy • Medical cannabis prescriptions • Safety and harm reduction

CANADIAN PHARMACY ASSOCIATIONS, ORGANIZATIONS, AND REGULATORY COLLEGES

The Canadian Council on Continuing Education in Pharmacy (CCCEP):

The Canadian Council on Continuing Education in Pharmacy (CCCEP) is a nationwide body tasked with accrediting ongoing pharmacy education programs intended for pharmacy professionals. These courses are accessible to pharmacists across the country and align with the cannabis education prerequisites established by the Ontario College of Pharmacy. Cannabis courses approved by the CCCEP conform to three key competencies outlined by the Council: ethical, legal, and professional responsibilities; cannabis and patient care; and cannabis knowledge and research applications. As CCCEP courses are required to adhere to these three competencies, the covered topics in each course are very similar. However, some courses delve into less common topics, including cannabis use within specific populations and harm reduction (refer to Table 3 for an overview of course topics). Notably, only one course is offered in French, which may limit accessibility for French Canadians.

It is important to note that most CCCEP cannabis courses are set to expire by the end of 2023. While one course is confirmed to be undergoing renewal, the status of others remains uncertain. Some previously accredited courses won't be renewed due to factors such as maintenance costs and decreased demand, likely due to most pharmacists having fulfilled the requirement.

Table 3. Cannabis Courses with CCCEP Accreditation -

Provider	Program Name	Cost	CEUs	Expiration (D/M/Y)	Topics Covered
Concinto Inc.	Medical Cannabis Core Education Program (MCCEP) Certificate in Cannabis and Patient Care in Pharmacy	\$399	10 CEUs	21/09/23	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Dosage forms and administration • Ethical considerations • Evidence-based practices • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis
TCN Academy	Cannabis and Patient Care for Pharmacists (offered in English and French)	\$95	4 CEUs	11/07/23	<ul style="list-style-type: none"> • Cannabis laws and regulations • Dosage forms and administration • Evidence-based practices • History and epidemiology of cannabis • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis

Waterloo University	Recreational and Medicinal Cannabis for Clinicians	\$35.40	4.5 CEUs	2/10/23 (in process of renewal)	<ul style="list-style-type: none">• Adverse effects and drug interactions• Cannabis harm reduction• Cannabis laws and regulations• Cannabis use disorder• Dosage forms and administration• Ethical considerations• Evidence-based practices• History and epidemiology of cannabis• Medical indications and therapeutic potential• Patient counseling and education• Pharmacology of cannabis• Non-medical use of cannabis• Special Populations
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Pharmacy Associations and Organizations:

A scan of pharmacy associations and organizations reveals that only a few provide resources or non-CCCEP-accredited courses on cannabis. The Canadian Society of Hospital Pharmacists offers a [best practices document](#) for cannabis hospital patients that provides information and guidance on patient counselling, assessment and education, adverse effects and drug interactions, harm reduction, ethical considerations, and evidence-based practices.

The Ontario Pharmacist Association also offers cannabis resources, such as a brief guide on counselling patients on the use of cannabis for both [medical](#) and [non-medical](#) purposes, and a [logbook](#) to give to patients to track use, symptoms, side effects, and more. An online [CBD course](#) is available, delving into topics such as CBD pharmacology, medical applications, administration methods, adverse effects, drug interactions, and evidence-based practices. Similarly, the British Columbia Pharmacy Association offers a non-CCCEP-accredited course on cannabis dosing and administration, however, the details of the program are unknown.

Regulatory Colleges of Pharmacy:

Regulatory colleges of pharmacy are established in every province and territory across Canada, serving as overseers of pharmacy practice within their respective jurisdictions. Their responsibilities include pharmacy licensing, registration, and the establishment of educational and care standards. While none of the regulatory colleges seem to provide cannabis-related courses, a selection of them offer professional resources regarding cannabis on their websites. These resources often consist of documents contextualizing cannabis within the pharmacy field. They include guides detailing the history and epidemiology of cannabis, cannabis laws and regulations, medical applications and therapeutic potentials, adverse effects and drug interactions, administration methods, ethical considerations, and patient counseling and education. However, these documents tend to be succinct and fall short of the depth seen in full course modules.

