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An Analysis of Applicants Presenting to a Medical Marijuana Specialty Practice in California

Helen Nunberg, Beau Kilmer, Rosalie Liccardo Pacula, and James R. Burgdorf

Abstract

While 15 states and the District of Columbia provide allowances for medical marijuana, little is known about the individuals who seek a physician's recommendation to use marijuana. This study provides descriptive information about 1,655 applicants in California who sought a physician's recommendation for medical marijuana, the conditions for which they sought treatment, and the diagnoses made by the physicians. It presents a systematic analysis of physician records and questionnaires obtained from consecutive applicants seen during a three-month period at nine medical marijuana specialty practices operating throughout the state. The analysis yields insights that may be useful for future research on medical marijuana and marijuana policy, including: 1) very few of those who sought a recommendation had cancer, HIV/AIDS, glaucoma, or multiple sclerosis; 2) most applicants presented with chronic pain, mental health conditions, or insomnia; and 3) half of the applicants reported using marijuana as a substitute for prescription drugs.

KEYWORDS: medical marijuana, California, ballot, drug policy

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I. INTRODUCTION

As of December 2010, 15 states and the District of Columbia provide allowances for medical marijuana (National Conference of State Legislatures, 2010).[1] There is a small literature about whether these laws influence the overall demand for marijuana (Gorman and Charles, 2007; Pacula et al., 2010), and a tremendous amount of discussion about how medicinal marijuana is distributed, especially in California (see e.g., Hoeffel, 2010a; 2010b). What remains largely missing from the literature and policy discussions is a good understanding of the individuals who seek a medical allowance for marijuana.

This paper helps fill this gap by systematically evaluating the characteristics, ailments, and medical histories of a large group of applicants who sought a medicinal marijuana recommendation. Data were collected from medical charts and doctor interviews with 1,655 individuals seen in June, July and August of 2006 from nine medical marijuana specialty practices dispersed throughout California. The results provide some interesting insights as to the characteristics of those seeking medicinal allowances nearly a decade after the policy was introduced in California.

The remainder of this paper is organized as follows. In Section 2 we briefly review the literature on the therapeutic value of cannabinoids, provide details of the specific allowances provided for within California state law, and review previously published surveys of populations of medical marijuana users. In Section 3 we discuss the methods that were used in the current study, including our data collection procedures, and in Section 4 we present our results. A general discussion of these findings and the limitations of our study are presented in Section 5.

II. BACKGROUND AND LITERATURE REVIEW

Research on the Therapeutic Value of Cannabinoids

Cannabinoids are compounds found in the cannabis plant (phytocannabinoids), in animals (endocannabinoids), and synthesized in laboratories (e.g., THC analogues, cannabinoid receptor agonists) (Pertwee, 2006). Cannabinoid receptors are found in all animals; in humans, cannabinoid receptors are concentrated in the brain but are also found in other parts of the body.

The use of cannabis as a medicine originated thousands of years ago. After being introduced to the West in the mid-nineteenth century, cannabis-based

[1] This excludes Maryland. While Maryland does allow those arrested for marijuana possession to use a medical necessity defense, those found to be using for medical purposes are still convicted and can be fined up to $100.

medicines were popular through the early decades of the twentieth century (Grinspoon, 2005; Zuardi, 2006). The virtual disappearance of cannabis-based medicines by the mid-1900s was due to the introduction of new pharmaceuticals (e.g., aspirin, chloral hydrate, barbiturates) for the same conditions, such as pain, migraines, menstrual cramps, and sedation, as well as the legal restrictions associated with the 1937 Marihuana Tax Act (Fankhauser, 2002; Grinspoon, 2005).

