What You Need to Know About Cannabis: An Evidence-Based Crash Course for Mental Health Trainees

Thida Thant, MD*, Abraham Nussbaum, MD

*Corresponding Author: thida.thant@cuanschutz.edu

**Abstract**

**Introduction:** Although increasing numbers of states are legalizing cannabis for both medical and recreational purposes, health care providers and students report low comfort levels and limited knowledge regarding cannabis, highlighting current deficits in medical training. **Methods:** We developed a structured cannabis curriculum for a general psychiatry residency program at the University of Colorado. In constructing our curriculum, we initially surveyed advanced psychiatry residents and attending psychiatrists in the university outpatient clinic regarding attitudes and approaches to psychiatric patients using cannabis. Prior to implementation in the following year’s core curriculum for first-year postgraduates (PGY 1s), pretest assessments evaluated PGY 1s’ attitudes towards cannabis use and identified learning expectations, challenges, and confidence levels. After the seminars were completed, residents provided posttest assessments and general course evaluations. Utilizing initial survey information, we constructed a Marijuana and Medicine introduction curriculum for psychiatry PGY 1s. Topics included strains and formulations, pharmacokinetics, the endocannabinoid system, local Colorado laws, monitoring, evidence regarding use in psychiatric disorders, use in pregnancy, and ethical issues. These topics were covered via case-based discussion, interactive quizzes, direct instruction, and facilitated discussion. **Results:** Posttest assessments indicated improvement in trainees’ confidence and knowledge base and requests for additional instruction on topics such as adolescent use. **Discussion:** The positive posttest assessments support the value of incorporating a cannabis curriculum into psychiatric training. Now in its second year, the course has been expanded to 4 hours. As cannabis is medicalized, it is increasingly important that psychiatrists be able to knowledgeably counsel their patients.

**Keywords**

Cannabis, Marijuana, Cannabinoids, Mental Health, Addiction, Medical Marijuana, Pharmacology and Toxicology, Psychology and Behavioral Science, Ethics/Bioethics, Psychiatry, Case-Based Learning

**Educational Objectives**

By the end of this activity, learners will be able to:

1. Describe the basic neurobiology of cannabis and the endocannabinoid system.
2. Compare various dispensary and pharmaceutical formulations of medical cannabis.
3. Describe the metabolism, monitoring, and drug-drug interactions of dispensary and pharmaceutical formulations of medical cannabis.
4. Describe current evidence concerning how medical cannabis affects mental health.
5. Discuss ethical arguments supporting medicalization of cannabis.

**Introduction**

As of September 2018, 31 states and Washington, DC, have enacted various regulations for legalizing the medical use of cannabis (i.e., THC/CBD or CBD only); nine states and Washington, DC, have also approved use of recreational cannabis. Data from states such as Colorado, which approved the use of both medical and recreational cannabis since 2000 and 2012, respectively, indicate increases in both adolescent and adult cannabis use since legalization as well as cannabis-related increases in calls to poison control centers.

We reviewed literature via PubMed, Embase, and Ovid (PsycINFO) utilizing the MeSH terms cannabis, curriculum, education, educational status, medical education, and marijuana. Of 1,172 papers identified, eight were deemed relevant to either...
cannabis training in the context of medical education or reporting survey data for health care students and providers regarding cannabis. In surveys of health care providers, pharmaceutical students, and medical students, respondents report minimal comfort levels and low knowledge base regarding cannabis, highlighting deficits in medical training. Several surveys have evaluated attitudes, beliefs, and knowledge about cannabis in students and health care providers. Among 494 health care providers in Washington state, respondents on average reported little knowledge and low comfort levels related to recommending the medical use of cannabis; up to 96% agreed that clinicians should receive training in the medical use of cannabis through continuing medical education and graduate or undergraduate curricula. In this same paper, providers reported generally obtaining their information about cannabis from non-peer-reviewed sources such as popular media, patients, or colleagues. Two surveys of Colorado-based clinicians, one of 520 family physicians and another of 114 medical providers, reported similar findings. Respondents to both surveys indicated the need for more formal training opportunities about marijuana and advocated that training should be incorporated into medical school and family medicine residency curricula. Surveys of medical and pharmacy students and physicians-in-training conclude that medical education has not caught up with students’ calls for further research and for the addition of cannabis-related education to existing curricula. In a survey of 101 curricula deans, 258 residents and fellows, and 145 schools, 84.9% reported receiving no education in medical school or residency on the medical use of cannabis; only 9% of medical school curricula documented such content.

