



Putting Patients First: Medical Cannabis Use Patterns and Policy Protections

By Chelsea Boyd

Regulating medical cannabis markets requires different strategies than non-medical or adult-use markets. Understanding patient preferences and use patterns is important for ensuring patients have access to safe and appropriate cannabis products.

Executive Summary

Historically, cannabis has been used for medical purposes for millennia.¹ Cannabis was introduced into western medicine in the mid-1800s but began to decline in use by the early 1900s. It was made a Schedule I substance under the Controlled Substances Act of 1970, which effectively prevented research on its potential medical uses and benefits.² Nevertheless, since 1996, more than three-quarters of states have legalized the medical use of cannabis in some form. This policy study explores what is known about medical cannabis patients' use patterns and preferences; describes marketplace trends and medical relevance of cannabinoid content; and suggests policies that promote the availability of safe, effective and accessible medical cannabis products for patients.

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1. Anne K. Schlag et al., "Cannabis based medicines and cannabis dependence: A critical review of issues and evidence," *Journal of Psychopharmacology* 35:7 (July 2021), pp. 773-785. <https://pubmed.ncbi.nlm.nih.gov/33593117>.

2. Ibid.; "About Cannabis Policy," National Institute on Alcohol Abuse and Alcoholism, last accessed Oct. 30, 2023. <https://alcoholpolicy.niaaa.nih.gov/about/about-cannabis-policy>.

Because there is limited research on cannabis as a therapeutic treatment, it is hard to make conclusive statements about effective dosing and use patterns for specific conditions or patient populations.³ Nevertheless, compared to non-medical users, medical cannabis patients tend to use daily, via multiple routes of administration, and do not report a desire to experience cannabis' psychotropic effects.⁴ Medical patients also seem to prefer different cannabinoid profiles than non-medical users.⁵ Keeping in mind that, for many patients, finding the most effective use pattern is a process of trial and error, ensuring a wide variety of products with different cannabinoid ratios is one policy that can enable patients to find the most beneficial product combinations for their conditions. Similarly, because medical patient preferences are different from non-medical users, insulating medical markets from the potential pressures of the adult-use market can ensure that patients have access to products they prefer, even after a state legalizes adult use.

Additionally, when states legalize medical cannabis, they have a duty to ensure that any markets that emerge are safe. Because cannabis is regulated at the state level, there is notable variability in cannabis markets and product standards. Ensuring that each state has accurate, comprehensive and (when possible) evidence-based labeling standards can help patients make informed decisions about the products they use. States can also protect patients by regulating contaminants appropriately. Practical medical cannabis policies are necessary to ensure patient safety and allow the greatest accessibility.

Introduction

Since California legalized medical cannabis in 1996, other states have followed suit.⁶ As of April 2023, 38 states and the District of Columbia have legalized medical cannabis and nine states allow medical use of low-THC or CBD-only products.⁷ Over time, as public opinion on legalization has grown increasingly favorable, the policy debate in many states has shifted from whether medical cannabis should be legalized to how it should be regulated.⁸



Ensuring that each state has accurate, comprehensive and (when possible) evidence-based labeling standards can help patients make informed decisions about the products they use.

3. Alivia Kaylor, "How Regulation Stymies Medical Research of Controlled Substances," *PharmaNewsIntelligence*, March 22, 2022. <https://pharmanewsintel.com/features/barriers-to-medical-research-constructed-by-federally-controlled-substance-scheduling-and-classification>; David J. Nutt et al., "Effects of Schedule I drug laws on neuroscience research and treatment innovation," *Nature Reviews Neuroscience* 14:8 (August 2013), pp. 577-585. <https://pubmed.ncbi.nlm.nih.gov/23756634>; National Academies of Sciences, Engineering and Medicine, *Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*, Washington, D.C.: The National Academies Press (2017). <https://doi.org/10.17226/24625>.
4. Schlag et al. <https://pubmed.ncbi.nlm.nih.gov/33593117>.
5. Yuyan Shi et al., "The impacts of potency, warning messages, and price on preferences for Cannabis flower products," *International Journal of Drug Policy* 74 (December 2019), pp. 1-10. <https://pubmed.ncbi.nlm.nih.gov/31382201>; Kevin F. Boehnke et al., "Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain," *The Journal of Pain* 20:11 (November 2019), pp. 1362-1372. <https://pubmed.ncbi.nlm.nih.gov/31132510>.
6. "State Medical Cannabis Laws," National Conference of State Legislatures, June 22, 2023. <https://www.ncsl.org/health/state-medical-cannabis-laws>.
7. Ibid.
8. Ted Van Green, "Americans overwhelmingly say marijuana should be legal for medical or recreational use," Pew Research Center, Nov. 22, 2022. <https://www.pewresearch.org/fact-tank/2022/11/22/americans-overwhelmingly-say-marijuana-should-be-legal-for-medical-or-recreational-use>.

