

# The Effects of Medical Cannabis Use Among Adults with Chronic Pain: An Integrative Review of the Literature

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THE EFFECTS OF MEDICAL CANNABIS USE AMONG ADULTS WITH CHRONIC PAIN:  
AN INTEGRATIVE REVIEW OF THE LITERATURE

by

BRIDGET A. ASEVEDO

A thesis submitted in partial fulfillment of the requirements  
for the Honors in the Major Program in Nursing  
in the College of Nursing  
and in The Burnett Honors College  
at the University of Central Florida  
Orlando, Florida

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Thesis Chair: Dr. Angeline Bushy, Ph.D., RN, FAAN, PHCNS-BC

## **Abstract**

The purpose of this integrative literature review was to understand the effects of medical cannabis for chronic pain management in adults. Anecdotal reports suggest use of medical marijuana as a pain management could be an alternative to opioids and other medications which have long term consequences. Potential uses span the health care continuum, from prescribed outpatient symptom management, to acute care, extended care, home care and hospice treatment settings. The methodology included a review and synthesis of relevant research articles from 2012 to 2018, written in the English language. The findings suggest medical cannabis has the potential of effectively managing chronic pain in older adults. Adverse effects, if present, are mild and resolve without intervention. Lower doses of medical cannabis were reported to be more effective in treating chronic pain compared to higher doses. Inconsistencies in the efficacy of THC were noted compared to CBD for managing neuropathic pain. Implication for nursing practice, policy, education, and recommendation for future research were discussed along with study limitations.

***Dedication***

*I would like to dedicate this review to my mom, dad, and siblings for helping me, each in their own way, along this journey. Thank you.*

### **Acknowledgements**

I would like to recognize the unwavering support Dr. Angeline Bushy, my thesis chair, provided throughout the course of this project. Without your willingness to go above and beyond what was expected of a thesis chair, this endeavor would not have been possible. Thank you for having faith in me. To Dr. Leslee D'Amato-Kubiet, your ability to recognize the potential within me during both my nursing education and thesis has, and always will, inspire me to achieve greater things. I am forever grateful for your unwavering encouragement over the last 18 months. I will always be appreciative of the wealth knowledge these two outstanding educators provided me. To my mother, father, siblings and close friends who have been by my side from the start, in both the highs, and lows. I am fortunate to have a supportive network of family and friends. You know who you are and how you have helped me. My heartfelt gratitude to all.

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## Introduction

With an ever-increasing cost of the current three trillion-dollar health care industry in the United States (US) challenges in the management of chronic pain is of utmost concern. America is experiencing a significant growth in the older adult population, and this trend is projected to continue for at least the next decade. Accompanying the aging process, there is a corresponding rate of chronic diseases, which goes hand in hand with chronic disease. However, the most recent approach to managing chronic pain by health care providers has increasingly use of opioids. Depending on their overall health status, the biological age of an older adult can range in age from 50 years and older. For instance, a growing number of 50-year-old individuals are diagnosed with multiple chronic medical conditions, while some 80-year-old persons continues to be highly active and in over all good health.

According to the National Institute of Health (NIH) there is an opioid misuse crisis. For instance, of those who were prescribed opiates to manage their pain, at least thirty percent did not adhere to the recommended dosage. (2018). Opioid over dosage is a public health crisis in our country. The Centers for Disease Control (CDC) reports that on a daily bases, there are at least 200 deaths from drug overdose; of these, about 100 deaths are reported each day from opioid overdose. (Sessions, 2018)

Considering this major public health concern, one option for a safer, less addictive, and holistic alternative could be use of medical cannabis for pain management (Borrelli, 2018). However, there is on ongoing debate at a national level on weather cannabis should be legalized for medicinal purposes. A growing number of states have voted to approve cannabis for medicinal purposes. However, there continues to be resistance in its use by some providers as well as certain segments of the population. Likewise, supporting evidence for use of cannabis is inconclusive and sometimes contraindicated.

The usage of marijuana became stigmatized after the U.S. government launched a campaign to tie the illicit substance known as “marihuana” to the influx of Mexican immigrants.

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At the time Americans didn't know cannabis and "marihuana" were the same plant and after the implementation of the Marijuana Tax Act in 1937 the usage of cannabis ultimately became illegal. (Burnett and Reiman, 2014)

Additionally, pharmaceutical companies developed synthetic opioids. Consequently, health care providers turned to opioids, which are highly addictive, for management of chronic pain. The current national challenge is educating the public and modifying the public's perception of cannabis as 'gateway drug' to a 'healthier' alternative - use of opioids.

The population that struggles the most to accept and incorporate medical cannabis into their treatment regime are older adults. (Satterlund et. al., 2015). Older individuals chose not to disclose their usage of medical marijuana to anyone besides their spouse, according to the same study. While both older and younger individuals were discrete about disclosing their status. In particular, the elderly population showed significantly less disclosure to their closer social circle. Despite being the most susceptible to experience chronic illnesses and pain, some older adults adhere to the stigma that surrounds cannabis usage. Their reluctance is associated with it not being legalized, or only very recently been legalized in the state in which they reside. This stigma involves an individual's fear of how they are perceived by their peers.

Medical practitioners disregard the current medical guidelines when treating chronic pain in the older adult. Opioid prescriptions are discouraged for those experiencing chronic pain not related to cancer, as a palliative intervention, or end-of-life hospice care (Le Roux, 2016). As of 2016, chronic pain is most commonly treated with opioids. Medical marijuana has been proven to reduce the side effects of other medications and improved quality of life in its users by 45%. (Boehnke, 2016). Considering cannabis is increasingly being accepted as an alternative pain management modality, there is a need to evaluate the evidence on its treatment effect in the older adult.