Setting itself apart, the Ontario College of Pharmacists (OCP) adopts a distinctive approach to cannabis education, emerging as the solitary province or territory to introduce an all-encompassing [Cannabis Strategy for Pharmacy Practice](#) in 2018. Shaped by the Cannabis Education Advisory Group, the Strategy focuses on four key priorities: cannabis competency development, patient data management, patient care and counselling, and harm prevention. The OCP also instituted a mandate stipulating that all Ontario Pharmacists must successfully complete an approved cannabis and patient care course or engage in a program designed with a curriculum that adequately addresses essential competencies. These courses must be approved by the Canadian Council on Continuing Education in Pharmacy (CCCEP).

Other Cannabis Courses and Professional Resources:

In addition to the learning resources above, private organizations offer non-CCCEP-accredited cannabis-related courses and learning tools tailored for healthcare providers. The Michener Institute, Pear Health Care Solutions, and Centre for Addictions and Mental Health are among the providers offering these courses. While topics are similar to those in pharmacy school programs, the content's scope and depth can differ based on the specific course (refer to Table 4 for details).

Pharmacy 5in5, an innovative initiative by the School of Pharmacy at Waterloo University, presents a distinctive approach. It provides concise "mini" courses and quizzes, including ones centered on cannabis, well-suited for the busy schedules of pharmacists and pharmacy students. Covering common cannabis subjects in pharmacy, these courses also incorporate vital harm reduction information.

Other professional resources are also available to aid pharmacists and healthcare professionals. These resources include online documents and guides supplied by the [Government of Canada](#) and the [Centre for Effective Practice \(CEP\)](#). These resources include information and guidance on cannabis laws and regulations, patient counseling and education, evidence-based practices, and more.

Table 4. Other Cannabis Courses and Professional Resources -

Provider	Type	Title	Cost	CEUs/Hours	Audience	Topics Covered:
Michener Institute	Course	Cannabis Educator Certificate Program	\$999	12-week course, 3-4 hours weekly	Healthcare professionals	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Dosage forms and administration • History and epidemiology of cannabis • Medical indications and therapeutic potential • Pharmacology of cannabis
Centre for Addiction and Mental Health	Course	Addressing Cannabis Use in Primary Care	\$425	10.5 CEUs	Healthcare professionals	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis harm reduction • Cannabis laws and regulations • Evidence-based practices • Medical indications and therapeutic potential • Patient counseling and education • Non-medical use of cannabis
Pharmacy 5in5	Module	Cannabis 101	Free	<1 hour	Pharmacists, students	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis harm reduction • Dosage forms and administration • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis
	Module	Cannabis Edibles 101	Free	<1 hour	Pharmacists, students	<ul style="list-style-type: none"> • Cannabis harm reduction • Cannabis laws and regulations • Patient counseling and education • Pharmacology of cannabis
Government of Canada	Online resources	Various documents	Free	N/A	Healthcare professionals	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Cannabis use disorder • Dosage forms and administration

						<ul style="list-style-type: none">• Evidence-based practices• Medical indications and therapeutic potential• Pharmacology of cannabis
Centre for Effective Practice	Online resource	Non-Medical Cannabis Resource Tool	Free	N/A	Healthcare professionals	<ul style="list-style-type: none">• Adverse effects and drug interactions• Medical indications and therapeutic potential• Patient counseling and education

CANNABIS EDUCATION IN THE UNITED STATES

A brief review of pharmacy education courses in the U.S. was conducted to assess the status of cannabis education. This review included continuing education courses offered by national, private, and state organizations, with a particular focus on three states where both medical and non-medical cannabis are legal: California, Colorado, and Washington. When comparing educational resources provided by pharmacy regulatory bodies and associations in Canada, it becomes apparent that the United States offers a more extensive range of courses dedicated to cannabis topics within the pharmacy field. Several of these courses have received accreditation from the Accreditation Council for Pharmacy Education (ACPE), as detailed in Table 5. Based on the current review, it appears that no U.S. state mandates pharmacists to complete a course specifically focused on cannabis. Many private organizations in the U.S. also offer a variety of pharmacy cannabis courses, some of which are accredited by the ACPE.

In comparison to Canadian course offerings, many similarities emerge. These courses predominantly cover subjects related to medical applications, therapeutic potentials, pharmacology, legal considerations, regulations, adverse effects, administration methods, patient education, and counseling, among other areas. Topics less frequently covered include non-medical cannabis use, harm reduction strategies, and at-risk populations. It's important to mention that this overview is brief, and some courses could include more extensive content not covered here.