As of April 2019, a single marijuana curriculum had been published in MedEdPORTAL. This curriculum provides a broader overview of cannabis, ranging from pharmacology to ethical considerations, to help improve practitioners’ understanding of cannabis and their discussions with patients. Here, we describe and discuss the development of an evidence-based cannabis curriculum for mental health trainees. In this publication, the term cannabis is predominantly used, except when citing other papers and in the title of the marijuana curriculum. This choice to use the term cannabis instead of marijuana was made to align with Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition terminology. However, this choice was made after initially designing the curriculum using the term marijuana. In future courses, assessments, and trainings, we will use the term cannabis, which is the botanical term.

Methods

Course Development
In 2017, we distributed an 11-question survey to 20 advanced psychiatry residents (training years three and four) and attending physicians in the University of Colorado outpatient psychiatry clinic as part of a targeted needs assessment. The survey evaluated attitudes towards recreational and medical cannabis, beliefs about what constituted excessive use, perceptions of different dispensary formulations of cannabis (e.g., smoked vs. edible, flower vs. concentrates), and approaches to requests for controlled substances for patients using cannabis. We also asked respondents to suggest topics for guidelines needed to inform the treatment of psychiatric patients using cannabis. Respondents were asked whether they supported recreational or medical use, what they considered excessive recreational or medical use in terms of frequency or amount per use, what perceptions they had between different cannabis formulations, how they managed requests for controlled medications from patients with known recreational use of cannabis, and what monitoring they routinely used with patients using cannabis. We also explored their knowledge of cannabis laws in Colorado (e.g., How much cannabis is a person legally allowed to possess for recreational use?). This survey revealed that our resident and attending physicians felt unsure of how to manage requests for controlled medications in patients using locally legalized recreational use of cannabis, evaluate different cannabis formulations, monitor use, or even decide what constitutes excessive cannabis intake.

To address this need, we created a structured cannabis curriculum to improve knowledge concerning biology, pharmacokinetics, formulations, adverse effects, and psychiatric indications for cannabis. Curriculum development included a literature review with an emphasis on systematic reviews when available. We reviewed the outline proposed by Ware and Ziemianski for a curriculum based on pharmacology course principles that included the history of medical use of cannabis, botany of cannabis sativa, biology of the endocannabinoid system, pharmacology of cannabinoids, cannabinoid administration, efficacy of cannabinoids in clinical conditions, safety of the medical use of cannabis, cannabis misuse and abuse, legal considerations, and communicating with patients about cannabis. However, to best serve the local needs identified in our survey, we focused our curriculum on basic concepts of the endocannabinoid system, dispensary and pharmaceutical formulations of cannabis, pharmacokinetics and metabolism, monitoring, current evidence concerning psychiatric indications for the medical use of cannabis, and ethical issues related to recommending cannabis.
This course was taught separately to psychology and psychiatric trainees as part of their respective mandatory didactics. To address low confidence in counseling patients about cannabis, we framed teaching around a clinical case, demonstrating how a clinician might respond to patients’ questions and present information. Addiction and treatment aspects of cannabis use disorder were not included in this course as these topics are covered in a separate addiction psychiatry course provided to second-year residents.

Course Outline
The course was divided into three sections, which are described in more detail below:

1. Introduction and objectives: 5 minutes.
2. Didactics part 1 plus large-group discussion covering history, pharmacology, strains and psychiatric indications by slide presentation: 95 minutes, with two 10-minute breaks in the middle and at the end.
3. Didactics part 2 plus large-group discussion covering ethical considerations related to marijuana: 50 minutes, with 10-minute break at the end.