## **Purpose**

The purpose of this integrative review of the research literature is to examine the effects of medical cannabis use among adults with chronic pain. The information could inform nurses of alternatives to opioid use for pain management.

## **Problem statement**

What are the effects of medical cannabis use among adults with chronic pain?

## Literature Review

To understand the effectiveness of medical marijuana a review of the literature is needed. Adults of all ages may be prescribed medical marijuana the purpose for usage, however, varies. Analyzing this is a key component towards assessing the effectiveness of medical marijuana for pain management in the older adult population. Haug et al., compared cannabis use patterns and motives among younger, middle-aged, and older adults. They found that younger adults reported the highest in usage of cannabis to relieve boredom, or recreationally. Conversely, the older adult population primarily use is for management of chronic health conditions or insomnia. (Haug et. al., 2017). These findings indicated that while the perception among older adults of medical marijuana was negative, the majority may have legitimate medical conditions that could possible benefit from this treatment approach.

The article also stresses the use of medical marijuana by younger individuals may not apply to the older adult population. In other words, while use of marijuana recreationally in one's youth has negative implications, this view may not be appropriate for the older adult population. In fact, when appropriate prescribing of medical marijuana to the older adult could help to minimize the aforementioned negative stigma. (Haug et. al., 2017).

The evidence suggests cannabis has no long-term side effects from usage. In addition, medical marijuana can be administered in a various ways including smoking, vaporization, orally, and transdermal. These administration options increase the likelihood of tolerance by an elderly individual. In the elderly, opioid analgesic overdose poses more of a mortality risk than the usage of medical marijuana. (Bachhuber et al., 2014)

Briscoe and Casarett discuss the challenges that accompany medicating older adults with opioids. Side effects of opioids include, constipation, confusion, falls, fractures, metabolic

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disturbances, soft tissue injury, and even death in older adults with dementia. (2018)

Comparatively, the primary adverse effects of cannabis when used by older adults are dizziness and dry mouth. In this study, medical marijuana was not reported to have the severe detrimental adverse effects as opioids when used for pain management.

With the increasing age of the general population, substance use disorders are occurring more frequently in older adults. Likewise, substance use disorders such as opioid addictions are ‘under-reported, under-detected, and under-treated’ (Le Roux et. al., 2016). Older adults tend to be over looked when it comes to determining the extent of the opioid misuse coupled with their growing problem of polypharmacy. This oversight impedes appropriately addressing current pain management protocols with older adults. There also are physiological changes associated with aging that impact the metabolism and excretion of medications, specifically opioids. Consequently, older adults are highly vulnerable to serious medication side effects, and accidental overdoses or with chronic pain management.

Eliminating opioids and providing alternative forms of pain medications such as medical marijuana could be an approach to deal with the over use of opioids in older adults. In fact, Boehnke found that cannabis use was associated with 64% lower opioid use to treat chronic pain (2016). Medical cannabis has been shown to reduce pain and decrease polypharmacy with fewer adverse side effects. Multiple routes of administration provide alternative options for older adults who cannot tolerate oral medication. Medical marijuana in small doses could address the emotional component of pain that often accompanies chronic illnesses. (Ware et al. 2002)

Preliminary findings in this limited literature review indicated there was a strong correlation between chronic pain in the older adult and the opioid epidemic in that growing segment of the population (Le Roux et al., 2016). Medical cannabis could also be an approach to address polypharmacy which often accompanies opioid usage in this population (Briscoe &

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Casarett, 2018). Polypharmacy is defined as the treatment of one ailment with multiple drugs simultaneously. Considering the increased use of this intervention, it is important that the research evidence focusing on the effects of cannabis in the older adult be examined.

When examining the usage of medical marijuana for chronic pain management in the elderly there is a need to address the safety and efficacy of the therapy. The current evidence is based on surveys and self-reports rather than quantitative data. Abuhasira et. al. (2018) implemented a prospective study to examine (N=2,736) adults 60 years and older on their experiences with medical cannabis delivered in capsule, cigarettes, oils, and inflorescence.

While Abuhasira et. al. (2018) analyses efficacy of medical cannabis in managing pain, Ahmed et. al. (2014) used a randomized controlled trial to explore the safety and pharmacokinetics of oral delta-9-tetrahydrocannabinol. Specifically, they focused on the older adults who were healthy. This sample (N=11) had prior exposure to cannabis thus reducing the risk of user error. While providing new insights to the pharmacokinetics of the drug through plasma concentration, researchers were unable to examine the same effect on those currently experiencing pain.

Additional literature discusses specifically the effects of medical cannabis for neuropathic pain. Mucke et. al. (2018) examines randomized, double-blind controlled trials on (N= 1,750) adults experiencing neuropathic pain with a rating of 4 or more out of 10. Wilsey et. al. (2012) undertook a double- blind, placebo controlled, crossover study focusing on the effects of vaporized cannabis for neuropathic pain. In both studies the population studied is not directly focusing on elderly adults.

Trends in the usage of marijuana be it medical or recreational provide insight to the most significant application of the drug for the late middle-aged and older populations. Both Lloyd et. al. (2018) and Salas-Wright (2016) address this aspect of marijuana usage prior to and through the 21<sup>st</sup> century. The discussion of what demographic is most likely to use marijuana and for what

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reason is discussed as well as health outcomes. These articles address comorbidities for use such as chronic pain and possible risk for substance abuse.