Medical cannabis patients have different use patterns and goals for their cannabis use than non-medical consumers.⁹ They also may face different challenges based on their access to and the availability of appropriate cannabis products. For these reasons, regulating medical cannabis markets requires different strategies than regulating non-medical or adult-use markets. Understanding patient preferences and use patterns is important for ensuring patients have access to safe and appropriate cannabis products. This policy paper explores patient use patterns and preferences related to medical cannabis, describes marketplace trends, explains issues related to self-titration, and suggests policies that would promote patient access, health, and safety.

Medical Cannabis Use Patterns and Preferences

Medical cannabis is used to treat and relieve the symptoms of many different medical conditions. Most states that allow legal medical cannabis use have specified a list of conditions that qualify a patient to use cannabis medicinally, with some states being more permissive and others more restrictive.¹⁰ Based on a 2017 report, there is strong evidence supporting the use of medical cannabis to treat chronic pain, muscle spasticity associated with multiple sclerosis, and chemotherapy-related nausea and vomiting.¹¹ Some research suggests that cannabis may be beneficial for other conditions, but the most recent systematic reviews have noted that there is currently inadequate evidence to support those claims.¹² The lack of sufficient evidence about cannabis' effectiveness for specific conditions is largely because of its Schedule I status, which has markedly limited clinical research.¹³ Still, studies show that chronic pain is the most commonly reported qualifying condition for cannabis patients.¹⁴

Medical Cannabis Use Patterns

Understanding how patients use cannabis has important policy consequences. For example, this information could help policymakers enact evidence-based purchase limits.



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- Schlag et al. <https://pubmed.ncbi.nlm.nih.gov/33593117>.
- "State Medical Cannabis Laws." <https://www.ncsl.org/health/state-medical-cannabis-laws>; Kevin F. Boehnke et al., "Qualifying Conditions Of Medical Cannabis License Holders In The United States," *Health Affairs* 38:2 (February 2019). <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2018.05266>.
- National Academies of Sciences, Engineering and Medicine. <https://doi.org/10.17226/24625>.
- Anne Katrin Schlag et al., "Current controversies in medical cannabis: Recent developments in human clinical applications and potential therapeutics," *Neuropharmacology* 191:108586 (June 15, 2021). <https://www.sciencedirect.com/science/article/abs/pii/S0028390821001404>; Sebastian Jugl et al., "A Mapping Literature Review of Medical Cannabis Clinical Outcomes and Quality of Evidence in Approved Conditions in the USA from 2016 to 2019," *Medical Cannabis and Cannabinoids* 4:1 (Feb. 25, 2021), pp. 21-42. <https://www.karger.com/Article/FullText/515069>; Erik A. Levinsohn and Kevin P. Hill, "Clinical uses of cannabis and cannabinoids in the United States," *Journal of the Neurological Sciences* 411:116717 (April 15, 2020). <https://www.sciencedirect.com/science/article/abs/pii/S0022510X20300538>.
- Kaylor. <https://pharmanewsintel.com/features/barriers-to-medical-research-constructed-by-federally-controlled-substance-scheduling-and-classification>; Nutt et al. <https://pubmed.ncbi.nlm.nih.gov/23756634>; National Academies of Sciences, Engineering and Medicine. <https://doi.org/10.17226/24625>.
- Boehnke et al., "Qualifying Conditions of Medical Cannabis License Holders In The United States." <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2018.05266>; Kevin F. Boehnke et al., "U.S. Trends in Registration for Medical Cannabis and Reasons for Use From 2016 to 2020: An Observational Study," *Annals of Internal Medicine* 175:7 (July 2022), pp. 945-951. <https://www.acpjournals.org/doi/abs/10.7326/M22-0217>.

