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Abstract: *Cannabis legalization is currently a topic of significant interest within the American healthcare system. Existing research has demonstrated the effects of medical cannabis in alleviating manifestations of several common health conditions which affect many Americans, including cancer and chronic pain. Additionally, research has demonstrated that medical cannabis programs have positive implications for the objectives of government health initiatives such as the Institute for Healthcare Improvement (IHI) Triple Aim. Economic benefits from cannabis taxation have also been documented in states with active medical cannabis programs. While federal restrictions inhibit extensive cannabis research, the legalization of medical cannabis has significant implications for the American healthcare system in terms of cost, access, and quality. This paper is a review of current literature and research regarding medical cannabis legalization in the United States.*

Keywords: healthcare, cannabis, medical cannabis, United States

The issue of legalizing cannabis for medical use has become one of the top-discussed health topics in recent years. With 27 states and the District of Columbia participating in active medical cannabis programs, much of the movement's effort is now focused on developing arguments to persuade the remaining states to implement similar legislation. The legalization of cannabis for both medical and recreational purposes has benefits and drawbacks, but this paper will focus on support for medicinal legalization.

History and Current Status of Legalization

The use of cannabis, or marijuana, for medicinal purposes dates back to the 15th century, when the first written mention of the drug was found in an ancient Chinese medical book, the Rh-Ya (*Historical Timeline*, 2017). In the United States, marijuana was a common prescription for a variety of health conditions until 1937, when the *Marihuana Tax Act of 1937* effectively criminalized and prohibited the drug (*Historical Timeline,* 2017). Since then, numerous advocacy groups, politicians, and social movements have attempted to expand the legalization of marijuana for both recreational and medicinal purposes. The general strategy is to use medical

legalization as a stepping stone to full legalization, and rightfully so. Recent research has shown marijuana to be effective in managing manifestations of numerous health conditions that are among the most prevalent in America, including cancer, HIV/AIDS, chronic pain, and glaucoma (Bradford & Bradford, 2016), and with less harmful effects than some commonly-prescribed pharmaceuticals. As it currently stands, national and state legislature are significantly divided on the topic of medical cannabis legalization. At the national level, possession of marijuana for any purpose is still illegal, meaning that patients in possession of the drug in medically-legal states could still potentially incur criminal charges on the federal level (Johannigman & Eschiti, 2013). This discrepancy stems in part from the federal classification of marijuana as a Schedule I drug, which the Controlled Substances Act of 1970 defines as having "no currently acceptable medical use in treatment in the United States, a high potential for abuse, and a lack of accepted safety for use under medical supervision (Bradford & Bradford, 2016)." This classification places cannabis in the same category of opiates such as heroin and morphine (*Controlled Substances Act*) and significantly inhibits the cultivation and acquisition of cannabis for prescriptive use and for further research on its effects in treating various health conditions. From what little cannabis research has been done, considerable implications have been found for two health issues currently at the forefront of the American healthcare field: cancer and opioid overdose.

Relevance to National and Community Health

Cancer. According to the Center for Disease Control, cancer is the second leading cause of death in the United States, claiming nearly 600,000 lives in 2015. In the state of Kentucky alone, there were over 10,000 deaths from cancer in 2015, making it the state's leading cause of death ("Cancer Rates by U.S. State," 2016). In states with operational medical cannabis programs, cancer is a qualifying condition for prescription, and use of the drug as it has proven effective in managing side effects of chemotherapy such as nausea, loss of appetite, and pain (Johannigman and Eschiti, 2013). Additionally, a 2014 study by Scott, Dalgleish, and Liu found that tetrahydrocannabinol (THC), the major active component of cannabis, reduced the size of certain cancer cells and inhibited the process of cell proliferation by interfering with cell communication mechanisms (Scott et al., 2014). While the results of this particular study only discovered these properties in glioma cells, the data "add further support to the concept that cannabinoids both alone and in combination with each other, possess anticancer properties" (Scott et al., 2014).