Table 5. Cannabis Courses offered by Pharmacy Associations and Organizations in the U.S. -

Provider	Resource	Title	Accreditation	CEUs/Hours	Cost	Topics Covered:
American Pharmacists Association	Continuing Education Course	Keep Up! Cannabis	N/A	0.5 hours	\$15	<ul style="list-style-type: none"> • Dosage forms and administration • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis • Non-medical use of cannabis
		To CBD or Not to CBD? The Research of the Uses, Benefits, and Risks of CBD Oil: What Pharmacists Need to Know	ACPE	2 hours	\$25	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Dosage forms and administration • Medical indications and therapeutic potential • Pharmacology of cannabis
	Live webinar (one-time event)	Addressing CBD Usage During COVID-19 Pandemic	N/A	1 hour	Free	<ul style="list-style-type: none"> • Medical indications and therapeutic potential • Patient counseling and education
American Association of Colleges of Pharmacies	Live webinar (one-time event)	Teaching Medical Cannabis in Pharmacy Curricula	ACPE	1 hour	Free	<ul style="list-style-type: none"> • Medical indications and therapeutic potential • Pharmacology of cannabis
National Community	Course	NCPA CBD Source	N/A	Unknown	Unknown	<ul style="list-style-type: none"> • Adverse effects and drug interactions

Pharmacists Association						<ul style="list-style-type: none"> • Cannabis laws and regulations • Patient counseling and education • Pharmacology of cannabis
California Pharmacists Association	Continuing Education Presentation	Cannabis Use & Distribution – Legal Implications for a Pharmacist	ACPE	1.25 hours	\$99	<ul style="list-style-type: none"> • Cannabis laws and regulations
Washington State Pharmacy Association	Continuing Education Course	Medical Cannabis Education Medical Cannabis: Best Practices	N/A N/A	Unknown Unknown	Unknown Unknown	<ul style="list-style-type: none"> • Information unavailable • Information unavailable
TRC Healthcare	Continuing Education Course	RxAdvanced: Guide to Cannabis	ACPE	16 hours	\$199	<ul style="list-style-type: none"> • Adverse effects and drug interactions (e.g., mental health) • At-risk populations • Cannabis laws and regulations • Dosage forms and administration • Medical indications and therapeutic potential (e.g., epilepsy, sleep disorders, migraine, multiple sclerosis) • Patient counseling and education • Pharmacology of cannabis
Freece	Continuing Education Course	Cannabis Specialty Pharmacist	ACPE	6 hours	\$257	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Dosage forms and administration • History and epidemiology of cannabis • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis
Biologix	Continuing Education Course	Pharmacists’ Role in Cannabis Dispensing and Counseling	ACPE	3 hours	\$20	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Dosage forms and administration • History and epidemiology of cannabis • Medical indications and therapeutic potential • Non-medical cannabis use • Patient counseling and education • Pharmacology of cannabis

A brief scan of select pharmacy schools in the U.S. was also conducted. Recognizing the considerable number of pharmacy programs nationwide (approximately 144), a comprehensive review of all programs was beyond the scope of this report. Due to this limitation, this examination includes a small sample of programs from the University of Southern California, the University of California San Diego, and the University of Colorado Denver (refer to the Appendix for program details). While our scan provides only a snapshot, it suggests that U.S. pharmacy programs offer a greater number of courses exclusively focused on cannabis within their curricula when compared to Canadian pharmacy programs. However, many of these courses typically fall under the elective category. Notably, the University of Colorado Denver stands out for offering a unique Master of Science in Pharmaceuticals program, featuring a specialized track centered on cannabis medicine and science.

To supplement this brief review, findings from two comprehensive studies on cannabis-related content in U.S. pharmacy schools were examined. In one study conducted by Smithburger, Zemaitis, and Meyer (2019), out of 49% of schools that responded to the survey, 62% reported including medical cannabis content within their curriculum. In a more recent study, researchers surveyed pharmacy schools across the country and found that cannabis content is becoming more common, however, it often lacks comprehensiveness (Kruger Kruger, Bednarczyk, & Prescott, 2021). Among the responding colleges (67% of those surveyed), the majority (85%) incorporated cannabis-related content into their curriculum, either as part of a required course (53%), an elective course (66%), or a combination of both (33%) (Kruger Kruger et al., 2021). Interestingly, 17% of programs offered an elective course dedicated exclusively to medical cannabis content, providing the most extensive cannabis education (Kruger Kruger et al., 2021).