Surveys of patients who use cannabis show that they most commonly consume it via inhalation, either smoked or vaporized.¹⁵ Edibles, tinctures and capsules are also commonly used, and most patients report using multiple products with different routes of administration.¹⁶ The amount of cannabis consumed and the preferred cannabinoid profile are also important factors to consider in relation to medical use of the drug. One study of patients in Washington State found that 90.5 percent used one-quarter of an ounce or less of cannabis flower per week.¹⁷ The same study found that 47.6 percent of patients reported using cannabis one to four times per day, and 23.5 percent used cannabis less than once a day, with the remainder reporting daily use.¹⁸ Another study that surveyed patients with chronic pain found that 76 percent of those who use cannabis exclusively for medicinal purposes consumed cannabis seven days per week; of these, 33 percent used the substance four or more times per day, 51 percent used it two or three times per day and 15.9 percent used it once per day.¹⁹

Cannabinoid Content Preferences

Patients select their preferred cannabis products based on many factors, including appearance, smell, variety/species and dispensary employee recommendations; however, cannabinoid profile seems to be one of the most important characteristics that patients consider. The aforementioned study of patients in Washington State found that 45.8 percent and 41.2 percent of survey respondents described THC and CBD content, respectively, as important factors in selecting their preferred cannabis products.²⁰ Similarly, the study of chronic pain patients found that 57 percent of those who used cannabis exclusively for medicinal purposes selected products based on cannabinoid profile.²¹

While patients who use cannabis often tend to select products based on cannabinoid profile, CBD content or the ratio of THC to CBD seems to be more important than THC content alone.²² One study that surveyed medical cannabis patients by asking them to choose which alternative they preferred when presented with a hypothetical scenario found that medical users preferred products with lower or balanced ratios of THC to CBD compared to higher ratios of THC to CBD, with CBD content being the most important attribute.²³



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15. Michelle Sexton et al., "A Cross-Sectional Survey of Medical Cannabis Users: Patterns of Use and Perceived Efficacy," *Cannabis and Cannabinoid Research* 1:1 (June 2, 2016), pp. 131-138. <https://www.liebertpub.com/doi/full/10.1089/can.2016.0007>; Arum Kim et al., "Patterns of Medical Cannabis Use among Cancer Patients from a Medical Cannabis Dispensary in New York State," *Journal of Palliative Medicine* 22:10 (Sept. 30, 2019), pp. 1196-1201. <https://www.liebertpub.com/doi/full/10.1089/jpm.2018.0529>; Boehnke et al., "Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain." <https://pubmed.ncbi.nlm.nih.gov/31132510>.

16. Ibid.

17. Sexton et al. <https://www.liebertpub.com/doi/full/10.1089/can.2016.0007>.

18. Ibid.

19. Boehnke et al., "Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain." <https://pubmed.ncbi.nlm.nih.gov/31132510>.

20. Sexton et al. <https://www.liebertpub.com/doi/full/10.1089/can.2016.0007>.

21. Boehnke et al., "Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain." <https://pubmed.ncbi.nlm.nih.gov/31132510>.

22. Ibid.; Shi et al. <https://pubmed.ncbi.nlm.nih.gov/31382201>; Linan Zeng et al., "Values and preferences towards medical cannabis among people living with chronic pain: a mixed-methods systematic review," *BMJ Open* 11:9 (Sept. 7, 2021). <https://pubmed.ncbi.nlm.nih.gov/34493521>.

23. Shi et al. <https://pubmed.ncbi.nlm.nih.gov/31382201>.

The subject of THC to CBD ratio is made more complex by conflicting study findings. One study of patients who use cannabis exclusively for medicinal purposes found that 41 percent of survey respondents preferred products with low THC and high CBD, 32.4 percent preferred equal amounts of THC and CBD, and 13.4 percent preferred high THC and low CBD products.²⁴ In contrast, another study of patients who use medical cannabis in New York found that 29.3 percent preferred products with low THC and high CBD, 30.6 percent preferred equal amounts of THC and CBD and 40.1 percent preferred high THC and low CBD products.²⁵ A systematic review concluded with moderate certainty that most patients prefer low THC and high CBD products with products containing equal amounts of THC and CBD being second most preferred.²⁶ It should be noted that some patients use cannabis both medicinally and recreationally, and this group of patients tend to prefer higher THC products compared to patients who use cannabis exclusively for medical purposes.²⁷ This could explain some of the differences in survey results.