## **Methodology**

This integrative literature review examined articles from peer reviewed professional journals. Research articles were found through a search on relevant data bases including Cumulative Index to Nursing and Allied Health Literature (CINAHL), Elton B. Stephens Co. Host (Ebsco Host), Medical Literature On-line (Medline), and PubMed Central (PMC). The following terms were used to acquire relevant research; medical marijuana, medical cannabis, pain management, chronic pain, elderly, and older adults. Inclusion criteria included peer-reviewed research articles published from 2012 to the present and written in the English language. Exclusion criteria includes articles that were published in another language besides English, and articles outside the specified publication date.

Initially when searching the databases, 194 articles were found. After application of inclusion and exclusion criteria the number was reduced to 9 peer-reviewed articles. Two of the studies were international publications and an additional two studies were acquired from references. The total studies that are to be reviewed include 12 articles, of which, 6 pertain specifically to the use of medical cannabis in the elderly population alone. (See Appendix: Figure 1: Consort Chart; Table 2: Table of Evidence.)

## Findings

There is a niche opening for medical marijuana in the elderly especially with the growing number of older adults over 65 years of age (Turner, 2019). The evidence suggests increase in usage of medical cannabis since 2000. From 2013 to 2016 marijuana use in late middle age and older adults nearly double (7% to 13%) (Salas-Wright et. al., 2016). Their findings identified a steady decline from 2005 where 55.07% of older adults were convinced that marijuana posed a great risk to their health decreased. In 2014 this attitude decreased to 50.24%. (Salas-Wright et. al., 2016) The findings linked accessibility with acceptability to the prevalence of increased cannabis use from the year 2003 to 2014 (N= 723,283). This study excluded marijuana usage for diagnosis of depression, anxiety, HIV/AIDS, and STD but included all other disease process that may cause chronic pain.

The chronic pain that accompanies older adults with comorbid is a factor in self-medicating with medical cannabis. From 2006 to 2013 the prevalence of marijuana use among older adults age 50 or higher increased by 71.4%. The majority reported for medicinal purposes rather than nonmedicinal reasons. (Lloyd et. al., 2018) In this study, cannabis was universally beneficial as treatment for chronic pain management. Cannabis can be a stand-alone therapy or an accompaniment for individuals who treat pain with polypharmacy including opioids.

Salas-Wright et. al. (2016) examined the nationwide (N=723,283) usage of medical cannabis in adults over the age of 65 years old. The researchers used a repeated, cross-sectional data collection method obtained from self-reports. The subjects were required to have a history of marijuana usage within the past 12 months. Any subject with a medical diagnosis of depression, anxiety, HIV/AIDS or STDs were excluded from the study. The pharmacology and method of consumption was not specified within the parameters. The results found that usage of medical cannabis increased exponentially with the increased accessibility and legalization of the drug

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within the older adult population. Subsequently, negative risk perceptions and disapproval rates decreased. No link was found between usage of marijuana and increased risk for substance abuse. However, subjects were more likely to use other substances if a history of marijuana use was present.

Lloyd and Striley (2018) analyzed the usage of marijuana in the older adult population over the 21<sup>st</sup> century. The researchers conducted a literature review to examine the indications for self-treatment with marijuana in adults 65 years and older. They included research of medical conditions where conventional treatment did not provide symptom improvement. There was no specific pharmacological or route of administration noted. The findings included the majority of older adults reporting usage of marijuana solely for medicinal purpose. When using marijuana adverse effects were reduced but present ranging from respiratory issues, metabolic syndrome, and mental health problems.

Abuhasira et. al. (2018) develop as prospective study that used self-report with 6 and 12-month follow-up questionnaires to investigate the safety and efficacy of medical cannabis among the elderly 65 years or older (N=2,736). Participation required a licensed physician's authorization for initiation of treatment with medical marijuana. Cancer associate pain, Parkinson's disease, Crohn's disease, ALS, Ulcerative colitis, and multiple sclerosis were all qualifications for pain. The researchers compared the analgesic properties of opioids with medical marijuana as all subjects had a history of opioid use. Subjects were administering marijuana in the form of oil, inflorescence, flowers, capsules, and cigarettes. After 6 months a 50% reduction in pain was reported and nearly 60% of subjects cited medical cannabis as a successful therapy. Prior to initiation of the therapy over half the participants reported a fall within the past 6 months whereas 6 months into the therapy only 21% reported falling once or more. This finding reduces the



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concerns for fall risk as patients did not increase their incidents of falls overall. In addition, nearly 20% of subjects stopped or reduced their use of opioid analgesics after initiating medical cannabis.

Ahmed et. al. (2014) researched the pharmacokinetics and safety of oral THC in healthy adults (N=11) over the age of 65 years. A randomized double blind, double-dummy, placebo controlled, cross-over trial was used. Subjects had no prior history of cannabis use and only mild hypertension and hypercholesterolemia was observed in 3 of the participants prior to initiation of therapy. THC was administered using a low 1.5 mg and high 5mg dose of Namisol. Common adverse effects included drowsiness, dry mouth, coordination disturbances, and headache but globally THC was well tolerated in older adults. An unexpected result proved the older population tolerated THC better than the younger population counterparts.

