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Qualifying Conditions Of Medical Cannabis License Holders In The United States

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ABSTRACT The evidence for cannabis’s treatment efficacy across different conditions varies widely, and comprehensive data on the conditions for which people use cannabis are lacking. We analyzed state registry data to provide nationwide estimates characterizing the qualifying conditions for which patients are licensed to use cannabis medically. We also compared the prevalence of medical cannabis qualifying conditions to recent evidence from the National Academies of Sciences, Engineering, and Medicine report on cannabis’s efficacy in treating each condition. Twenty states and the District of Columbia had available registry data on patient numbers, and fifteen states had data on patient-reported qualifying conditions. Chronic pain is currently and historically the most common qualifying condition reported by medical cannabis patients (64.5 percent in 2016). Of all patient-reported qualifying conditions in 2016, 84.6 percent had either substantial or conclusive evidence of therapeutic efficacy. As medical cannabis use continues to increase, creating a nationwide patient registry would facilitate better understanding of trends in use and of its potential effectiveness.

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Thirty-three US states and the District of Columbia have legalized cannabis for medical use since 1996, and ten states have legalized cannabis for recreational use since 2012.¹ Patients receiving cannabis for medical purposes must possess a license to use it. Patients must have a doctor certify that they have a qualifying condition to obtain a license from the state. Despite the existence of medical cannabis patient registries to monitor these patients, registry implementation varies across states.² Some states (such as California and Maine) collect minimal or no data in voluntary registries, while others (such as Arizona and Colorado) collect and publish detailed reports. One prior study aggregated and examined the prevalence of medical cannabis cardholders nationwide in the period 2001–15, showing generally increasing total numbers of licensed medical

cannabis patients.³ However, nationwide documentation is lacking on the qualifying conditions for which people are actually using cannabis medically. Thus, characterizing the national scope and implications of such use remains challenging and is important because of the policy implications of using cannabis as a potential therapeutic agent.

In 2017 the National Academies of Sciences, Engineering, and Medicine published a comprehensive review of the risks and therapeutic benefits of cannabis and cannabinoids (the active compounds in cannabis) for a wide range of conditions.⁴ There was conclusive or substantial evidence that chronic pain, nausea and vomiting due to chemotherapy, and multiple sclerosis (MS) spasticity symptoms were improved as a result of cannabis treatment. However, there was limited, insufficient, or no evidence of therapeutic value for many conditions allowed under state

law, including posttraumatic stress disorder, anxiety, cancer, epilepsy, and irritable bowel disease.

Given the lack of detailed registry data and widely variable evidence of cannabis efficacy for different qualifying conditions, we aimed to provide an up-to-date set of estimates characterizing the conditions for which people have obtained medical cannabis licenses nationwide. We hypothesized that the proportion of medical cannabis licenses issued for a given condition would be consistent with both the efficacy of cannabis for and the population prevalence of that condition in the US. For example, we expected that chronic pain (which has substantial evidence of efficacy and affects 100 million Americans)⁵ would be a common condition for which people used cannabis. In contrast, we hypothesized that amyotrophic lateral sclerosis (which has no evidence of efficacy and is a rare condition) would rarely be approved or used to qualify for treatment with cannabis.

Using the 2017 National Academies report as a guideline,⁴ we examined the relationship between published evidence of cannabis's efficacy and the relative prevalence of those qualifying conditions, as well as the number of states that allowed medical use of cannabis for those conditions. Finally, we compared enrollment rates and qualifying conditions across states based on their medical cannabis legislation—that is, whether there were differences between states that used a medicalized versus a nonmedicalized model, as these terms have been defined in prior work.⁶

Study Data And Methods

DATA COLLECTION We collected registry statistics as of April 2018 from states with legalized medical cannabis, using publicly available reports on state websites and by contacting the relevant state departments via phone and email. Registry data were obtained from the District of Columbia and twenty states: Alaska, Arizona, California, Colorado, Delaware, Hawaii, Illinois, Maine, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Rhode Island, and Vermont. Some states publish monthly reports, while others publish annual reports. Three of these states do not publish reports every year: Michigan (data were missing for 2010 and 2013), Montana (data were missing for 2005–11 and 2013–15), and Rhode Island (data were missing for 2007, 2009, 2011, 2013, 2015, and 2016). Connecticut does not publish reports, and officials in that state did not respond to data requests. Twelve states (Arkansas, Florida,