Marketplace Trends: Cannabinoid Content and Medical Relevance

The potency of cannabis is typically defined as the percentage of THC found in a cannabis flower or product.²⁸ Over time, potency levels have increased, and cannabis concentrates have entered the market.²⁹ From 1995 to 2021, the average THC content of cannabis seized by the Drug Enforcement Administration (DEA) increased from 3.96 percent to 15.34 percent.³⁰ In legal medical markets, the same trend has been observed.³¹ Recent reports put the average THC content of medical cannabis flower advertised online at 19.2 percent, with a range from zero percent to 35 percent THC.³² Other forms of cannabis, such as concentrates that include butane hash oil, wax, resin, shatter, hash and bubble oil, typically range from 52 percent to 69 percent THC on the recreational market—but they can reach as high as 95 percent THC.³³ We did not identify any studies assessing the potency of concentrates on the medical market.



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24. Boehnke et al., “Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain.” <https://pubmed.ncbi.nlm.nih.gov/31132510>.
25. Kim et al. <https://www.liebertpub.com/doi/full/10.1089/jpm.2018.0529>.
26. Zeng et al. <https://pubmed.ncbi.nlm.nih.gov/34493521>.
27. Boehnke et al., “Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain.” <https://pubmed.ncbi.nlm.nih.gov/31132510>; Shi et al. <https://pubmed.ncbi.nlm.nih.gov/31382201>.
28. Joseph M. Pierre, “Risks of increasingly potent Cannabis: The joint effects of potency and frequency,” *Current Psychiatry* 16:2 (February 2017), pp.14-20. <https://www.mdedge.com/psychiatry/article/130324/addiction-medicine/risks-increasingly-potent-cannabis-joint-effects>.
29. Janni Leung et al., “Do Cannabis Users Reduce Their THC Dosages When Using More Potent Cannabis Products? A Review,” *Frontiers in Psychiatry* 12 (Feb. 18, 2021). <https://www.frontiersin.org/articles/10.3389/fpsy.2021.630602/full>.
30. National Institute on Drug Abuse, “Cannabis Potency Data,” National Institutes of Health, Nov. 23, 2022. <https://nida.nih.gov/research/research-data-measures-resources/cannabis-potency-data>.
31. Anna L. Schwabe et al., “Uncomfortably high: Testing reveals inflated THC potency on retail Cannabis labels,” *PLoS One* (April 12, 2023). <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0282396>.
32. Mary Catherine Cash et al., “Mapping cannabis potency in medical and recreational programs in the United States,” *PLoS One* 15:3 (March 26, 2020). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7098613>.
33. L. Cinnamon Bidwell et al., “Advancing the science on cannabis concentrates and behavioural health,” *Drug and Alcohol Review* 40:6 (September 2021), pp. 900-913. <https://pubmed.ncbi.nlm.nih.gov/33783029>.

Since the optimal ratio of THC to CBD has not been scientifically determined for different conditions and is only beginning to be explored, using patient preferences as a benchmark for the most medically effective cannabinoid ratios offers some idea of what products are most suitable for medical use.³⁴ Clinical trials assessing cannabis' efficacy for relieving pain consistently use cannabis with THC concentrations that are less than 10 percent, although some have used concentrations as low as 1 to 3 percent to successfully manage pain.³⁵

On the medical market, access to products with patients' preferred cannabinoid ratio may be limited. One study of products on the medical market in nine states, found that nearly 60 percent of products did not list CBD content. Of those that provided CBD information, the vast majority had cannabinoid ratios that were THC dominant and thus deemed less appropriate for medical use.³⁶

Thus, more research is needed to determine the most effective cannabinoid ratio for different conditions, and patient preference studies suggest that patients may not be able to access their preferred products on the medical market.

Self-Titration: How Do You Know Enough Is Enough?

The cannabinoid profile of a cannabis product is just one factor that contributes to a patient's experience. In addition, route of administration, frequency of use and the quantity of product used can all affect the subjective effects a patient experiences as well as the dose of cannabinoids received.³⁷ Unfortunately, much of the research about cannabis' effects does not comprehensively assess the factors that can impact cannabinoid dose.³⁸ The lack of more granular data about patient use patterns means that many studies rely on an incomplete picture of use when drawing conclusions.