Wilsey et. al. (2012) examined the efficacy of low-dose vaporized cannabis for neuropathic pain. A randomized, double-blind, placebo controlled, crossover design was used to examine adults (N=39) experiencing pain related to neuropathic conditions. Low-doses THC (1.29%), medium-dose THC (3.53%), and placebo cannabis were administered via “Foltin Puff Procedure”. The researchers found that, compared to the placebo doses, THC yielded a significantly higher equianalgesic effect. Cannabis was confirmed unsuitable in acute pain management in individuals with neuropathic disorders.

Mucke et. al. (2018) created a randomized, double-blind controlled trial to examine cannabis use for chronic neuropathic pain in adults (N=1,750). Subjects required a neuropathic pain reported as 4 or above on the numeric pain intensity rating scale unsuccessfully reduced with analgesic therapy in order to qualify. The primary method for administration of cannabis consisted of herbal, plant-derived, and synthetic components. All forms of cannabis medications proved better outcomes in general pain relief and global improvement compared to the placebo. A lack of “high quality” evidence, which the researchers define as very confident the result acquired

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correlates to the estimated effect, was reported in the treatment of chronic neuropathic pain, an unexpected result.

Bigand et. al. (2018) studied adults over the age of 18 years old (N=150) using a qualitative self-report method to obtain the perceived benefits and adverse effects of cannabis use. All participants took prescription opioid medication prior to the initiation of the study. Numerous adverse effects were reported including fuzzy thinking, sleepiness, poor memory, overeating, coughing, weight gain, burning red eyes, dry mouth, nausea, and increased heart rate. Subjects reported the social and financial burden of medical cannabis usage deterred them from continuation of cannabis therapy despite 67% endorsement from participants regarding the alleviation of pain.

Reiman et. al. (2017) researched the efficacy of cannabis as an opioid substitution for adults (N=2,987). A cross-sectional Qualtrics survey was used to gather data on the "HelloMD" patient database. Chronic pain related conditions ranging from back pain, migraines, PMS, Fibromyalgia, inflammation, and cancer were included. The subjects reported various methods of administration including smoking (50%) followed by vaporizing (31%) and edibles (10%). Cannabis users reported relief of their neuropathic symptoms without experiencing unwanted side effects. In addition, 97% of respondents were able to decrease the intake of opioid medications with concurrent use of cannabis. More participants reported stigma and obtainability as the primary reason for decrease use of cannabis.

Nugent et. al. (2018) developed a multisite prospective cohort study to examine the patterns of medical cannabis and long-term opioid therapy. The researches examined adults (N=371) experiencing musculoskeletal pain currently on long-term opioid therapy. Medical cannabis was not associated with an increase in misuse of substances such as alcohol or nicotine. Additionally, participants who endorsed medical cannabis reported decreased impairment due to medication

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related side effects compared to those denied medical cannabis use. Using medical cannabis also lowered the experienced side effects from other opioid medications.

Boehnke et. al. (2016) examined the association between medical cannabis use and decreased opioid medication using a cross-sectional retrospective study. Adults (N=374) with a history of opioid usage for chronic pain management and registered medical cannabis licensure were included. The researchers found that cannabis reduced the side effects experienced after the administration of opioids and a 45% improvement in overall quality of life was reported.

Abuhasira et. al. (2018) and Ahmed et. al. (2014) examined the efficacy of medical cannabis for chronic pain management demonstrated a strong case for the validity of the therapy. In a prospective study of older adults above the age of 65, Abuhasira et. al. (2018) determined cannabis a safe and efficacious form of therapy when analyzing quality of life, pain intensity, and perception of general effectiveness. After six months of treatment, 60% of participants seeking to gain moderate improvement in their condition view the cannabis therapy as successful in achieving that goal. (Abuhasira et. al., 2018)

Ahmed et. al., (2014) analyzed the efficacy and safety of medical cannabis for (N=11) older adults using delta-9-tetrahydrocannabinol (THC) in varying doses with 3 mg, 5 mg, and 6.5 mg doses including a placebo. (Ahmed et. al., 2014) Using a Visual Analog Scale, Attentional Performance, and SwayStar to record their “feeling high”, alertness/reaction time, and body sway respectively, only 4% of participants experienced “feeling high”. An unexpected finding was that the mean age of older adults (72 years and older) demonstrated a superior tolerance to THC compared to their younger counterparts. Participants attention performance and body sway was not significantly disturbed during the course of their treatment using cannabis. (Ahmed et. al., 2014)

## Discussion

The next section highlights consistent and inconsistent findings from the reviewed articles along with gaps in the literature.

### Consistent Findings

When treating with a flexible dose design medical cannabis proved most effective at the lower dosage end of the spectrum. Both Ahmed et. al. (2014) and Wilsey et. al. (2012) found this phenomenon when treating participants with low, medium, high, and placebo doses (N=11) and (N=39) respectively. The highest dosage given, 6.5 mg of THC, resulted in increased adverse events while no significant instances were noted in the medium (5mg) and lower (3mg) doses. (Ahmed et. al., 2014) Similarly, both the low (1.29% THC) and medium (3.53% THC) dose had the same global effect on pain management which was significantly higher than the placebo. (Wilsey et. al., 2012) In this study the lower dose was found to be superior when compared to the medium dose in reducing aching pains.