The Institute of Medicine's (IOM) 1999 report *Marijuana and Medicine: Assessing the Science Base*, concluded: "Scientific data indicate the potential therapeutic value of cannabinoid drugs, primarily THC, for pain relief, control of nausea and vomiting, and appetite stimulation; smoked marijuana, however, is a crude THC delivery system that also delivers harmful substances" (4). The report further noted that, "For the most part, the logical categories for the medical use of marijuana are not based on particular diseases but on symptoms…[that] can be caused by various diseases or even by treatments for diseases" (IOM, 1999; pp. 137-138). Based on these findings, the panel recommended that "clinical trials of cannabinoid drugs for symptom management should be conducted with the goal of developing rapid-onset, reliable, and safe delivery systems" (4). In addition to focusing on pain relief, control of nausea and vomiting, and appetite stimulation, the IOM report also recommended that clinical trials focus on the suitability of cannabinoid drugs to address anxiety reduction and sedation.

Reviews published since the IOM report also highlight the potential therapeutic value of cannabinoid drugs; however, few of the studies focus on inhaled marijuana. A review of 72 randomized, double-blind, placebo-controlled studies from 1975 to 2004 that evaluated the therapeutic effects of cannabinoids concludes: "Cannabinoids present an interesting therapeutic potential as antiemetics, appetite stimulants in debilitating diseases (cancer and AIDS), analgesics, and in the treatment of multiple sclerosis, spinal cord injuries, Tourette's syndrome, epilepsy and glaucoma" (Ben Amar, 2006). A more recent review focusing on clinical studies published from 2005 to 2009 (Hazekamp and Grotenhermen, 2010) concluded that cannabinoids have "therapeutic potential mainly as analgesics in chronic neuropathic pain, appetite stimulants in debilitating diseases (cancer and AIDS), as well as in the treatment of multiple sclerosis." For both reviews, a minority of the trials evaluated inhaled marijuana (six and eight studies, respectively). The others used a synthetic THC isomer or analog for oral administration, or plant extract in oral or sublingual preparations.[2]

[2] Hazekamp and Grotenhermen included recent studies of nabilone, a prescription drug that is a THC analog. Skrabek et al. (2008) performed a randomized, controlled trial to assess the benefit of nabilone on pain reduction and quality of life improvement in patients with fibromyalgia. They found significant decreases in pain and anxiety. Similarly, Ware et al. (2010) concluded that nabilone "is effective in improving sleep in patients with fibromyalgia and is well tolerated."

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In February 2010, the Center for Medicinal Cannabis Research (CMCR) at the University of California San Diego submitted a report to the Legislature and Governor of California describing five completed clinical trials with inhaled marijuana (Grant et al., 2010). Four demonstrated pain relief effects in conditions secondary to injury or disease of the nervous system (Abrams et al., 2007; Wallace et al., 2007; Wilsey et al., 2008; Ellis et al., 2009), and one suggested a reduction of spasticity in multiple sclerosis (Corey-Bloom et al., 2008).

Medicinal Marijuana in California

In California, patients with a physician's recommendation, along with their designated caregivers and recommending physicians, are exempted from state criminal laws against marijuana. Although provision and use remain illegal under federal law, U.S. Attorney General Eric Holder made a statement in March 2009 suggesting that the federal government would not target those who complied with state medical marijuana laws. This was made more official in an October 2009 memo to U.S. Attorneys which noted: "As a general matter, pursuit of these priorities should not focus federal resources in your States on individuals whose actions are in clear and unambiguous compliance with existing state laws providing for the medical use of marijuana."

The California medical marijuana law, passed through voter referendum (Proposition 215) in 1996, permits the use of marijuana for "cancer, anorexia, AIDS, chronic pain, spasticity, glaucoma, arthritis, migraine, or any other illness for which marijuana provides relief." California Senate Bill 420, signed into law on October 12, 2003, named additional ailments such as severe nausea, cachexia, seizures, and persistent muscle spasms (regardless of whether they are associated with multiple sclerosis). In an effort to provide better guidance to law enforcement agencies, SB 420 allowed patients and primary caregivers to possess up to six mature plants (or 12 immature plants) and eight ounces of marijuana; however, it granted local governments the authority to establish larger maximum quantities.