Another consideration for researchers is how patients adjust, or do not adjust, their cannabis use based on product characteristics. Because there is no standard dose or recommended treatment protocol for medical cannabis patients to use, they must titrate doses on their own to achieve the desired



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34. Victoria Zeyl et al., "What Do You Know About Maryjane? A Systematic Review of the Current Data on the THC:CBD Ratio," *Substance Use & Misuse* 55:8 (March 3, 2020), pp. 1223-1227. <https://www.tandfonline.com/doi/abs/10.1080/10826084.2020.1731547>; Nitzan Halamish et al., "Can we predict the treatment doses of THC and CBD and does it matter?" *European Journal of Internal Medicine* 112 (June 2023), pp. 100-108. <https://www.sciencedirect.com/science/article/abs/pii/S0953620523001000>.
35. Sarah D. Pennypacker et al., "Potency and Therapeutic THC and CBD Ratios: U.S. Cannabis Markets Overshoot," *Frontiers in Pharmacology* 13 (June 6, 2022). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9207456>.
36. Ibid.
37. Colorado School of Public Health, "Health Effects of High-Potency Cannabis Products: A Scoping Review," The University of Colorado Anschutz Medical Campus, July 1, 2022. https://coloradosph.cuanschutz.edu/docs/librariesprovider151/default-document-library/hb-1317-initial-report-to-the-state-of-colorado---july-1-2022---final.pdf?sfvrsn=3b239c8a_0; Mark A. Prince and Bradley T. Conner, "Examining links between cannabis potency and mental and physical health outcomes," *Behaviour Research and Therapy* 115 (April 2019), pp. 111-120. <https://pubmed.ncbi.nlm.nih.gov/30497655>; Colorado School of Public Health, "A Scoping Review on Health Effects of High-Concentration Cannabis Products: Findings on Key Policy Questions," The University of Colorado Anschutz Medical Campus, April 19, 2023. https://www1.ucdenver.edu/docs/librariesprovider151/default-document-library/final-hb-1317-report-with-appendix-04-19-23.pdf?sfvrsn=cf5725bb_0; Jeremy Plumb et al., "The Nose Knows: Aroma, but Not THC Mediates the Subjective Effects of Smoked and Vaporized Cannabis Flower," *Psychoactives* 1:2 (Nov. 8, 2022), pp. 70-86. <https://www.mdpi.com/2813-1851/1/2/8>.
38. Prince and Conner. <https://pubmed.ncbi.nlm.nih.gov/30497655>; Peggy van der Pol et al., "Cross-sectional and prospective relation of cannabis potency, dosing and smoking behaviour with cannabis dependence: an ecological study," *Addiction* 109:7 (July 2014), pp. 1101-1109. <https://pubmed.ncbi.nlm.nih.gov/24628797>.

benefits and avoid undesirable side effects.³⁹ Titration refers to how people modify their consumption behaviors and patterns when using different varieties of products.⁴⁰ This is a particularly important point for researchers assessing the biological and subjective effects of different THC and CBD concentrations.

Although patients report certain preferences for product attributes and routes of administration, there is mixed evidence regarding patients' ability to self-titrate based on cannabinoid profile alone.⁴¹ One study found that, as THC concentration increased, people who use cannabis rolled less joints, but there was no association between CBD concentration and the amount of cannabis rolled into joints.⁴² However, another study of people who use cannabis recreationally contradicts that finding, showing that as THC potency increases, so does the amount of cannabis people roll into a joint.⁴³ The same study also found that the total volume inhaled while smoking was lower when a person used cannabis with a higher concentration of THC.⁴⁴ Another study compared smoked cannabis flower to cannabis concentrates in order to assess differences in intoxication. This study found no difference in the measurements of intoxication and cognitive impairment between the two different THC variants, suggesting that participants self titrated to some degree.⁴⁵ More research is needed to determine if and how people change their consumption patterns and behaviors to achieve the desired effects from cannabis, these studies collectively suggest that those who use cannabis self-titrate to some degree based on THC concentrations.⁴⁶

Of note, this assessment is complicated even further by CBD's effect on THC. Although it is commonly believed that CBD decreases the psychotropic effects of THC, emerging evidence suggests the relationship is more complex.⁴⁷ The effect of CBD on THC may depend on the ratio of the two cannabinoids, with CBD increasing intoxication when present in a THC-dominant ratio (e.g., 2 THC: 1 CBD) and decreasing intoxication when present in a CBD-dominant ratio (e.g., 1 THC: 20 CBD).⁴⁸

To better understand how cannabinoid profiles affect patient behavior, choice and health, it is important to better understand the extent to which patients titrate doses. It is also important to collect more granular data about medical cannabis use patterns.