ANALYSIS

An examination of the data collected reveals key themes, including content availability and depth, common cannabis topics taught in pharmacy schools, and the need for enhanced cannabis education in pharmacy courses or programs. Some of these observations are consistent with findings from existing studies on cannabis education within pharmacy curricula.

Cannabis Content Availability, Coverage and Depth:

Cannabis content in pharmacy education is highly varied in coverage and depth across a range of programs and courses. While the majority of university pharmacy programs include some level of cannabis coverage, the extent of this coverage varies considerably. Certain courses allocate specific lectures or modules to cannabis, while others briefly touch upon cannabis within the context of broader pharmacy subjects.

Canadian pharmacy courses that discussed cannabis were typically offered in years 2 to 4 and usually have a lecture-based format. These findings closely align with a previous study examining cannabis content in Canadian undergraduate pharmacy programs (Tang, Schwarz, Lok, & Wilbur, 2020). Due to the prevalence of lecture-based education, the researchers of this study emphasized the importance of practical training to enable pharmacy students to apply their knowledge and enhance their learning experience (2019). Limited resources are accessible from Canadian pharmacy organizations and associations. Although a few organizations offer online resources for pharmacists,

only two seem to offer courses on cannabis. However, these courses appear to be less comprehensive, concentrating solely on specific subjects like CBD, or dosing and administration. In contrast, compared to U.S. pharmacy colleges, it's apparent that pharmacy organizations and associations in the U.S. have a wider array of cannabis courses accessible to pharmacists.

Continuing education courses, including both CCCEP accredited and those offered by private organizations, seem to offer the most comprehensive training in cannabis and pharmacy. Except for Ontario, other provinces and territories do not mandate pharmacists to undergo cannabis training. Consequently, many may miss out on such training, apart from what's covered during their academic studies. Additionally, the accessibility of these courses is limited since the majority are only available in English and require payment. This situation is concerning, given that a recent Canadian study examining the effects of a cannabis education course on students' knowledge and confidence revealed that students who completed an accredited course were more likely to feel well-prepared and knowledgeable when counseling cannabis-using patients (Parihar, Beazely, Katz, Dhimi, & Patterson, 2022). Students' understanding of medical cannabis use and the quality of therapeutic evidence improved as well (2022). Similar to the Canadian context, accredited courses in the U.S. and from private organizations also offer extensive training. However, it appears that no U.S. state mandates cannabis education as a requirement within pharmacy education.

Cannabis-Related Topics in Pharmacy Education:

Throughout various pharmacy education programs, courses, and supplementary learning materials, the covered topics related to cannabis exhibit many similarities. Notably, a clear trend emerges where the majority of resources delve into shared common cannabis subjects yet offer minimal coverage on specific topics. Refer to Table 6 to review the most and least common topics.

Table 6. *The Most and Least Covered Cannabis Topics in Pharmacy Education in Canada and the U.S. -*

Most Common Cannabis Topics	Least Common Cannabis Topics
<ul style="list-style-type: none"> • Medical indications and therapeutic potential • Pharmacology of cannabis • Patient counseling and education • Adverse effects and drug interactions • Dosage forms and administration • Cannabis laws and regulations • Evidence-based practices 	<ul style="list-style-type: none"> • Perspectives of those with lived experience of cannabis use • At-risk or special populations • Harm reduction • Non-medical use of cannabis

The most common cannabis topics closely resemble results from a survey that measured cannabis content within Canadian undergraduate pharmacy programs (Tang, Schwarz, Lok, and Wilbur, 2020). In line with the findings of this report, most programs incorporated cannabis content, with primary subjects including therapeutics and adverse effects, pharmacology, evidence, formulations, counseling, and pharmaceutical roles (2019). Conversely, the least covered topics comprised societal effects, regulation and access, substance abuse, non-medical use, mental health implications, and pharmacoeconomics. These findings also bear resemblance to U.S. studies investigating cannabis topics within pharmacy programs (Smithburger, Zemaitis, & Meyer, 2019).

The Need for Enhanced Cannabis Education for Pharmacists:

The information in this report highlights gaps in cannabis education for pharmacists, resulting in limited accessibility and depth of cannabis-related content in pharmacy courses. While elective or continuing education courses offer more comprehensive coverage, mandatory cannabis training is currently only implemented in Ontario. Moreover, these courses are often fee-based and are predominately offered in English. These limitations highlight the pressing need for more comprehensive and accessible cannabis training in pharmacy programs and continuing education.