Many of the early studies about medicinal marijuana users in California focused on individuals with HIV or AIDS (e.g., Harris et al., 2000; Sidney, 2001; de Jong et al., 2005; Prentiss et al., 2004). Based on analyses of several unpublished surveys of clients entering cannabis buyer clubs in the San Francisco Bay Area, Gieringer (2002) found that the share of clients that were AIDS and cancer patients declined after the passage of Proposition 215. More recent research in California shows that medicinal marijuana patients are largely men

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Finally, in a more recent observational study (Bestard and Toth, 2010), nabilone was found to be as effective as gabapentin, a first line medication for peripheral neuropathy, in measures of pain, sleep, depression and anxiety.

who present with pain and/or emotional/mental health concerns (O'Connell and Bou-Matar, 2007; Reiman, 2007; Reiman, 2009). An informal survey of several California medical marijuana specialty physicians revealed that more than 95% of the patients of each physician were already "self-medicating" prior to the receipt of their recommendation, leading Mikuriya et al. (2007) to conclude that the physicians were really "approving" the medical use of marijuana as opposed to "recommending" it.

III. DATA AND METHODS

The data used in this study come from medical records of 1,745 applicants consecutively presenting to nine MediCann clinics located in large and small cities throughout California.[3] The sample is based on visits in June, July, and August 2006, roughly ten years after the original law was enacted. Medical charts were reviewed and data entered within a few weeks of the visit. Our final sample excludes 90 individuals who are either missing diagnosis information (N=35) or did not report using marijuana before seeking a recommendation (N=55).[4] There are no statistically significant differences in terms of age, race/ethnicity, and gender between those included and excluded in the analysis sample.

We drew on consecutive visits from all nine clinics in hopes of approximating a representative sample of applicants seeking recommendations at these medical marijuana specialty practices. The sample is not generalizable to all individuals applying for a medical marijuana recommendation as it only represents those individuals selecting this particular network of physicians.

In general, the MediCann policy was to provide a 12-month recommendation to those with an acceptable medical condition who had supporting medical record documentation.[5] Those without medical record documentation received a provisional three-month recommendation conditional upon them providing the MediCann physician with a copy of the relevant supporting medical record, or, if not currently under the care of a medical professional, seeking care and providing those records. Applicants were only denied if they did not report having an eligible medical condition or if they

[3] Since 2006, MediCann has expanded to 21 locations throughout California.

[4] While in many ways the applicants who report not using marijuana prior to seeking this recommendation are perhaps the most interesting, there are an insufficient number of these individuals in our sample for robust comparisons.

[5] Qualifying patients would be given a recommendation and would be reassessed periodically to review the course of treatment and any new information about their health, as well as to monitor response to treatment as indicated by a decrease in symptoms, an increase in level of function, or an improvement in quality of life.

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refused to be under the care of a medical professional. For our sample the denial rate was less than 2%.

MediCann's medical records include two standard forms specifically created for MediCann. One form is filled out by the applicant and includes demographic information, medical history, and marijuana use history. The second form is filled out by the evaluating physician and contains clinical information related to the health problem and symptoms for which the applicant is seeking help. Clinic physicians relied on medical histories, physical exams, and the supporting medical documents when they assigned diagnoses. The supporting medical documents included laboratory and radiological evaluations to validate applicant claims of use of marijuana for relief of symptoms due to a medical condition. Over two-thirds of applicants (67.8%) brought medical record documentation with them at the time of the visits analyzed in our study.

In light of the limited information on this population of interest, we examine simple means or sample proportions for several variables of interest, including patient characteristics and stated therapeutic needs, physician diagnoses, and medical history. Results are provided for the entire sample and then broken down by gender.

IV. RESULTS

Applicant Characteristics

Applicant demographic information is shown in Table 1 both for the full sample and by gender, since almost 73% of the applicants seeking a recommendation were male. This is not much different than the share of those in the 2006 National Household Survey on Drug Use and Health who reported purchasing marijuana in the previous month (70%). Female applicants seeking recommendations were, on average, older and more likely than men to be African American, have some college education, have Medicaid (Medi-Cal) health insurance, or to be unemployed and disabled (19.5% of women reported being unemployed due to disability). In general, those seeking recommendations were insured (73.0% currently insured, of whom 24.2% were covered through Medicare or Medicaid), have at least a high school degree (only 8.8% had less than a high school degree), and were generally employed (68.7%).