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39. Schlag et al., "Cannabis based medicines and cannabis dependence: A critical review of issues and evidence." <https://pubmed.ncbi.nlm.nih.gov/33593117>; Daniel M. Donahue et al., "Let's Match: Making Cannabis Policy Guided by Research," *Clinical Therapeutics* 45:6 (June 2023), pp. 515-520. <https://www.sciencedirect.com/science/article/pii/S014929182300111X>.

40. van der Pol et al. <https://pubmed.ncbi.nlm.nih.gov/24628797>.

41. Maja Kalaba and Mark A. Ware, "Cannabinoid Profiles in Medical Cannabis Users: Effects of Age, Gender, Symptoms, and Duration of Use," *Cannabis and Cannabinoid Research* 7:6 (December 2022), pp. 840-851. <https://pubmed.ncbi.nlm.nih.gov/33999649>; Boehnke et al., "Cannabis Use Preferences and Decision-making Among a Cross-sectional Cohort of Medical Cannabis Patients with Chronic Pain." <https://pubmed.ncbi.nlm.nih.gov/31132510>.

42. Tom P. Freeman et al., "Just say 'know': how do cannabinoid concentrations influence users' estimates of cannabis potency and the amount they roll in joints?," *Addiction* 109:10 (October 2014), pp. 1686-1694. <https://pubmed.ncbi.nlm.nih.gov/24894801>.

43. van der Pol et al. <https://pubmed.ncbi.nlm.nih.gov/24628797>.

44. Ibid.

45. Carrie Cuttler et al., "Acute effects of high potency cannabis flower and cannabis concentrates on everyday life memory and decision making," *Scientific Reports* 11:13784 (July 2, 2021). <https://www.nature.com/articles/s41598-021-93198-5>.

46. Leung et al. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7930233>.

47. Cuttler et al. <https://www.nature.com/articles/s41598-021-93198-5>.

48. Pennypacker et al. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9207456>.

Putting Patients First: Policies and Practices to Protect Patients

In the absence of conclusive recommendations to use specific cannabis products for specific conditions, it is vital that patients have the information necessary to make decisions about their treatment so they can adjust dosages based on individual experiences.⁴⁹ Furthermore, to maintain patient safety, policies should ensure that products are tested, accurately labeled in appropriate detail and made available in a wide variety of cannabinoid profiles and administration modes. Additionally, medical markets must remain viable even after recreational laws take effect.

Ensure Accurate and Comprehensive Labeling

In the absence of specific dosing recommendations for patients, there are some general rules often suggested when determining the proper dose. The first is to “start low and go slow.”⁵⁰ The second is not to confuse psychoactive effects with therapeutic efficacy.⁵¹ The third is to use the lowest dose that produces the desired therapeutic effect without adverse consequences.⁵² To make this easier for patients, accurate, understandable and comprehensive labeling is necessary.

State laws regulating label requirements for medical cannabis vary, and the research on cannabis-labeling best practices is sparse.⁵³ However, based on the available literature, some suggestions for medical cannabis labels can be made. General information about the manufacturer and batch should be available to customers in the event that they need to report abnormalities or adverse reactions. Dose information should be another component of the label for edibles and oils. Although there is no standard dose of cannabis, experts have suggested that a standard dose not exceed 5 milligrams of THC.⁵⁴ For these products, considering how doses are portioned and how the dose is communicated to patients is important, as well.⁵⁵ For edibles and oils, labels should also include ingredients and nutritional information to help patients make informed decisions if they have dietary restrictions or allergies.

One of the most important labeling components is the cannabinoid profile of the product. Because patients often make purchasing decisions based on THC and CBD levels, these cannabinoids should—at a minimum—be clearly marked on the

Policies and Practices to Protect Patients



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49. Schlag et al., “Cannabis based medicines and cannabis dependence: A critical review of issues and evidence.” <https://pubmed.ncbi.nlm.nih.gov/33593117>; Kalaba and Ware. <https://pubmed.ncbi.nlm.nih.gov/33999649>.

50. Caroline A. MacCallum and Ethan B. Russo, “Practical considerations in medical cannabis administration and dosing,” *European Journal of Internal Medicine* 49 (March 2018), pp. 12-19. <https://www.sciencedirect.com/science/article/abs/pii/S09553620518300049>.