Louisiana, Maryland, Missouri, North Dakota, Ohio, Oklahoma, Pennsylvania, Utah, Washington, and West Virginia) reported not having any statistics available. California and Maine have voluntary registries, so it is very unlikely that the numbers reported are representative of the total number of licensed patients and qualifying conditions.¹ This is especially true for California, which reported a maximum of 12,659 cardholders in 2009–10, despite having the oldest medical cannabis legislation in the country (the legislation was passed in 1996) and the largest population of any state. Thus, these states were excluded from our analyses. (See online appendix A1 for a list of states and reports that were used for data analysis.)⁷

DEFINITIONS We use the terms *patient*, *qualifying condition*, and *patient-reported qualifying condition* to describe data from states' registries. *Patient* refers to a person enrolled in a medical cannabis program. *Qualifying condition* refers to a medical condition that states recognize as allowing patients to obtain cannabis licenses. *Patient-reported qualifying condition* refers to the reported medical condition that allowed patients to obtain medical cannabis licenses. Thus, patients obtain licenses for one or more qualifying conditions, which often results in there being more patient-reported qualifying conditions than there are patients.

We classified qualifying conditions from each state report into categories in the 2017 National Academies report,⁴ combining or keeping separate certain symptoms or conditions when clinically appropriate according to the advice of a physician, coauthor Daniel Clauw. (See appendix A2 for the full list of qualifying conditions and report categories.)⁷ We then graphically represented the total number of patient-reported qualifying conditions of each type from each year. Conditions that accounted for less than 1.5 percent of the total were consolidated into an “other” category. We also graphically represented patient-reported qualifying conditions in 2016 (the most recent year for which we had data from all states except Rhode Island) with medicalized laws compared to those with nonmedicalized laws. Following prior work, we considered medicalized laws to be those that include requirements for more than one of the following, while nonmedicalized laws include requirements for one or fewer of them: the doctor-patient relationship, regulations on manufacturing or dispensing, testing or labeling, refills, physician training, smoked versus unsmoked products, and prescription drug monitoring programs.⁶ Finally, also using data for 2016, we examined the number of patient-reported qualifying conditions in each National Academies

report category,⁴ according to the level of evidence associated with that condition.

LIMITATIONS This study had several limitations. First, we were unable to access data for all states with medical cannabis registries, and some historical and current data were missing in certain states from which we did access data. This is especially concerning in the case of California, as some estimates suggest that California may have as many patients as the entire rest of the country combined.² However, an observational study of 2,897 medical cannabis users in California found that 63 percent used cannabis for pain, which is consistent with our results.⁸

Second, in the context of new recreational cannabis laws, some medical cannabis users may choose not to obtain licenses. This is a different type of missing data concern that could have affected data reported from five states (Alaska, Colorado, Massachusetts, Nevada, and Oregon) and the District of Columbia in our analysis.

Third, as patients often have comorbid medical conditions, there are consistently more patient-reported qualifying conditions than there are patients, so it is uncertain for which condition or symptom patients are primarily using cannabis.

Fourth, given the range of conditions for

which the use of cannabis is legal and the broad categories defined by the 2017 National Academies report,⁴ our assigning conditions to different categories may have oversimplified clinical and disease-specific differences. For example, conditions such as spinal cord injury or muscular dystrophy likely have a pain component, so placing them in a category of no or insufficient evidence may be problematic.

Fifth, there are some qualifying conditions for which additional evidence has been provided since the report was published in 2017. For example, a pharmaceutical product containing the cannabinoid cannabidiol (CBD) was recently approved by the Food and Drug Administration for treatment of the epileptic conditions Dravet syndrome and Lennox-Gastaut syndrome.

Finally, there is mixed evidence of efficacy within certain conditions. For example, there is substantial evidence for analgesia in chronic pain but some evidence of inefficacy for managing depression and anxiety in chronic pain.