This necessity is underscored by studies conducted in both the U.S. and Canada, revealing that pharmacy students lack the necessary knowledge and feel inadequately prepared to engage in discussions and provide counsel to patients using cannabis for medical or non-medical purposes (Abazia & Bridgeman, 2018; Hwang, Arneson, & St Peter, 2016). For example, a survey evaluating the cannabis knowledge of pharmacy students in Ohio revealed that students obtained average scores of approximately 50-60% on knowledge-based questions (Berlekamp, Rao, Patton, & Berner, 2019). Students further noted a lack of cannabis-related education within their curriculum and expressed a clear interest in receiving more comprehensive training on medical cannabis (2019).

In addition to the necessity for comprehensive, accessible, and mandatory training, cannabis education should expand its focus to include less common topics subjects, such as cannabis harm reduction, non-medical use, and considerations for vulnerable or special populations (e.g., pregnant individuals, youth, the elderly, athletes, veterans, those experiencing mental health challenges). While it remains crucial to cover conventional cannabis topics, active steps should be taken to integrate these subjects into the curriculum. Gaining a grasp of these concepts and patient considerations can substantially enhance overall patient care and assessment. By tailoring interventions to individual needs, potential harms tied to cannabis use may be mitigated effectively.

CONCLUSION

This report reviewed cannabis education available in Canadian pharmacy schools, accredited courses, pharmacy associations, organizations, and private entities, extending to the United States and relevant literature. Within Canada, the landscape of cannabis education in pharmacy schools showcased varying coverage and depth across academic levels. While accredited courses provided comprehensive cannabis education, they predominantly remained optional, except in Ontario. Moreover, private institutions offered alternative courses, with limited representation from nationwide pharmacy associations.

Prominent cannabis topics included medical applications, pharmacology, and patient counseling. In contrast, areas like harm reduction, special populations, and perspectives from those with lived cannabis experiences received comparatively less attention. A parallel analysis of the U.S. revealed similar findings yet demonstrated a more pronounced integration of cannabis-specific courses within pharmacy education, alongside a broader range of optional courses from associations and private organizations.

In summary, this review emphasizes the need to enhance cannabis education in pharmacy programs and courses to help students navigate the evolving landscape of medical and non-medical cannabis use.

Strategies may involve improving cannabis education, implementing mandatory training across all provinces, or improving accessibility by expanding bilingual course options and eliminating enrollment costs to encourage participation. Ultimately, the goal is to equip pharmacists with the knowledge to offer informed guidance, ensuring patients' well-being in the complex domain of cannabis use.

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APPENDIX

Table A1. A Brief Scan of Cannabis Content in Pharmacy Programs in the United States -

University	Program	Course	Format	Topics Covered
Southern California	PharmD	Cannabis User Safety (elective)	Lecture	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis harm reduction • Evidence-based practices • Medical indications and therapeutic potential • Pharmacology of cannabis
	Continuing Education	Applying Ryan’s Law	Online Course	<ul style="list-style-type: none"> • Cannabis laws and regulations • Dosage forms and administration • Medical indications and therapeutic potential
California San Diego	PharmD	Cannabis Pharmacology and Therapeutics (elective)	Lecture	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • History and epidemiology of cannabis • Medical indications and therapeutic potential • Pharmacology of cannabis
Colorado Denver	M.Sc. in Pharmaceutical Sciences	Specialized track in Cannabis Science and Medicine	Online program	<ul style="list-style-type: none"> • Cannabis laws and regulations • Ethical considerations • Evidence-based practices • Medical indications and therapeutic potential • Pharmacology of cannabis
	Continuing Education	Medical Cannabis Education for Health Care Providers Certificate	Online course	<ul style="list-style-type: none"> • Adverse effects and drug interactions • Cannabis laws and regulations • Dosage forms and administration • Evidence-based practices • Evidence-based practices • Medical indications and therapeutic potential • Patient counseling and education • Pharmacology of cannabis • Special populations
		Cannabis Science and Medicine Certificate	Online course	<ul style="list-style-type: none"> • Cannabis laws and regulations • Evidence-based practices

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- Medical indications and therapeutic potential
 - Pharmacology of cannabis
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