No major side effects were found in clinical trials and client reports when using medical cannabis. Side effects associated with respiratory issues (Salas- Wright et. al., 2016) related to inhalation of toxins when smoking cannabis (Lloyd et. al., 2018) along with confusion and psychosis (Mucke et. al., 2018). Dizziness, dry mouth, and drowsiness are the most common adverse effects during the treatment. Only one study, Mucke et. al., 2018, had participants (N= 1,750) withdrawal due to adverse events. The adverse effects of medical cannabis treatment were found to be less severe than opioids (Boehnke et.al., 2016). The findings also concluded medical cannabis posed no significant limitation on activities of daily living due to adverse effects (Wilsey et. al., 2012)

In comparison to opioid therapy for chronic pain management one fourth of the studies, (Boehnke, et.al., 2016, Nugent, et.al., 2018, Reiman, et.al., 2017, and Vyas, et.al., 2017), found a

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reduction in opioid usage after initial treatment. Opioid overdose mortality rates have declined in states with medical cannabis laws in place (Bachhuber et.al., 2014). Reiman et. al. (2017) used a cross sectional survey to ask subjects (N=2,897) if treatment with cannabis as a stand-alone therapy as opposed to a combination between cannabis and opioids was more effective, 81% of participants “strongly agreed/ agreed with the statement. (Reiman et. al., 2017) Nugent et. al. (2018) reaffirmed that medical cannabis was not only perceived as valuable for chronic pain management in subjects (N=371), but also lowered opioid-related adverse effects. When administer for chronic pain cannabis was associated with fewer side effects and a 64% decrease in opioid use (Boehnke et. al., 2016). Cannabis in combination with opioid pain medications could also reduce polypharmacy among older adults.

### **Inconsistent Findings**

Mucke et. al. (2018) and Winley et. al. (2012) both used double blind placebo-controlled studies to examine efficacy medical cannabis has on neuropathic pain in particular. The results differ in that Mucke et.al. (2018) found no evidence to support the efficacy of cannabis for neuropathic pain management in adults (N=1,750). Cannabis provided better outcomes in general pain relief and global improvement compared to the placebo. However, the researchers determined this was not a significant effect of medical cannabis. They determined cannabis adverse effects included dizziness, sleep, and mental disturbances such as confusion, somnolence, and psychosis were enough to denounce the clinical usefulness of the therapy. The researchers concluded that only a minimal number of people could benefit from the long-term usage of cannabis-based medicines. (This study used dronabinol, nabilone, and THC/CBD combination derived from the plant.)

Winley et. al. (2012) investigated the efficacy of delta-9-tetrahydrocannabinol (THC) in a low (2%), medium (3.53%), and high (8%) dosages in addition to the placebo. An interesting

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phenomenon occurred when subjects (N=39) took the high dosage who reported increased pain. This level of pain was not experienced with the medium or low doses who reported a 30% reduction in pain level compared to the placebo. Other side effects included a feeling of cognitive impairment including slight memory loss. However, in spite of the adverse effects, no participants withdrew from the study. This was significant, since 10.4% of participants withdrew from the Mucke et.al. (2018) study, none of which were in the placebo group. Winley et. al. was able to conclude the low dose THC is more effective in the treatment of neuropathic pain.

Inconsistencies within the literature could be partly explained by the various treatment approach in each study. Mucke et. al. (2018) did not offer flexible dosages which could explain high participant withdrawal and negative outcome. Winley et. al. experienced a negative outcome with the highest dose of 8% THC. The flexible-dose design offered another approach to therapeutic dosages. In particular lower doses being more effective for pain management.

### **Gaps in the Literature**

The current research focused specifically on the older adult population. At this time the elderly population is not specifically targeted for medical cannabis research associated with their comorbidities. Most available research examines the effects of cannabis on adults over the age of 18 years. While older adults are incorporated into this broad age bracket, age is not the sole focus of the research. The ability to narrow in on a specific age demographic provides an individualistic look into the efficacy of marijuana for that population. Without multiple clinical studies to focus on the older adult population specifically, a deficiency exists in the evidence.

The literature also fails to examine the biological differences in cannabis efficacy between males and females as well as for racial variations. The literature covers medical cannabis in the adult population without distinguishing between the two genders and by race. Genetic and

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metabolic variations could impact the dosage, tolerance and effectiveness in treating chronic pain in these subpopulations

## **Implications for Nursing**

The next section highlights implications for nursing education, practice, policy and research.

### **Education**

Currently medical education does not include context on use of medical cannabis in the hospital or long-term care setting. Implementing this information in the curriculum for medical cannabis is not possible given the conflicting and incomplete evidence for clinical practice. Researchers are still studying the pharmacokinetics of cannabis. As a result, pharmacology classes do not teach the drug's uses or efficacy as it is only viewed as an illicit substance. Nursing students are not exposed to medical cannabis in any manner that advocates for the benefits it provides to clients. In addition, there is a lack of continuing education in the nursing profession on medical cannabis. As the drug continues to be legalized and adults are gaining access, educating nurses and nursing students becomes a necessity. A collaborative effort needs to be made in the nursing profession to increase the education on relevant drugs. As the patient advocate, it is the nurse's responsibility to be knowledgeable of the available alternative therapies for pain management, including medical cannabis.

### **Practice**

Implementing the use of medical cannabis in the nursing profession comes with its challenges. Nurses must work with their client to educate on the interactions medical cannabis has with their condition. The client needs to understand the benefits and risks the medical cannabis poses. Health professionals in general, nurses in particular, must better understand palliative and end of life care options especially for older adults. In addition to advocating medical cannabis for chronic pain management nurses are able to confidently support the therapy as an opioid reducing alternative. Medical cannabis is linked with a decrease in adverse effects and addiction caused by



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opioid therapy (Vyas et. al, 2017). Currently, dronabinol and nabilone are the only two oral cannabis medications approved in the United States by the Food and Drug Administration.