Study Results

Including states that did not have data on patient-reported qualifying conditions, there were 646,854 registered medical cannabis pa-

EXHIBIT 1

Number of patients enrolled in state medical cannabis programs, 2009-17

	2009	2010	2011	2012	2013	2014	2015	2016	2017
AK (1998)					1,431	1,743	1,773	1,084	1,053
AZ (2010)			17,852	34,699	43,148	61,272	92,705	114,439	152,979
CO (2000)	41,039	116,198	82,089	108,526	110,979	115,467	107,534	94,577	93,372
DE (2011)					36	73	370	1,414	3,274
DC (2010)								4,600	5,386
HI (2000)							13,150	15,334	19,858
IL (2013)							2,663	7,707	21,800
MA (2012)						1,423	18,476	33,543	45,319
MI (2008)	1,717		119,470	124,131		96,408	182,091	218,556	269,553
MN (2014)								2,806	7,022
MT (2004)				8,681				7,785	21,881
NV (2000)					4,989	8,055	13,561	25,358	23,489
NH (2013)								2,089	3,493
NJ (2010)					1,670	3,727	6,960	12,154	16,937
NM (2007)				8,206	10,708	12,419	19,629	29,046	46,645
NY (2014)								4,998	
OR (1998)	29,289	39,301	45,456	50,258	54,884	66,311	78,045	68,032	59,137
RI (2006)		3,069		4,849		11,914			18,533
VT (2004)	219	344	385	648	844	1,290	2,056	3,332	5,313
Total	72,264	158,912	265,252	339,998	228,689	380,102	539,013	646,854	815,044

SOURCE Authors' analysis of data from state medical cannabis registries, collected from state reports over time. **NOTES** Many states did not report data (indicated by blank cells) until one or more years after their law was passed (dates of passage are in parentheses). In addition, number of patients was not originally reported in the 2014 Rhode Island report, so it was calculated based on the ratio of the number of patients to the number of patient-reported qualifying conditions from 2017.

tients in 2016 and 815,044 in 2017 (exhibit 1). The 2017 estimate does not include New York, and it likely underestimates the total by more than 70,000 patients based on changes in the New York patient number since 2016. By comparison, there were 749,363 patient-reported qualifying conditions in 2016, and 981,319 in 2017 (data not shown), which reflects the facts that multiple states report patient counts but not patient-reporting qualifying conditions and that people can have more than one patient-reported qualifying condition in a given year.

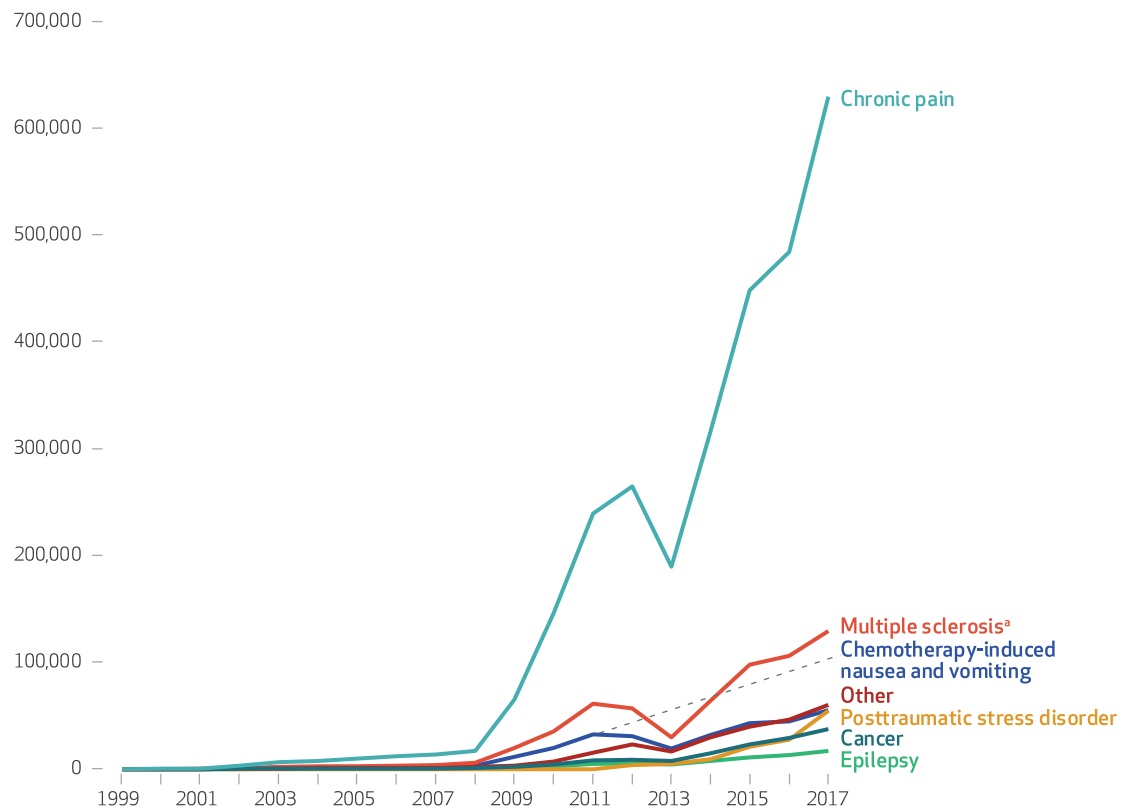
Chronic pain has consistently been the most common patient-reported qualifying condition, accounting for 61.4 percent of the total patient-reported qualifying conditions, on average (ranging from 33.3 percent to 72.5 percent in the period 1999–2016). Multiple sclerosis spasticity symptoms is the second most common, followed by chemotherapy-induced nausea and vomiting, posttraumatic stress disorder, and cancer (exhibit 2). The missing data from Rhode Island and Michigan described in the “Study Data And Methods” section are apparent in this