Introduction and objectives: At the beginning of the course, the facilitators introduced themselves and provided an overview of the 3-hour course. The lead facilitator presented the course objectives using PowerPoint presentations.

Didactics by slide presentation part 1 plus large-group discussion (2 hours; Appendix A): One of the facilitators introduced the importance of cannabis education and highlighted the impact of the state-level legalization of cannabis using Colorado as a case example. This was followed by a review of the basics of cannabis strains, the endocannabinoid system, pharmaceutical and dispensary formulations of cannabis, adverse effects, blood and urine monitoring, and cannabis-medication interactions. Local laws regarding possession, use, and driving were covered through interactive quizzes. Quizzes were included following informational slides to check knowledge, highlight important learning points, and summarize prior sections. The questions covered local use and driving laws, pharmacology questions, and other topics. The facilitator also reviewed literature concerning cannabis use in a variety of psychiatric conditions. All of the information described above was framed around a clinical case, demonstrating how a clinician might respond to patients’ questions and present information. Case-based teaching was supplemented with additional discussions including question-and-answer sessions.

Didactics by slide presentation part 2 plus large-group discussion (1 hour; Appendix B): The third hour covered attitudinal and ethical questions related to cannabis including how cannabis is viewed and treated (e.g., as an illicit substance, as a medication, like alcohol or tobacco), how the cannabis industry and dispensaries are viewed (e.g., as pharmacies or bars), and differences between traditional physician-patient relationships versus the nontraditional relationships between patients and prescribers in the cannabis industry. Questions posed periodically throughout part 2 guided discussion on ethical concerns, including differences in regulations and how marijuana is viewed in the physician-patient relationship.

Room Setup, Equipment, and Environment
The setting for this course was a small conference room that could accommodate the expected trainees. The room was equipped with a laptop, projector, and projection screen to display the PowerPoint presentation.

Course Evaluation
To evaluate this course, we used a pre-/posttest administered at the beginning and end of the course in addition to individual speaker evaluations (Appendix C). The pre-/posttest was developed by the course instructors and sought to evaluate trainees’ attitudes towards cannabis use and to identify their key learning expectations regarding cannabis, challenges they encountered in this patient population, their personal strengths and weaknesses in this knowledge area, and their subjective confidence levels in knowing and understanding various psychiatric indications for cannabis use, screening and monitoring, short- and long-term adverse effects, different formulations of cannabis, pharmacokinetics, the endocannabinoid system, use in pregnancy, and ethical issues.

The pretest assessment (Appendix C) included four open-ended questions exploring feelings around counselling patients about their cannabis use and identifying individual learning expectations, challenges experienced while working with patients using cannabis, and what the learner's perceived strengths and weaknesses were when working with patients who used cannabis. These questions were followed by 14 additional questions evaluating comfort with specific aspects of cannabis use and evaluation rated on a 5-point Likert scale. These same 14 Likert-scale questions were repeated in the posttest assessment, in addition to a general course and speaker evaluation. The pretest assessment, posttest assessment, and course evaluation were anonymous, although trainees picked unique identifiers to allow pre- and posttest assessments to be matched.
Results

All 22 course participants completed the evaluations (36% psychology trainees and 64% psychiatry first-year postgraduates, PGY 1s). Twenty percent of the PGY 1s reported attending school or living in a state with legalized or medicalized cannabis use before entering their current training program, while 80% denied having done so.

Our findings through this project demonstrated lower levels of confidence in junior trainees prior to our course, followed by an increase in confidence in knowledge of cannabis pharmacology, adverse effects, and monitoring. In the Table, the mean confidence scores for all 14 Likert-scale items increased from pre- to posttest. The increase in mean confidence score was largest for the items discussing the differences between various strains and formulations of marijuana and discussing marijuana and medication interactions with patients. The two items with the lowest percentage of participants (38%) reporting feeling confident at posttest were discussing the endocannabinoid system with patients and discussing the pharmacokinetics of marijuana.