As for the age distribution, at least half of the population that sought medical recommendations through this physician group was over the age of 35. For comparison, the median age category for those 18 and older in the 2006 NSDUH who reported purchasing marijuana in the previous month was 26-29 years.

Table 1. Characteristics of applicants seeking physician recommendations for medical marijuana

	All	Females	Males	P-value
	N=1655	N=452	N=1203	
Male	72.7%	--	--	--
White	58.5%	60.0%	58.0%	0.477
Hispanic	14.5%	13.1%	15.0%	0.305
Black	10.9%	14.2%	9.7%	*0.010*
Native American/Asian	6.9%	5.3%	7.6%	0.108
Mixed race or other	8.9%	8.0%	9.3%	0.393
12-18 years old	0.2%	0.0%	0.2%	0.288
18-24 years old	17.8%	12.6%	19.8%	*0.001*
25-34years old	27.9%	26.8%	28.3%	0.546
35-44 years old	21.8%	19.9%	22.5%	0.251
45-54 years old	19.3%	26.1%	16.8%	*0.000*
55+ years old	13.0%	14.6%	12.4%	0.232
Not a high school graduate	8.8%	8.6%	8.9%	0.866
High school graduate	42.5%	35.7%	45.1%	*0.001*
Some college	27.1%	31.0%	25.6%	*0.031*
College graduate	21.6%	24.7%	20.4%	0.064
Employed	68.7%	60.4%	71.8%	*0.000*
Disabled	15.5%	19.5%	14%	*0.006*
Previous military service	10.5%	2.1%	13.6%	*0.000*
Currently insured	73.0%	78.2%	71.1%	*0.004*
Workers' compensation	3.5%	2.9%	3.7%	0.394
Medicare	9.2%	11.9%	8.2%	*0.020*
Medi-Cal	15.0%	21.7%	12.6%	*0.000*
Private	42.4%	41.4%	42.7%	0.619
Veterans Administration	3.2%	2.0%	3.7%	0.086

Notes: Missing employment/disability data for 3 applicants, insurance information for 13 applicants, education information for 51 applicants, and military information for 86 applicants. Education variables denote highest level obtained. P-values below 0.05 are printed in italics.

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Table 2. Self report of therapeutic benefits of medical marijuana

	All	Females	Males	P-value
	N=1655	N=452	N=1203	
To relieve:				
Pain	82.6%	82.7%	82.5%	0.924
Spasms	41.3%	44.2%	40.1%	0.132
Headache	40.8%	49.3%	37.6%	*0.000*
Anxiety	38.1%	51.1%	33.3%	*0.000*
Nausea	27.7%	44.9%	21.3%	*0.000*
Depression	26.1%	35.4%	22.6%	*0.000*
Cramps	19.0%	33.4%	13.5%	*0.000*
Panic	16.9%	27.2%	13.1%	*0.000*
Diarrhea	4.8%	4.9%	4.7%	0.913
Itching	2.7%	1.1%	3.3%	*0.013*
To improve:				
Sleep	70.6%	69.0%	71.2%	0.397
Relaxation	55.6%	60.2%	53.9%	*0.023*
Appetite	38.0%	35.0%	39.2%	0.117
Focus	23.3%	19.7%	24.6%	*0.035*
Energy	15.5%	17.7%	14.7%	0.135
To prevent:				
Anger	22.7%	21.9%	22.9%	0.653
Medication side effects	22.6%	27.0%	20.9%	*0.009*
Involuntary movements	6.2%	7.3%	5.8%	0.266
Seizure	3.0%	3.8%	2.7%	0.239
As a substitute for:				
Prescription medicine	50.8%	51.1%	50.7%	0.885
Alcohol	13.2%	11.3%	13.9%	0.164

Note: P-values below 0.05 are printed in italics.

Applicants' Self Reports of the Therapeutic Benefits of Marijuana

In light of the IOM's argument that "the logical categories for the medical use of marijuana are not based on particular diseases but on symptoms" (IOM; pp. 137-138), we examined the self-reported therapeutic benefit received from marijuana and the symptoms it helped relieve. Applicants were asked: "Which of the following best describe the therapeutic benefit you receive from medicinal cannabis? (Check the most important reasons you use cannabis.)" The results are presented in Table 2.