(Ahmed et. al, 2014) Both medications are only prescribed for nausea and vomiting and there is no oral cannabis-based medication for pain relief approved by the Food and Drug Administration.

For nurses to be capable of accurately educating and advocating for the patient, knowledge of what is currently available to the client as an alternative for pain management is essential.

### **Policy**

In the US, nurse practitioners are not able to prescribe medical marijuana, rather, they evaluate an individual for appropriateness of this medication. Subsequently, a referral is made to a medical marijuana dispensary. In these cases a pharmacist works with the individual to achieve the desired effects. This shift of responsibility from the nurse practitioner to the pharmacist is associated with the deficit in cannabis prescription practices. The nurse practitioner often is wary when evaluating clients for referral eligibility because the pharmacist is more educated on medical cannabis. The disparity between the two providers ultimately affects the client who is unable to find a nurse practitioner confident enough to complete the referral.

Another barrier in place for medical cannabis users is the cost. In the United States, medical cannabis is not covered by insurance because it is classified as a Schedule I drug and considered an illicit substance. When a state legalizes medical cannabis, it still remains under the federal classification Schedule I drug, meaning “no medicinal value”. Third party payers are subsequently allowed to deny coverage of medical cannabis. As a result, medical cannabis users are forced to pay one-hundred percent of the costs out of pocket for the medication. Nurses must keep this in mind when advocating use of medical cannabis for clients with chronic pain. A discussion should be held between the nurse and the client to discuss financial stability.

### **Research**

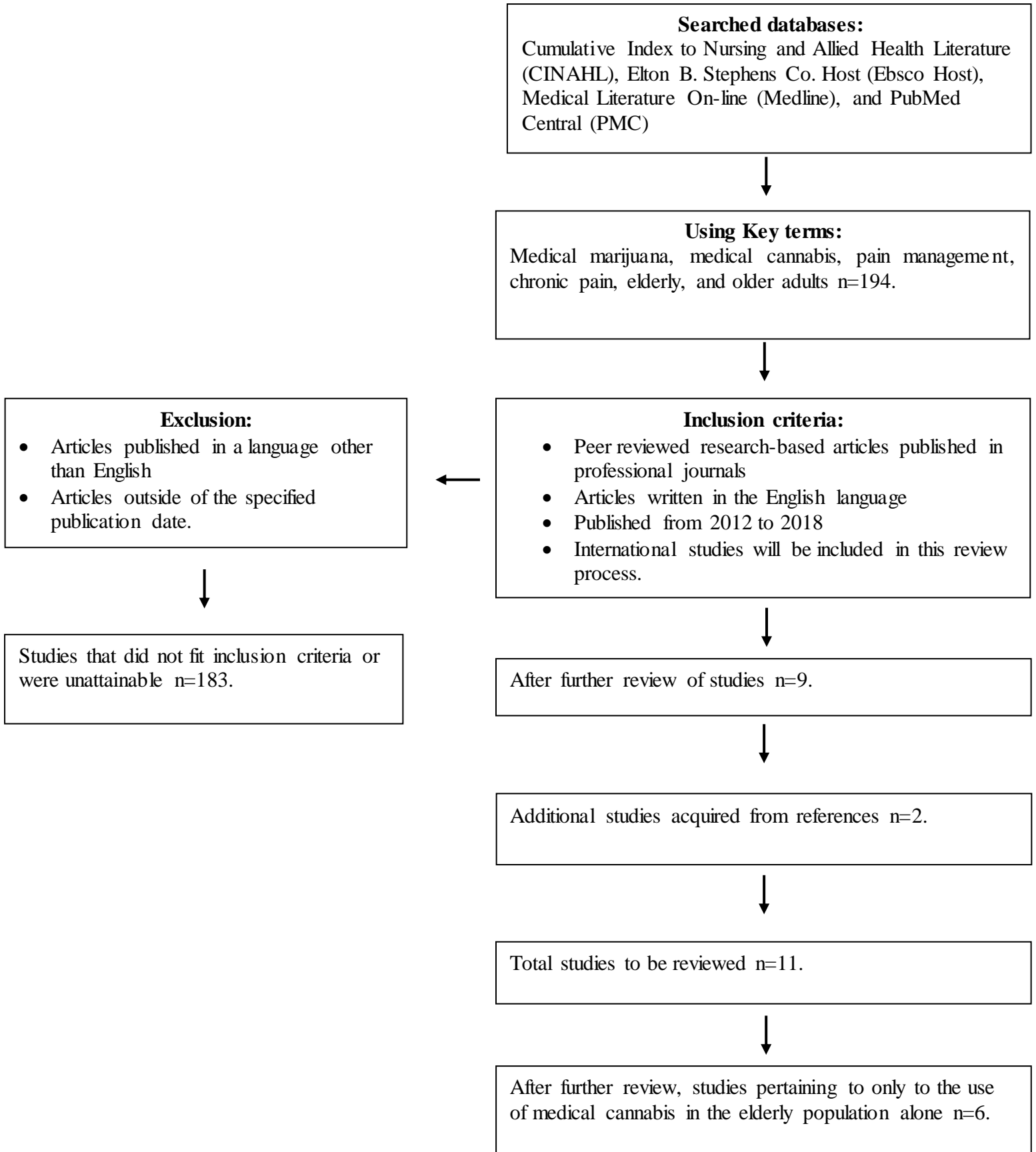
As more research becomes available nurses will be able to educate themselves and future clients on the efficacy of medical cannabis for chronic pain management. Future research should examine the implications of medical cannabis at the bedside including what to monitor after administration of the drug. Recommendation for further research using repeated quantitative, clinical based trials of the same low dose cannabis on adults over the age of 65 may bridge the gap in available literature. Examining flexible dose designs on male and female subjects individually could also provide a varying prospective for cannabis administration. Additional studies are needed to determine if there are genetic variations in the tolerance and effectiveness in racial subgroups. Without a complete picture of what medical cannabis therapies offer a patient experiencing chronic pain nurses are not able to advocate for the client.