Common learning objectives identified by trainees on pretest assessments included the following:

- Differences between various cannabis strains, differing cannabinoid concentrations, and potency.
- Negative health consequences of cannabis use in both physical and mental health conditions.
- Evidence supporting potential benefit of cannabis use in mental health conditions.
- Medical versus recreational cannabis use, distribution, and regulation.
- How to best counsel patients on cannabis use and harm-reduction strategies.
- Improving confidence in ability to knowledgeably discuss cannabis with patients.

All participating trainees evaluated the course positively. In response to being asked if this training course helped them address challenges in working with patients who used cannabis, trainees commented on improvements in their confidence to counsel patients on cannabis use. Specific comments included the following:

- “Will be better able to engage with patients who are using cannabis and be better informed.”
- “Yes, it has bolstered my knowledge base about current evidence regarding marijuana.”
- “I feel more confident in explaining the adverse effects of marijuana to patients.”
- “Yes, it gave me a clearer picture of what evidence exists and a better understanding of the quality.”

### Table. Pre- and Posttest Assessment of Marijuana and Medicine Course-Related Knowledge

| Statement                                                                 | Not Confident: No. (%) | Neutral/Somewhat Confident: No. (%) | Confident/Expert: No. (%) | M (SD)* |
|--------------------------------------------------------------------------|------------------------|-------------------------------------|--------------------------|---------|
|                                                                          | Pre        | Post     | Pre        | Post     | Pre        | Post     | Pre       | Post     |                  |
| Evaluating patients’ marijuana use.                                      | 2 (9%)     | 0 (0%)   | 11 (52%)  | 6 (28%)  | 8 (38%)   | 15 (71%) | 3.2 (0.6) | 3.7 (0.5) |                  |
| Discussing the differences between various strains and formulations of    | 11 (52%)  | 2 (9%)   | 7 (33%)   | 3 (14%)  | 3 (14%)   | 16 (76%) | 2.1 (1.1) | 3.7 (0.7) |                  |
| marijuana.                                                               |            |          |           |          |           |          |           |          |                  |
| Discussing the pharmacokinetics of marijuana.                            | 17 (81%)  | 2 (9%)   | 1 (4%)    | 11 (52%) | 3 (14%)   | 8 (38%)  | 1.9 (0.1) | 3.3 (0.7) |                  |
| Discussing the endocannabinoid system with my patients.                  | 17 (81%)  | 3 (14%)  | 2 (9%)    | 10 (47%) | 2 (9%)    | 8 (38%)  | 1.8 (0.9) | 3.2 (0.7) |                  |
| Interpreting urine drug screens and blood tests in relation to marijuana  | 7 (33%)   | 2 (9%)   | 7 (33%)   | 9 (42%)  | 7 (33%)   | 10 (47%) | 2.8 (1.0) | 3.3 (0.7) |                  |
| use.                                                                    |            |          |           |          |           |          |           |          |                  |
| Discussing both the short- and long-term effects of marijuana use with    | 7 (33%)   | 0 (0%)   | 9 (42%)   | 7 (33%)  | 5 (23%)   | 14 (66%) | 2.8 (0.8) | 3.7 (0.5) |                  |
| patients.                                                               |            |          |           |          |           |          |           |          |                  |
| Discussing marijuana and medication interactions with patients.          | 18 (85%)  | 3 (14%)  | 13 (42%)  | 9 (42%)  | 0 (0%)    | 9 (42%)  | 1.6 (0.7) | 3.2 (0.8) |                  |
| Counselling patients about marijuana use during pregnancy.               | 11 (52%)  | 0 (0%)   | 7 (33%)   | 5 (23%)  | 3 (14%)   | 16 (76%) | 2.3 (0.9) | 3.8 (0.5) |                  |
| Discussing the current medical evidence regarding marijuana and          | 8 (38%)   | 0 (0%)   | 10 (47%)  | 5 (23%)  | 3 (14%)   | 16 (76%) | 2.7 (0.6) | 3.9 (0.6) |                  |
| psychotic disorders.                                                     |            |          |           |          |           |          |           |          |                  |
| Discussing the current medical evidence regarding marijuana and          | 11 (52%)  | 0 (0%)   | 7 (33%)   | 5 (23%)  | 3 (14%)   | 16 (76%) | 2.5 (0.8) | 3.8 (0.6) |                  |
| mood disorders.                                                          |            |          |           |          |           |          |           |          |                  |
| Discussing the current medical evidence regarding marijuana and          | 12 (57%)  | 0 (0%)   | 6 (28%)   | 5 (23%)  | 3 (14%)   | 16 (76%) | 2.4 (0.9) | 3.9 (0.6) |                  |
| anxiety disorders.                                                       |            |          |           |          |           |          |           |          |                  |
| Discussing the current medical evidence regarding marijuana and PTSD.    | 8 (38%)   | 0 (0%)   | 8 (38%)   | 4 (19%)  | 5 (23%)   | 17 (81%) | 2.7 (0.9) | 3.9 (0.5) |                  |
| Discussing the current medical evidence regarding marijuana and          | 8 (38%)   | 1 (4%)   | 7 (33%)   | 5 (23%)  | 6 (28%)   | 15 (71%) | 2.8 (0.8) | 3.7 (0.6) |                  |
| sleep-wake disturbances.                                                 |            |          |           |          |           |          |           |          |                  |
| Discussing the ethical issues related to marijuana.                      | 7 (33%)   | 0 (0%)   | 9 (42%)   | 8 (38%)  | 5 (23%)   | 13 (61%) | 2.7 (1.1) | 3.6 (0.4) |                  |