Applicants most frequently reported using medical marijuana for pain relief (82.6%), improved sleep (70.6%), and relaxation (55.6%). The next most frequently reported benefits included relief of muscle spasms (41.3%), headache (40.8%), relief of anxiety (38.1%), improved appetite (38.0%), relief of nausea and vomiting (27.7%), and relief of depression (26.1%). Half the applicants (50.8%) reported using marijuana as a substitute for prescription medication and 13.2% reported using marijuana as a substitute for alcohol.

Interestingly, women were statistically more likely than men to report that they used marijuana to relieve most of the indications listed, including headaches, anxiety, nausea, depression, panic, and medication side-effects. The only indication for which men were more likely than women to report use of marijuana was to help with focus (24.6% and 19.7%, respectively).

Physician Diagnoses

Table 3 presents the highest frequency diagnoses made by MediCann physicians and the diagnoses specifically listed in the Compassionate Use Act. Recall that treating physicians make their diagnoses based on a review of the applicant's history, the medical records from treating physicians (in two-thirds of the cases), and on their own physical examination. Evaluating physicians were then asked to "circle only diagnoses related to patient's medicinal marijuana use" from a list of 162 diagnoses.

In general, chronic pain disorders were the most common diagnoses made by physicians, with nearly 60 percent (58.2%) of applicants being diagnosed with some sort of musculoskeletal or neuropathic chronic pain condition. Low back pain was diagnosed for over one quarter (26.2%) of patients seen during this three month period, with lumbar and cervical degenerative disc disease (together 21.8%) and arthritis (18%) the next most common diagnoses in the chronic pain group. Mental health disorders were the next largest group of diagnoses made (22.9%), followed closely by sleep disorders (21.3%). Diagnoses in the grouping "neurological disorders," including migraine and other headache, were made in

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16.6% of applicants. Only 3% of the applicants were diagnosed with either cancer or HIV/AIDS.

Table 3. High frequency diagnoses and diagnoses listed in Proposition 215 and SB 420

	All	Females	Males	P-value
	N= 1655	N= 452	N= 1203	
Musculoskeletal and neuropathic chronic pain				
Low back pain	26.2%	20.4%	28.4%	*0.001*
Arthritis	18.0%	17.0%	18.4%	0.529
Lumbar degenerative disc disease	15.6%	16.6%	15.3%	0.518
Muscle spasm	11.7%	9.5%	12.5%	0.095
Cervicalgia	8.9%	11.7%	7.9%	*0.015*
Cervical degenerative disc disease	6.2%	6.2%	6.2%	0.976
Peripheral neuropathy	5.8%	8.8%	4.7%	*0.001*
Fibromyalgia	1.6%	4.0%	0.7%	*0.000*
Spasticity	0.2%	0.0%	0.2%	0.288
Any of these chronic pain ICDs	58.2%	57.3%	58.5%	0.654
Mental disorders				
Anxiety disorders	18.7%	28.5%	15.0%	*0.000*
Depression	9.3%	14.2%	7.5%	*0.000*
Bipolar disorder	2.5%	4.9%	1.7%	*0.000*
Attention deficit disorder	3.1%	2.0%	3.6%	0.100
Any of these mental disorder ICDs	22.9%	33.6%	18.9%	*0.000*
Sleep disorders				
Persistent insomnia	13.5%	13.9%	13.4%	0.769
Insomnia due to pain	8.0%	8.4%	7.9%	0.734
Any of these sleep disorder ICDs	21.3%	21.9%	21.1%	0.727
Gastrointestinal disorders				
Nausea and vomiting	7.4%	9.5%	6.6%	*0.041*
Anorexia	4.6%	4.4%	4.7%	0.842
Abdominal pain	2.9%	4.9%	2.2%	*0.004*
Gastritis and GERD	2.5%	4.0%	1.9%	*0.016*
Irritable bowel syndrome	1.1%	0.4%	1.3%	0.121
Any of these gastrointestinal disorder ICDs	13.3%	16.6%	12.1%	*0.015*
Neurologic disorders				
Migraine headache	9.2%	16.2%	6.7%	*0.000*
Other headache	6.5%	6.6%	6.5%	0.910
Seizure	1.4%	1.5%	1.3%	0.735
Multiple sclerosis	0.6%	1.1%	0.4%	0.106
Any of these neurologic disorder ICDs	16.6%	24.8%	13.5%	*0.000*