exhibit, with the sharpest decrease in trends due to the lack of Michigan data in 2013.

In 2016 chronic pain accounted for 64.5 percent of patient-reported qualifying conditions (483,394 of 749,363) among active cardholders (data not shown). We examined whether this trend was similar in states with and without medicalized programs.⁶ Chronic pain was most common (accounting for 66.7 percent of all patient-reported qualifying conditions) in older, nonmedicalized state programs, such as those in Arizona, Colorado, and Michigan (exhibit 3). Compared to medicalized programs, nonmedicalized ones have far more patients (573,127 versus 31,168) and patient-reported qualifying conditions (701,993 versus 47,370) than medicalized ones, accounting for 93.7 percent of the latter total. Although chronic pain is also the most common patient-reported qualifying condition in medicalized states (32.2 percent), other conditions such as multiple sclerosis spasticity symptoms (26.8 percent), cancer (9.8 percent), and irritable bowel disease (5.6 percent) make up a substantial portion of the total in

EXHIBIT 2

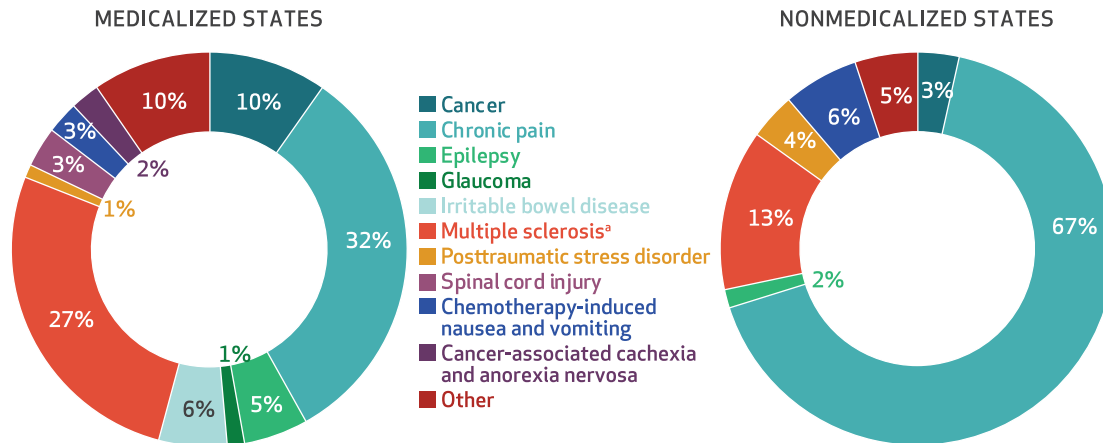
Numbers of patient-reported qualifying conditions for medical cannabis licenses, 1999–2017



SOURCE Authors' analysis of data from state medical cannabis registries. **NOTES** Data were missing for Michigan for 2010 and 2013 and for Rhode Island for 2007, 2009, 2011, 2013, 2015 and 2016. The sharp dip in patient-reported qualifying conditions in 2013 is attributable to the large number of patients in Michigan who were not accounted for in that year. ^aSpasticity symptoms.