Opioid overdose. The second prominent national and community health issue pertaining to medical cannabis legalization is opioid overdose. While illegal opioids such as heroin were responsible for nearly 13,000 deaths in the United States in 2015, over 15,000 of the nation's opioid-related deaths in the same year were caused by prescription opioids alone (*National*

Center for Health Statistics, 2017). These prescription opioids include methadone, oxycodone, and hydrocodone, and are usually prescribed to patients with chronic pain, a common health condition in the United States. According to an investigation by Bachhuber et al. (2014), chronic pain is also the primary indication for medical cannabis prescription in states with active laws. Subsequent research found that in states with medical cannabis laws, the mean annual rate of opioid overdose was 24.8% lower than in states without medical cannabis laws. From these results, it is predicted that "patients with chronic [noncancer] pain who would have otherwise initiated opioid analgesics may choose medical cannabis instead" (Bachhuber et al., 2014), and therefore contribute to lower rates of prescription opioid overdose and death. If substantiated by further research, these findings could prove to be significant for Kentucky in particular; according to the Overdose Fatality Report released by the Kentucky Office of Drug Policy, over 1,000 Kentuckians die from drug overdose per year (Tilley & Ingram, 2015). Among the most commonly detected drugs in these cases were morphine (45%), fentanyl (34%), oxycodone (23%), and hydrocodone (21%), all of which are commonly prescribed analgesic opioids (Tilley & Ingram, 2015). While the research on these health issues has strong implications, it lacks volume; current federal legislation regarding medical marijuana inhibits its accessibility for clinical and scientific research. The legalization of medical marijuana on a federal level would eliminate these barriers and allow for more thorough and interdisciplinary research on the effects of cannabis on cancer, opioid overdose, and an array of other health conditions, making this an important healthcare issue on both national and community levels in the United States. In addition, the legalization of medical cannabis could have significant impacts on central concepts of the U.S. healthcare delivery framework as well.

Impact on Healthcare Delivery and Impacted Populations

The three cornerstones of the healthcare delivery system are cost, access, and quality (Shi & Singh, 2015).

Cost. In the realm of healthcare, cost carries a different meaning based on the perspective from which it is viewed; consumers and providers place cost into a "price" context, while government defines it as "national expenditures." While research on the "price" of medical cannabis is limited due to lack of cannabis accessibility, some research has been done on the impact of medical cannabis on national healthcare expenditures. In a 2016 study, Bradford & Bradford performed an analysis of Medicare Part D spending data for prescription drugs from 2010 to 2013. The researchers limited the analysis to drugs prescribed for conditions for which medical marijuana is considered an alternative method of treatment: anxiety, depression, glaucoma, nausea, pain, psychosis, seizures, sleep disorders, and spasticity. The study's results indicated that in states with active medical marijuana policies, all of the conditions except glaucoma had fewer

drug prescriptions written than in states without legal medical marijuana. This translated to a Medicare Part D and enrollee spending reduction of $165.2 million in 2013 when totaled across the 17 states and the District of Columbia, all of which had legal medical marijuana laws at that time (Bradford & Bradford, 2016). If all states had had active medical marijuana laws in 2013, the study projected that Medicare Part D expenditures would have been reduced by $468.1 million (Bradford & Bradford, 2016).

Access. The cornerstone of access refers to "the ability of a person to obtain health care services when needed" (Shi and Singh, 2015). Access is considered "one of the key determinants of health" (Shi and Singh, 2015), and is a valuable assessment tool in evaluating the effectiveness of a healthcare delivery system. In the case of medical cannabis, access is fragmented and inconsistent due to varying state policies and federal restrictions. Medical marijuana patients, as well as healthcare practitioners, who live in legalized states are still subject to criminal possession charges, and face difficulty accessing the drug in other states due to varying requirements and approved indications. As summarized by J. Michael Bostwick, MD. (2012),

Without a federal umbrella, regulations lack any state-to-state uniformity about what constitutes acceptable indications, appropriate prescriber-patient relationships, or legitimate means of acquiring botanical cannabis…physicians who prescribe medical marijuana are susceptible to prosecution under the same statutes as drug dealers.

Legalizing medical cannabis on a national level would provide consistent regulations across all states, thereby increasing access to medical cannabis for all patient populations with approved indications.

Quality. The third cornerstone, quality, is defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Shi and Singh, 2015). Despite the emerging research evidencing positive health effects of medical cannabis, many medical and legislative professionals remain staunchly opposed. Much of this hesitation comes from assumption that medical cannabis must be smoked in order to be effective and the negative implications that may have one one's health; in the words of Johannigman and Eschiti, "Smoking of any substance has been linked to lung cancer, which carries the highest mortality rate of any cancer type in the United States" (2013). While marijuana smoke inhalation is the most common method of usage and the quickest way to experience its effects ("How Marijuana is Consumed", 2016), the lung and throat irritation and damage caused can make certain health conditions worse. Oral consumption of marijuana, or "edibles", is often preferred by medicinal patients; chronic pain patients in particular have reported that the effects of orally ingested marijuana last longer, reducing the number of doses required to achieve pain relief ("How Marijuana is Consumed", 2016). For more superficial health conditions such as muscle pain, stiffness, swelling, and neuralgia, topical cannabis products can be applied in the form of cream, lotion, or salve. The cannabinoids in the topical product interact with CB1 and CB2 receptors