51. Ibid.

52. Ibid.

53. Daniel J. Kruger et al., “Requirements for Cannabis Product Labeling by U.S. State,” *Cannabis and Cannabinoid Research* 7:2 (April 19, 2022). <https://www.liebertpub.com/doi/abs/10.1089/can.2020.0079>; Samantha Goodman and David Hammond, “THC labeling on cannabis products: an experimental study of approaches for labeling the servings on cannabis edibles,” *Journal of Cannabis Research* 4:17 (April 7, 2022). <https://link.springer.com/article/10.1186/s42238-022-00124-1>.

54. Schlag et al., “Cannabis based medicines and cannabis dependence: A critical review of issues and evidence.” <https://pubmed.ncbi.nlm.nih.gov/33593117>; David Hammond, “Communicating THC levels and ‘dose’ to consumers: Implications for product labelling and packaging of cannabis products in regulated markets,” *International Journal of Drug Policy* 91:102509 (May 2021). <https://www.sciencedirect.com/science/article/abs/pii/S0955395919301823>.

55. Schlag et al., “Cannabis based medicines and cannabis dependence: A critical review of issues and evidence.” <https://pubmed.ncbi.nlm.nih.gov/33593117>.

label.⁵⁶ Additionally, a 2023 paper highlighted the importance of standardizing testing procedures between labs at the time of harvest and point of sale when it found that, out of 23 flower samples, 18 contained lower concentrations of THC than the label listed.⁵⁷ Thirteen samples' tested THC concentration was more than 30 percent lower than what was listed on the label.⁵⁸

Many non-cannabis product labels display health information or warnings, and this has been applied to cannabis products in many states, as well.⁵⁹ Warnings about psychotropic effects, driving under the influence and other factors that impact safety and health are worth including on packaging.⁶⁰ However, it is important that these warnings be concise, accurate and evidence-based to maintain consumer trust.⁶¹

Support Product Diversity

Few states regulate the types of products that can be sold for medicinal purposes; however, as of 2021, six states prohibited combustible cannabis products, and two states prohibited vaporized products.⁶² Because surveys show that patients most frequently choose to consume cannabis via inhalation, patients in these states may not be able to access their preferred products. Additionally, whole-plant cannabis and whole extracts contain the full profile of more than 140 cannabinoids, in addition to terpenoids, flavonoids and other compounds with potential therapeutic activities, and studies have shown that whole extracts are more effective than THC or CBD administered individually.⁶³ Therefore, limiting access to whole-plant cannabis may negate some of the benefits of the plant.

Additionally, some states regulate the THC content of medical cannabis products. For instance, Wyoming, Texas, Georgia, North Carolina, South Carolina, Tennessee, Iowa, Wisconsin and Indiana have authorized low-THC medical use.⁶⁴ Generally, the highest THC concentration allowable by the various laws in these states is five percent; however, most of the states limit THC concentration to less than 1 percent THC with varying regulations around total CBD concentration or CBD concentration relative to THC.⁶⁵ Most of these states also require patient registration

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62. Richard et al. <https://www.sciencedirect.com/science/article/abs/pii/S0955395921001006>.

63. Shiri Procaccia et al., "Cannabis for Medical Use: Versatile Plant Rather Than a Single Drug," *Frontiers in Pharmacology* 13 (April 25, 2022). <https://www.frontiersin.org/articles/10.3389/fphar.2022.894960/full>.

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65. Ibid.

or ID cards and specify conditions (most often seizure disorders, but some lists are more extensive) for which patients can access medical products.⁶⁶ Perhaps most interestingly from an access perspective, few of these states allow dispensaries to operate; some do not specify where or how patients can obtain cannabis products; and one state (Tennessee) does not allow the purchase of medical cannabis products within the state, which is challenging because most state laws do not allow cannabis products to be transported across state lines.⁶⁷ The restrictions on product type and acquisition, as well as the narrow set of authorized conditions, likely keep many would be patients from accessing medical cannabis legally.