Gynecologic disorders				
Dysmenorrhea		7.7%		
Endometriosis		1.8%		
Any of these gynecologic disorder ICDs		9.3%		
Other				
HIV/AIDS	1.6%	0.9%	1.9%	0.142
Cancer	1.5%	2.4%	1.1%	*0.040*
Glaucoma	1.3%	1.1%	1.3%	0.717

Note: Does not include all ICD9s, and excludes those that were written in. P-values below 0.05 are printed in italics.

Previous Treatments Reported by Applicants

Because self-reported information was collected from applicants and most provided medical documentation from their treating physician, it was possible to consider the extent to which previous therapies had been used to cope with or treat the primary symptoms for which they were seeking a medical allowance. In Table 4 we provide a list of therapies or approaches that were previously tried or currently being used. Almost half of the applicants (47.6%) reported taking prescription medication at the time of their evaluation, and nearly 4 out of 5 (79.5%) reported having taken prescription medication in the past for their problems. As chronic pain was the leading diagnosis for which marijuana was being recommended, we were curious to see what percent of applicants had used opioids or opiate medication to deal with their problem. On the physician evaluation form, evaluating physicians were asked to check yes or no if the applicant was currently using or had used in the past opioids or opiate medication prescribed by another physician for their chronic pain. Evaluating physicians determined that almost half of all applicants (48.0%) experiencing chronic pain either currently or in the past had been prescribed opioids or opiate medication.

Non-prescription therapies tried by applicants seeking medicinal marijuana allowances included physical therapy (48.6%), chiropractic services (37.2%), surgery (21.9%), psychological counseling (20.7%), and acupuncture (19.6%). Thus, these data do not suggest that applicants immediately seek marijuana recommendations as the first strategy to deal with their symptoms. In many cases, these individuals tried more traditional forms of medicine first.

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Table 4. Previous treatments and physician recommendations for additional treatment

	All	Females	Males	P-value
	N=1655	N=452	N=1203	
Other treatment modalities applicants tried for medical conditions				
Current prescription medication	47.6%	57.1%	44.2%	*0.000*
1-2 prescriptions	36.7%	36.1%	37.0%	0.727
3-5 prescriptions	4.4%	9.1%	2.7%	*0.000*
6+ prescriptions	6.5%	11.9%	4.5%	*0.000*
Previous prescription medication	79.5%	86.5%	76.8%	*0.000*
Past or current Rx for opioids for pain	48.0%	52.3%	46.4%	*0.040*
Physical therapy	48.6%	54.4%	46.5%	*0.004*
Chiropractic	37.2%	42.3%	35.2%	*0.009*
Surgery	21.9%	22.3%	21.8%	0.804
Psychological counseling	20.7%	33.4%	16.0%	*0.000*
Acupuncture	19.6%	26.8%	16.9%	*0.000*
Therapeutic injection	15.0%	21.5%	12.6%	*0.000*
Other types of treatment	8.6%	11.1%	7.7%	*0.032*
Referrals for further evaluation and treatment				
Primary care provider	22.4%	22.6%	22.3%	0.900
Medical specialist	16.2%	16.2%	16.2%	0.977
Physical therapy	8.2%	7.1%	8.6%	0.327
Chiropractor	6.5%	3.8%	7.5%	*0.006*
Psychological counseling	5.6%	7.1%	5.0%	0.098
Acupuncture	1.8%	2.2%	1.6%	0.382
Homeopathy	0.2%	0.2%	0.2%	0.815
Biofeedback	0.1%	0.0%	0.1%	0.540

Note: P-values below 0.05 are printed in italics.