in the skin, providing pain relief and anti-inflammatory effects without the psychoactive effects associated with inhaled and ingested cannabis ("Cannabis 101", 2016). Topical administration of cannabis is often popular with older adult populations due to its effective management of localized pain and lack of psychoactive effects ("Cannabis 101", 2016). Overall, the various forms of marijuana ingestion allow for healthier alternatives to chemical medication, and the positive effects of the drug that have been revealed through research could improve the quality of life for countless Americans and Kentuckians alike.

Current federal restrictions limit opportunities for medical marijuana prescription and clinical research. However, legalization of medical cannabis would provide regulations for the cultivation and production of cannabis and cannabis byproducts, which would provide populations such as chronic pain patients, cancer patients, and older adults with the safest and highest quality form of medical cannabis for their specific health conditions and needs. Therefore, legalization of medical cannabis has significant positive implications for the facets of cost, access, and quality within the American healthcare delivery system.

Applications

As previously addressed, research suggests that the healthcare delivery cornerstones of cost, access, and quality could face significant alterations with the legalization of medical cannabis. In a similar vein, medical cannabis legalization has positive potential implications for each objective within the Institute for Health Improvement (IHI) Triple Aim. The objectives of the IHI Triple Aim are experience of care, population health and per capita cost ("The IHI Triple Aim", 2016).

Experience of care. In a study by Reiman (2008), patient care experience ratings from 130 adult medical cannabis patients were collected via questionnaire and analyzed. The results of the study yielded an 80% or higher satisfaction rating in three of the four satisfaction dimensions, which included General, Interpersonal, Access, and Privacy satisfaction (Reiman, 2008, p.35). These results indicate that the interdisciplinary services of medical cannabis programs improve patient healthcare experience; as stated by Reimer (p. 40), "the social support offered to medical cannabis patients provides an escape and a way to cope."

Population health. As referenced in the Relevance to National and Community Health section, medical cannabis has been shown to be effective in managing two of the most prominent health concerns in the United States: cancer and opioid addiction. In addition, research by Reimer (2008) suggests that medical cannabis programs improve population health by implementing a more holistic approach to patient care. Reimer acknowledges the positive effects of social support and teaching of healthy coping mechanisms on patient satisfaction, stating that "primary physical and mental health services might have a better chance of achieving their intended effect if clients are receiving additional social support and coping

services" (p. 40).

Per capita cost. While current national policies restrict the scope of research on medical cannabis and per capita cost in the United States, economic benefits have been observed in states with active medical cannabis programs. In particular, research has highlighted benefits in the arenas of Medicare Part D spending and taxation profits. A study by Bradford & Bradford (2013) attributes the reduction in Medicare Part D spending to fewer pharmaceutical prescriptions in states with active medical cannabis programs. Significant taxation revenue has also been noted in these states. A review of 2016 Tax Foundation Reports showed that Colorado, a state with one of the most established medical cannabis programs, collected approximately $140 million in marijuana taxes in 2016 (Ekins & Henchman, 2016).

Application to Occupational Science

Through the lens of occupational science, the legalization of medical cannabis would also fulfill the ideal of occupational justice. Nilsson and Townsend (2010) define occupational justice as "a justice that recognizes occupational rights to inclusive participation in everyday occupations for all persons in society, regardless of age, ability, gender, social class, or other differences." Occupational injustice, or situations in which occupational justice is absent, takes several different forms; occupational deprivation is a form of occupational injustice which connects to the legal ramifications surrounding medical cannabis. According to Whiteford (2003), occupational deprivation is "a state of prolonged preclusion from engagement in occupations of necessity and/or meaning due to factors that stand outside the control of the individual." In the case of medical cannabis patients, the inconsistencies and legal restrictions of the medical cannabis industry pose potential difficulties in terms of acquiring the needed dosages, accessing proper cannabis products such as edible forms and topical substances, and legal protection in states where medical cannabis is not yet legal. As such, there could be situations in which chronic pain patients, cancer patients, or patients with a number of other health conditions cannot gain access to their source of symptom management. This could result in acute manifestations of symptoms such as pain, nausea, vomiting, and loss of appetite, making it difficult if not impossible for these patients to participate in activities of daily living, leisure activities, and social participation.