Mississippi and Florida implemented different forms of THC concentration restrictions within their comprehensive medical cannabis programs. In 2022, Florida's Department of Health issued an emergency rule setting a maximum amount of THC contained in a daily dose (in milligrams) and limiting the amount of THC contained in a 70-day supply.⁶⁸ Florida set limits for different types of products (i.e., edibles, topical preparations, smoked, inhaled, etc).⁶⁹ Rather than using daily dose limits, Mississippi limits the concentration of THC available in different products.⁷⁰ The THC concentration of cannabis flower cannot exceed 30 percent THC, whereas edibles, tinctures, oils and concentrates cannot exceed 60 percent THC.⁷¹ Similarly, during its 2023 session, the Oklahoma legislature advanced a bill to set THC concentration limits at 30 percent for flower and 60 percent for other products; however, the bill did not pass before the end of the regular legislative session and was amended to only involve maximum THC per set serving size for edible products.⁷²

At this stage, evidence about the most effective dosing, administration route and cannabinoid profile for patients is still emerging.⁷³ With cannabis, the reality may be that results vary considerably between individuals, further necessitating a diverse range of products for patients to choose from.⁷⁴

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The restrictions on product type and acquisition, as well as the narrow set of authorized conditions, likely keep many would be patients from accessing medical cannabis legally.

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68. Florida Department of Health, "Emergency 64ER22-8: Dosing and Supply Limits for Medical Marijuana," Florida Administrative Code, Aug. 29, 2022. <https://www.flrules.org/gateway/ruleNo.asp?id=64ER22-8>.

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Insulate Medical Markets from Potentially Preferential Adult-Use Policies

As more states have moved to legalize and create marketplaces for recreational or adult-use cannabis, there is some evidence that medical programs may be adversely affected. Anecdotally, patients in some states have reported concerns that fewer medical dispensaries are continuing to operate after adult-use was legalized.⁷⁵ A 2021 report supported this concern, finding that medical markets may be at risk, noting that, after accounting for economic, administrative and regulatory costs, it is more expensive to operate a medical dispensary than an adult-use dispensary in several states.⁷⁶ Although more research is needed to assess the specific policies that protect and encourage medical dispensaries, at least one study has found differential effects on medical cannabis sales and the number of patient registrations by state.⁷⁷ This suggests that differences in states' regulation of medical and adult-use markets can affect the sustainability of medical programs.⁷⁸

For instance, Oregon allowed medical dispensaries to sell adult-use products for a year before licensed adult-use dispensaries opened.⁷⁹ This coincided with a 28 percent decrease in the number of medical dispensaries over just three months, which the authors of the paper speculated could have resulted in changes in the customer base that incentivized a licensing change.⁸⁰ The study also noted that Oregon's policies allow adult-use license holders to sell medical products but not vice versa, which further incentivizes dispensaries to hold adult-use licenses over medical licenses.⁸¹

Conversely, recent legislation in California has attempted to expand access to medical cannabis for patients by requiring all cities and counties to allow the delivery of cannabis to patients and primary caregivers within their jurisdictions.⁸² Because many states allow local jurisdictions to ban or limit the sale of cannabis within their boundaries, legislation with exceptions like delivery or home cultivation can help ensure more even access for patients.⁸³

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Regulate Contaminants

Because medical cannabis is regulated at the state level, the regulation of contaminants allowed or prohibited in medical cannabis also varies by state.⁸⁴ Contamination by microbes, pesticides, solvents, fungus and heavy-metals is possible, with the likelihood of their presence varying by product type and cultivation practices.⁸⁵ In the case of medical cannabis, the importance of identifying these contaminants is especially salient because patients may be immune-compromised or more sensitive to contaminants than the rest of the population.⁸⁶

A study comparing states' regulation of contaminants found more variability in regulations for cannabis than for other agricultural products.⁸⁷ Furthermore, states varied in what they considered to be unacceptable levels of different contaminants, with five not specifying any unacceptable contaminants and one not specifying levels that would prompt regulatory action.⁸⁸ Although the literature on the effects of different contaminants on patient prognosis is limited, it stands to reason that ensuring a product free of potentially harmful compounds benefits public health.⁸⁹

Conclusion

Overall, additional research is needed to identify best practices for medical use of cannabis and patient use patterns. The lack of consensus makes it difficult to build evidence-based medical cannabis policy and has likely contributed to the disparate state policies currently in effect. For patients, this means that their state of residency impacts the safety and availability of their desired products.

By keeping patient safety and preference at the forefront, policies can be designed to regulate medical access to cannabis without harming patients. Accurate, comprehensive labeling; diverse product availability; ensuring the existence of medical markets; and regulating contaminants are all areas in which practical policies can improve access and safety in medical markets.

Policies and Practices to Protect Patients



Contamination is possible, and it is critical to identify contaminants for those who are immune-compromised or have sensitivities.



By keeping patient safety and preference at the forefront, policies can be designed to regulate medical access to cannabis without harming patients.

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