Abbreviation: PTSD, post-traumatic stress disorder.

*Rated on a 5-point Likert scale (1 = not confident, 5 = expert).
• “Yes, it provided me more information on the legal aspect as well as the biology to provide a basis for discussion with patients.”

Posttest assessments and comments by the PGY 1s suggested that the course resulted in improvements in their confidence levels and knowledge base and included requests that the course be expanded to permit more in-depth exploration of the topics, as well as adding areas such as adolescent cannabis use.

Discussion
To address the discrepancy between the rapid spread of medical and legalized cannabis across the United States and the much slower growth of cannabis-based curricula in medical education, we developed this crash-course curriculum in hopes of providing a foundation to draw from when facing these discussions in clinical care. Surveys of our own trainees and faculty supported findings from other publications: namely, that students and clinicians in many parts of the United States feel inadequately trained regarding cannabis. Our findings through this project demonstrate lower levels of confidence in junior trainees prior to our course, followed by an increase in confidence regarding several domains of cannabis: pharmacology, adverse effects, monitoring, and more.

The positive posttest assessments, course evaluations, and suggestions highlight the need for the incorporation of cannabis-related issues into psychiatric training. As more states legalize or medicalize use of cannabis, it is especially important that psychiatrists confidently and knowledgeably counsel their patients about cannabis use. As cannabis’ unique emergence as a medicine has occurred in the absence of high-quality evidence-based studies, its rapid medicalization has left medical trainees and physicians undertrained and ill-prepared to manage patients who use cannabis recreationally or medically.1 In contrast to medical schools, very few of which report medical use of cannabis as a part of their curriculum, the cannabis industry has produced a plethora of universities, certificate programs, and other educational opportunities in the past few years.12 A survey describing the training of 55 individual cannabis dispensary staff reported that 20% of the survey participants received medical or scientific training related to marijuana but 94% provided specific cannabis advice to patients.13

Based on postcourse feedback, residents who participated in our course now feel more confident in how to discuss cannabis with their patients and in their knowledge concerning fundamentals of pharmacokinetics and the endocannabinoid system, and they are more aware of the existing literature regarding cannabis use in psychiatric disorders.