## **Summary**

Strides are being made to understand the therapeutic indication of medical cannabis for chronic pain management in the elderly. Cannabis use may be a safe and efficacious alternative method of medication for chronic pain management in some adults. When used as an analgesic that evidence supports there are minimum adverse events to accompany it. Ultimately some clients are interested in using medical cannabis to reduce their polypharmacy and take control of their quality of life. There is still a long way to go to break the legal and social barriers of medical cannabis usage.

**APPENDIX A**

FIGURE 1: CONSORT FLOW CHART



APPENDIX B

TABLE I: TABLE OF EVIDENCE

Last name of first author/year	Study design Dates	Sample size/data collection method	Categories/ Definitions of Pain	History of Opioid use	Pharmacokinetics/ Method of consumption	Key Findings
Abuhasira/ Schleider/ Mechoulam/ Novack/ Israel/ 2018	Prospective study. January 2015 – October 2017	N= 2,736  Self-report through initial, 6 months, and 12 months follow up questionnaires.	Initiation of treatment with medical marijuana under authorization of a physician.  Qualifications for pain include cancer associated pain, nonspecific pain, cancer, Parkinson’s disease, Crohn’s disease, Amyotrophic lateral sclerosis, Ulcerative colitis, multiple sclerosis.	Did not directly address the usage of opioids, however, the survey does compare the analgesic qualities of opioids with medical marijuana if history of opioid use is presented.	Medical cannabis administered in the form of oil and inflorescence distributed through flowers, capsules, and cigarettes.	The usage of medical cannabis resulted in a 50 percent reduction of pain after 6 months based on a pain rating scale of 0 to 10. Almost 60 percent of participants reported a successful outcome after using medical cannabis. Over half of the participants reported a fall prior to the usage of medical marijuana. Within 6 months after using medical marijuana only 21% of participants reported falling once or more. A significant 18 percent of participants reduced or stopped using opioid analgesics after initiating cannabis for pain management.
Ahmed/ Elsen/ Colbers/ Marck/ Burger/ Feuth/ Rikkert/ Kramers/ 2014	Randomized, double-blind, double-dummy,	N= 11	No prior history of cannabis usage.	Did not address the usage of opioids.	A dosage of 1.5mg or 5 mg Namisol tablets	Common adverse effects included drowsiness, dry

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	<p>placebo controlled, cross-over trial.</p> <p>August – November 2012</p>	<p>Blood sampling to measure the plasma contractions of THC, body sway, TAP- alertness, VAS- feeling high.</p>	<p>In order to test the safety and efficacy of medical cannabis all participants were in relatively healthy shape. Hypertension and hypercholesterolemia were noted in 3 participants respectively.</p>	<p>Participants were excluded if a history of drug or alcohol abuse was present.</p>	<p>were administered. Ingested orally.</p>	<p>mouth, coordination disturbances, and headache. Cannabis was well tolerated by older individuals ages 65 and older. The study proves THC to be better tolerated in the older population compared to the younger population.</p>
<p>Bigand/ Anderson/ Roberts/ Shaw/ Wilson/ 2018</p>	<p>Qualitative descriptive content analysis method, self-report.</p> <p>No date available</p>	<p>N= 150</p> <p>Recruitment from clinic waiting rooms with qualitative self-reported health outcomes</p>	<p>Adults over the age of 18 currently prescribed opioid medication for pain, including cancer pain.</p> <p>Issues of physical pain including insomnia, reduced appetite, nausea or symptoms caused by cancer, scleroderma, headache, neuropathies, muscle spasms, and Crohn’s disease.</p>	<p>Participants must currently be taking prescription opioid medication.</p>	<p>Variation in administration of strength, dose, and vessel.</p>	<p>Commonly reported adverse effects of medical cannabis include fuzzy thinking, sleepiness, poor memory, overeating, coughing, weight gain, burning red eyes, dry mouth, nausea, and increased heart rate. Participants reported judgement from others as a negative social consequence when using cannabis. Only 10.7% (N=16) of the participants reported current</p>



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						<p>registration as a medical marijuana patient.</p> <p>For the alleviation of pain, 67% of participants endorsed the use of cannabis.</p> <p>The cost of cannabis was reported a significant strain on finances that 53% of respondents could not afford regularly.</p>
Boehnke/Litinas/Clauw/ 2016	<p>Cross-sectional retrospective survey</p> <p>November 2013 – February 2015</p>	<p>N= 374</p> <p>Survey of Qualtrics (Provo, UT)</p>	<p>Registered medical cannabis participants from local medical cannabis dispensary.</p> <p>Fibromyalgia Survey Criteria (FM score) from 0 to 31. The most intense pain equivalent to 31.</p>	<p>All participants were required to have a history of opioid usage for chronic pain management.</p>	<p>Variation in administration of strength, dose, and vessel.</p>	<p>Cannabis significantly reduce the side effects experienced after the administration of opioids.</p> <p>Patients reported improvement in overall quality of life by up to 45%.</p> <p>When used in partnership with the minimum amount of opioids for pain management cannabis showed up to 95% reduction in administration. These trends decrease as the prescription opioids increase.</p>

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Lloyd/ Striley/ 2018	Systematic review of the literature  January 2000-December 2017	N= N/A  Database search of epidemiological studies, human subjects, English language, peer review publications, and U.S. populations	Self-treatment for unrelieved symptoms of pain and recreational usage. Medical conditions with symptoms that show no signs of improvement with conventional treatment.	Did not address the usage of opioids.	Variation in administration of strength, dose, and vessel.	The vast majority of aging older adults use marijuana strictly for medical purposes with age. It has been associated with lower adverse effects, less risk for addiction, and increase benefits for usage in treating medical conditions. Subsequently negative effects of marijuana include mental health problems, respirator issues, metabolic syndrome, and drug-drug interactions.