EXHIBIT 3

Percentages of patient-reported qualifying conditions for medical cannabis licenses, medicalized and nonmedicalized states, 2016



SOURCE Authors' analysis of data from state medical cannabis registries. **NOTES** The percentages come from active patient data for 2016 (see note 6 in text). Medicalized states (including DE, IL, MN, NH, NJ, and NY) have more than one requirement pertaining to the doctor-patient relationship, physician training, supply chain, and so on. In these states there were 47,370 patient-reported qualifying conditions and 31,168 patients. Nonmedicalized states (including AZ, CO, HI, MI, MT, NV, NM, and OR) have no or only one such requirement. In these states there were 701,993 patient-reported qualifying conditions and 573,127 patients. The exhibit does not include data for all twenty states with registries because several do not provide data on qualifying conditions. ^aSpasticity symptoms.

those states.

Overall, in 2016, 84.6 percent of patient-reported qualifying conditions (chronic pain, chemotherapy-induced nausea and vomiting, and MS spasticity symptoms) were supported by conclusive or substantial evidence of therapeutic effectiveness, according to the 2017 National Academies report (data not shown).⁴ This percentage was quite consistent across the time frame of available registry data (mean: 87.1 percent; standard deviation: 6.2 percent). However, there are many other less well-supported qualifying conditions, including some for which there is either no or insufficient evidence for efficacy (such as hepatitis C and muscular dystrophy) or even evidence suggesting that cannabis is ineffective (for example, glaucoma) for treating them (exhibit 4). (See appendix exhibit A3 for a visualization of the number of states that allow medical cannabis licensure for each qualifying condition.)⁷

Discussion

We have reported the number of patients who used medical cannabis for the various qualifying conditions allowed under state law, tracking changes in the conditions for which patients used it over time. Though our reported values likely underestimate the true number of patients and qualifying conditions because of the lack of data (especially for California), our data show that the number of medical cannabis patients has

risen dramatically over time as more states have legalized medical cannabis.

While substantial or conclusive evidence exists to establish the efficacy of cannabis to treat 84.6 percent of patient-reported qualifying conditions in 2016, there is a mismatch between many of the qualifying conditions allowed under state law and the level of evidence supporting the use of cannabis for each condition. This may be due to several factors. First, as noted in the 2017 National Academies report,⁴ the legal status of cannabis as a Schedule I substance makes it challenging to conduct clinical trials to establish evidence of efficacy. Second, there is a funding bias, as government funding has typically been used to examine harm due to cannabis use and abuse rather than to investigate its therapeutic benefits.^{4,9} Third, groups representing certain conditions (for example, veterans advocating for medical access to cannabis for managing posttraumatic stress disorder) have effectively lobbied for certain qualifying conditions to be added in selected states.¹⁰ Recently, such advocates have also obtained resources to do more relevant clinical trials that examine efficacy, which may address some of the funding bias in the future.¹¹

Chronic pain was by far the most prevalent patient-reported qualifying condition. This finding is consistent with the prevalence of chronic pain, which affects an estimated 100 million Americans.⁵ Furthermore, many drugs do not effectively manage pain symptoms or have side

EXHIBIT 4

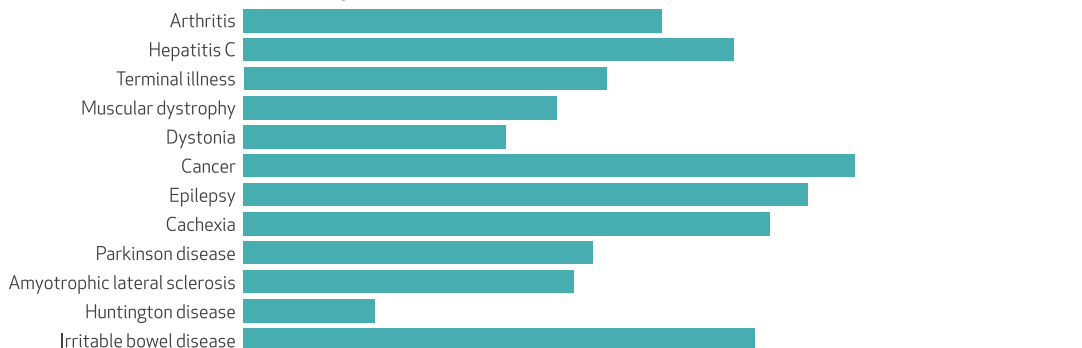
Patient-reported qualifying conditions and level of evidence, 2016