There were many challenges in developing and implementing this curriculum. Most other cannabis didactics focus on a specific component such as use disorder, history, or use in adolescents, or on specific formulations such as vaping or concentrates. Objectivity was also a large focus of the course, with a goal of providing facts and literature as available while also helping trainees consider how to think about cannabis literature rather than instructing them what we think they should think about cannabis. Fortunately, in our training program, the request to include this course in resident didactics was eagerly received as many teaching faculty within the program and department felt unprepared to discuss cannabis with their own patients. An additional challenge was streamlining the initial curriculum to fit the 2-hour limit, which resulted in some of the initial iterations of the course feeling rushed and without enough time for discussion. As a result, this course was revised based on trainee feedback to focus on highlights and most-common disorders (i.e., focusing on anxiety, mood disorders, and psychosis, instead of obsessive-compulsive disorder or Tourette’s). The decision was made to focus on psychiatric disorders and conditions even though it would be pertinent to include more-common medical conditions and symptoms for which cannabis is used if more time is allocated.

Limitations
This type of course presents instructors with several challenges. First, the cannabis knowledge base with which trainees enter the course varies depending on where they attended medical or graduate school. Those who had attended medical school or a psychology internship in Colorado typically had more exposure to clinical pearls about cannabis prior to this course compared to trainees from other states. Second, due to changing political and social climates, the status of legalized and medicalized cannabis can shift from locale to locale, with parallel shifts in state-specific knowledge required to practice effectively, specifically around local laws, policies, and guidelines. Finally, scientific literature regarding the use of cannabis is ever changing, so that curricula such as this one will require frequent revision to ensure that the most-current information is provided; we update our curriculum continuously. Multiple new studies, including review articles have been published since the initial submission of this course. Also, as discussed above, the breadth of information that could be covered is staggering, making adjusting this course to time constraints challenging.
Finding high-quality sources and literature was also a challenge in constructing this course. There were very few high-quality reviews published at the time this course was created, especially concerning topics such as dispensary formulations and purported benefits of specific strains. It is important to cover these topics as patients are presented this information. However, this often requires utilizing sources we often would not otherwise.

There are also limitations in the creation and timing of our assessment tools. Our original pre- and posttest assessments did not label each anchor on the scale (e.g., simply denoting 1 as not confident, 3 as somewhat confident, and 5 as expert) and used the inequivalent term expert instead of very confident. The timing of our posttest assessment would also more accurately evaluate the lasting effects of our course if administered later (such as 6 months or 1 year) rather than immediately following the course.

Future changes to the curriculum will include consistent uses of the terms marijuana versus cannabis, expanding the course to include historical background, and discussing cannabis use in adolescents. Recent increase in our course duration from 2 hours to 4 hours, while helpful, still does not allow comprehensive coverage of this topic. The trainees requested the increase as they wished to have more time to cover topics such as adolescent use. We have been able to offer a 90-minute version of the course to psychology residents, all of whom have responded positively. We have also been asked to offer extended versions of the course at several national psychiatric conferences, efforts that support our mission of increasing marijuana competency through evidence-based and peer-reviewed means. As higher-quality literature continues to emerge, more time is needed to adequately review the current state of evidence and discuss the myriad questions that will be raised by patients. A seminar series would likely be best suited to this, especially if integrated longitudinally over the course of training. Such a series could include cannabis over a life span, with different sessions on use in pregnancy, children and adolescents, young adults, adults, and the elderly. Functional concerns—how patients are affected regarding driving, working, and other activities—are also quite relevant but underdiscussed in this course. Sessions on different practice settings are also important as the ramifications and discussions around cannabis use vary from inpatient psychiatry to consultation-liaison ranging from medical to ambulatory settings. Ideally, many topics included in our introductory course could be integrated into undergraduate studies or medical school pharmacology curricula. Expanding topics covered by the integrated quizzes could ideally include workplace concerns related to in-hospital use and postpartum-specific issues (e.g., reporting to child protective services, etc.). Longer-term outcomes could also track persistence of improvement in knowledge, application of knowledge postcourse, and topics arising in clinical settings not addressed by our course.

Appendices

A. Didactic Slides Part 1.pptx
B. Didactic Slides Part 2.pptx
C. Evaluation Pre and Posttest.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Thida Thant, MD: Assistant Professor, Department of Psychiatry, University of Colorado School of Medicine
Abraham Nussbaum, MD: Chief Education Officer, Office of Education, Denver Health; Department of Psychiatry, University of Colorado School of Medicine

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