Application to Healthcare Practitioner Role

As healthcare practitioners, a significant part of those roles is to advocate for clients and their rights and needs. Investigating topics such as the legalization of medical cannabis and its implications for healthcare delivery in America is an important educational opportunity as it is a current and highly controversial issue that is becoming a prevalent topic of

discussion in political, academic, and medical arenas.

Relevance

Relevance to Current Policies

In the political, academic, and medical realms, policies are constantly changing and modifying to include new regulations, restrictions, and penalties. Additionally, public health and safety policies are constantly adapting to accommodate medical cannabis as new states begin to consider its legalization. As the first state in the nation to have legalized both medical and recreational cannabis (Ghosh et al., 2016), the public health framework of Colorado has been studied and serves as a valuable reference for states desiring to implement similar policies. To improve consistency and effectiveness of its policies, Colorado has adopted a multidisciplinary approach to working on cannabis-related issues; experts from a variety of public agencies such as human services, public safety, education, and health care work together to establish regulations for cannabis production and distribution that both "respect the intention of the voters while striving to mitigate negative outcomes (Ghosh et al., 2016)." One of the key components and core values of Colorado's policy development is education (Ghosh et al., 2016), to which end they implemented the "Good to Know Colorado" campaign. The campaign's purpose is to provide educational messages and materials to the residents of Colorado regarding safe, legal, and responsible marijuana use; this includes information about secondhand smoke reduction, combining marijuana with other substances, and the dangers of using marijuana while underage (Ghosh et al., 2016). The "Good to Know Colorado" campaign is reminiscent of other public policy education efforts nationwide, and is an invaluable component of the public health framework. The Colorado policymakers report that one of the most significant challenges to their work has been discord between local, state, and federal laws regarding cannabis. A reference to limited potential for research is made in their report; "Research to assess both the beneficial and the adverse health effects of marijuana's Schedule I drug designation applied by the U.S Drug Enforcement Agency (Ghosh et al., 2016)."

Implications for Healthcare Delivery

The legalization of medical marijuana would carry many positive implications for the healthcare delivery system. With legalization on a national level, federal regulations could be implemented to streamline the medical cannabis industry, product cultivation, and product distribution, ultimately making the drug more accessible to a larger patient population. Further research on cannabis's effects on health conditions such as cancer and chronic pain could substantiate current research findings, and increased prescription of medical cannabis could reduce Medicare Part D spending and

private insurance costs in the pharmaceutical realm. Overall, the utilization of medical marijuana as an intervention for pain and symptom management demonstrates significant implications for improved patient quality of life as evidenced by current research.

Consequences for Healthcare Delivery

In addition to the consequences of reducing healthcare costs, increasing accessibility, and increasing overall patient quality of life, the legalization of medical cannabis is a potential source of significant revenue at both state and federal levels. According to a 2016 Tax Foundation report, states with full legalization of marijuana have seen revenue collections that far exceeded their initial projections; Colorado, anticipating an annual collection of $70 million in marijuana tax, was on track to collect over $140 million by the end of 2016 (Ekins & Henchman, 2016). The report predicts that if all states legalized cannabis, there would be a collective revenue of $5 billion to $18 billion per year (Ekins & Henchman, 2016). On a federal level, the report proposes that an excise tax on marijuana similar to that on cigarettes would yield $500 million in revenue, while a 10% sales tax on cannabis products is projected to raise $5.3 billion (Ekins & Henchman, 2016).

Conclusion

Current research supports the idea that nationwide legalization of medical cannabis would offer improvements to the three healthcare cornerstones of cost, access, and quality. In short, medical cannabis legalization would lower healthcare expenditures on pharmaceuticals, increase accessibility of the drug to include a larger patient population, and improve overall patient quality of life by offering cannabis in various forms for use. The public health policy frameworks of legalized states such as Colorado can be taken into consideration when developing federal and state policies and regulations. Medical cannabis legalization has implications to increase tax revenue on individual state and federal levels, and government regulations would work to streamline the cultivation, production, and distribution of cannabis and its byproducts. With full legalization, jobs would be created within the industry in the form of farming, production, and dispensary positions. Client and caregiver education, much like the "Good to Know Colorado" campaign, are crucial in order to promote safe, legal, and responsible cannabis use. While the issue of medical marijuana legalization is controversial, the research presented within this document strongly suggests that further investigation is warranted and has significant implications for improvements within the healthcare delivery system.

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