LEVEL OF EVIDENCE

Limited evidence of inefficacy



No or insufficient evidence of efficacy



Limited evidence of efficacy



Substantial evidence of efficacy



Conclusive evidence of efficacy



0 10 100 1,000 10,000 100,000 1,000,000
Qualifying conditions

SOURCE Authors' analysis of data from state medical cannabis registries. **NOTES** The level of evidence comes from the 2017 National Academies report (see note 4 in text). All conditions had at least one associated patient except anxiety, which is currently allowed as a qualifying condition in West Virginia (a state with no available data) and was recently added in New Jersey. ^aSpasticity symptoms.

effects that preclude their long-term use,¹² and fear of addiction and side effects (especially with opioids) may incentivize patients to use cannabis. Problems with pain management and dissatisfaction with current treatment options are substantiated by nationwide studies that have shown decreased opioid overdose deaths, prescriptions, and hospitalizations in states with medical cannabis legislation,^{13–20} as well as reports of people with chronic pain substituting cannabis for opioids.^{8,21–29} Finally, chronic pain is an extremely common symptom in many medical conditions, so if patients have conditions that are not covered but also have chronic pain, it is possible that they may use chronic pain as the umbrella condition under which they obtain a license. If this is true, the pattern of chronic pain registrations may change as data emerge from

states with newer medical cannabis laws, which now tend to be more medicalized and have more stringent definitions of qualifying conditions or symptoms.¹ For example, New York and Illinois have recently added opioid substitution or replacement therapy as a qualifying condition.³⁰

Alaska, Colorado, Nevada, and Oregon exhibited a decline in medical cannabis patient enrollees following legalization of recreational cannabis in the period 2012–16. In contrast, Massachusetts and the District of Columbia exhibited increased numbers of enrollees, although this may be because the recreational law in Massachusetts had not yet been implemented at the time of data collection and the District of Columbia does not have any active recreational cannabis dispensaries. (California, Maine, Vermont, Washington State, and Michi-

gan do not have available or reliable data to analyze since their recreational laws were passed.) The data from Alaska, Colorado, Nevada, and Oregon are in keeping with the blurred lines between types of cannabis use, as many people use cannabis recreationally, medically, or both.^{31,32} These declines in medical cannabis patient enrollment suggest that in states where cannabis becomes legal for recreational adult use, people who use cannabis may no longer feel the need to obtain a license to protect themselves from legal reprisal. Moreover, medical users may no longer wish to incur licensing costs, including those associated with doctor approval and license fees, when they can otherwise obtain cannabis legally. As no states with medicalized laws have yet legalized cannabis for recreational use, it remains to be seen whether they will have enrollment patterns similar to those of the non-medicalized states.

Given the wide variability in the number of patients using cannabis for different conditions, these results suggest that it may be important to account for patient-reported qualifying conditions, rather than simply patient numbers, when examining the effects of cannabis legislation on public health (for example, medication prescribing, which varies based on medical condition). They also highlight the importance of compiling a nationwide database of medical cannabis users to evaluate the risks and benefits of using medical cannabis for different medical conditions and symptoms. Such a registry could guide state legislation on allowable qualifying conditions and track risks associated with specific products (such as cannabis concentrates or edibles). Finally, our results suggest the need to monitor how medical and recreational cannabis regimes coevolve, as early data indicate that recreational

cannabis legalization could render medical cannabis laws moot over time. If legal cannabis use is increasingly decoupled from medical need or oversight at the state level, then a larger role for federal government oversight—for instance, by the Food and Drug Administration—regarding product safety and information may be warranted.³³

Conclusion

We provided a historical and current view of qualifying conditions for which medical cannabis patients obtain their licenses. Our results highlight many inconsistencies in data quality across states, which suggests the need for further standardization of data collection. Such standardization would add transparency to understanding how medical cannabis programs are used, which would help guide both research and policy needs. For example, funneling resources into relevant clinical or epidemiological studies that determine the risks and benefits of cannabis compared to those of other medications could influence insurance coverage for cannabis products and thus warrant improved federal oversight.

Of the conditions for which patients are licensed to use medical cannabis, 84.6 percent have either substantial or conclusive evidence of efficacy, according to the categories outlined in the 2017 National Academies report.⁴ Thus, we believe not only that it is inappropriate for cannabis to remain a Schedule I substance, but also that state and federal policy makers should begin evaluating evidence-based ways for safely integrating cannabis research and products into the health care system.³³ ■

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Aptinyx, Regeneron, IMC, and Intec. None of the other authors has relevant financial interests in or relationships with entities in the biomedical arena that could be perceived to influence, or that give the appearance of potentially influencing, this article.

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