V. DISCUSSION

This study provides descriptive information from 1,655 applicants who sought to obtain a physician's recommendation for medical marijuana in California, the conditions for which they sought treatment, and the diagnoses made by the physicians. The most common diagnoses reported were for chronic pain, mental health conditions (primarily anxiety and depression), and sleep disorders

(insomnia). For physicians who make medical marijuana recommendations, the risk of being deceived is not dissimilar to the risk of deception faced by those who prescribe oxycodone and other painkillers; however, those prescribing the latter can limit the number of pills and refills.[6] For medical marijuana, existing laws and policies only allow physicians to make recommendations, they cannot control the number of purchases, what is purchased (e.g., % THC or other cannabinoid content), where it is purchased, or the route of administration (e.g., inhale smoke or vapor, ingest an edible, apply topically).

The majority of applicants reported that they tried other therapies, including prescription drugs, to manage their symptoms prior to seeking the medicinal allowance. Fifty percent of the sample reported that they used marijuana as a substitute for prescription medicine. This is consistent with other studies (e.g., Reiman, 2007; 2009) and raises important questions about the specific drugs they are replacing. Future research with this population should focus on previous and concurrent prescription medication use to examine claims that marijuana enables people to reduce or eliminate their use of prescription medications. These data could also be useful for understanding whether there could be cost-savings or quality of life gains associated with substituting certain prescription medicines with marijuana.

This also raises the issue about whether the legalization of marijuana for non-medicinal purposes would influence the consumption of prescription drugs. Not only would full-scale legalization increase the availability and reduce the price of marijuana (Kilmer et al., 2010), but the reduced stigma may increase the likelihood that some individuals try it for medicinal purposes. It could also be the case that doctors may be more willing to discuss marijuana use with patients if it was not prohibited.

Less than 5% of the applicants in our sample were diagnosed with HIV/AIDS, cancer, or glaucoma. While these were not the only diseases and conditions discussed when Proposition 215 was on the ballot, they did receive a lot of attention. This low figure is not surprising; we would expect the number of applicants presenting with HIV/AIDS, cancer, or glaucoma to be relatively low compared to the number presenting with pain, anxiety, and insomnia, due to the relative prevalence of these conditions in the general population. However, it is also important to note that many of those receiving recommendations did so for conditions other than those listed by the IOM.

Finally, the age profile observed in the sample of applicants is intriguing, especially when compared with those who report purchasing marijuana in the previous month in the 2006 NSDUH. One should not assume the larger median age for these applicants is statistically meaningful given sampling differences and

[6] However, doctors prescribing oxycodone cannot prevent patients from crushing the pill to deactivate the time-release functionality and then snorting or injecting it.

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the fact that our sample is drawn exclusively from California. However, if these age differences appear in future studies, it could offer important insight about age-related risk aversion and/or age-specific access to distribution networks—each with different policy implications. Thus, future work should explore the robustness of these differences and consider their implications for policy.

We conclude by reminding readers that we did not examine a randomly-selected representative sample of all individuals in California seeking a medical recommendation for the use of marijuana. We were merely able to collect data from a sample of individuals who presented themselves within a three month window to a group of doctors that they most likely expected would be willing to provide them with a recommendation. The applicants receiving recommendations from these doctors may differ from those in the general population in important ways that we are unable to know. As applicants receiving physician recommendations are not required by law to register with county or state health officials, we have no way of knowing the extent to which the population served by this particular physician group might differ from that served by other medical marijuana specialists or by primary care physicians. Knowledge about the number and type of individuals that receive recommendations from other specialists or from primary care physicians would improve our understanding of medical marijuana users in California.

Since California law allows for medical marijuana use for any "illness for which marijuana provides relief," we have an enormous opportunity to further our understanding of the risks and benefits of marijuana with careful questioning of some of the thousands of patients willing to discuss their use of marijuana. Detailed information about the doses, frequency, methods, and forms of marijuana consumed, as well as information about past and present alcohol, illicit drug, and prescription medication consumption would be of great interest.

VI. REFERENCES

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