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Mucke/ Phillips/ Radbruch/ Petzke/ Hauser/ 2018	Randomized, double-blind controlled trials 2000-2010	N= 1,750  Numerical rating scale of 0 to 10 to report pain intensity.	Adults had to be at least 35 with a pain rating of above 4 experiencing neuropathic pain.  Participants either had to report a grade of 4 or higher on the pain intensity scale or experience prior unsuccessful analgesic therapy.	Did not directly address the usage of opioids.	Variation in administration of strength, dose, and vessel. Primary method include herbal, plant-derived, and synthetic.	In regard to treatment of chronic neuropathic pain cannabis showed no high quality evidence of its efficacy. All forms of cannabis medications proved better outcomes in general pain relief and global improvement compared to the placebo. Primary adverse effects include sleepiness, dizziness, and confusion. When treating neuropathic pain in particular the study sites cannabis as the third-line therapy after anticonvulsant and antidepressant medications prove unsuccessful.
Nugent/ Yarborough/ Smith/ Dobscha/ Deyo/ Green/ Morasco/ 2018	Multisite prospective cohort study  October 2016 – November 2017	N= 371  Self-report measurement with the Pain Medication	Documented musculoskeletal pain diagnosis within their medical records.	Patients must be currently on Long-term Opioid Therapy which indications history of opioid use.	Variation in administration of strength, dose, and vessel.	Side effects from medications were lowered with usage of medical cannabis. Medical cannabis was not associated with an increase in misuse of

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		Questionnaire (PMQ)	Conditions included but not limited to arthritis, back, and neck/joint pain.			substances such as alcohol or nicotine. Participants who endorsed medical cannabis reported decreased impairment due to medication related side effects compared to those denied medical cannabis use.
Reiman/ Welty/ Silomon/2017	Cross-Sectional Survey 2016-2017	N=2,897 HelloMD patient database, Qualtrics survey site	Affirmation of usage of medical marijuana for substitution of opioid/non opioid pain medications  Pain-related conditions including back pain, migraines, PMS, Fibromyalgia, inflammation, cancer, etc.	Thirty percent of the study population reported using opioids for pain management currently or within the past six months.	Variation in administration of strength, dose, and vessel. Primarily smoking (50%) followed by vaporizing (31%) then edibles (10%)	More participants would use cannabis frequently if it was less stigmatized and more obtainable.  A significant decrease in opioid related mortalities was observed in states with legalized medical marijuana.

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Salas-Wright/ Vaughn/ Cummings-Vaughn/ Holzer/ Nelson/ AbiNader/ Oh/ 2016	Repeated, cross-sectional data collection	N= 723,283  Self-reports of 12month marijuana usage	Addressed the overall usage of the late middle age population (age 65 or older) rather than a specific relation to pain.  The exclusion of depression, anxiety, HIV/AIDS, and STD diagnoses was due to the unobtainable variables in the population.	Did not address the usage of opioids.	Variation in administration of strength, dose, and vessel.	With the increasing accessibility and legalization of marijuana usage among older adults has increased exponentially. There is a link between marijuana users and other substance usage, however, no real evidence has shown increase risk for substance abuse. Marijuana disapproval and risk perception of marijuana usage decreased as marijuana use became more prevalent and overall disapproval decreased.
Wilsey/Marcotte/ Deutsch/Gouaux/ Sakai/2012	Randomized, double-blind, placebo controlled, crossover design  December 2009 – March 2011	N=39  100-mm visual analog scale, Patient Global Impression of Change (PGIC)	Prior exposure to cannabis was a requirement for participation.  Pain related specifically to neuropathic conditions including peripheral neuropathic pain, diabetic neuropathy, idiopathic peripheral neuropathy,	All participants underwent a urine toxicology screening; however, the specific usage of opioids is not applicable to this study.	Administer via “Foltin Puff Procedure” a cued-puff system.  Placebo cannabis Low-does THC (1.29%)	THC yielded significantly higher equianalgesic effects compared to the placebo doses. The results analyzing neuropathic effects showed that the medium dosage was less effective on both

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			postherpetic neuralgia, brachial plexopathy, and lumbosacral radiculopathy.		Medium-dose THC (3.53%)	burning and aching pains compared to the low dose. No tolerance issues were encountered over the course of the trial. In an assessment of acute pain cannabis proved less effective making it not suitable for acute pain management.

APPENDIX C

TABLE II: TABLE OF EVIDENCE SUMMARY TABLE OF PEER REVIEWED NON-RESEARCH AND EXCLUDED RESEARCH LITERATURE

Last name of First Author/year	Topic/Research/Summary	Key Statements
Bachhuber/ Saloner/ Cunningham/ Barry/ 2014	<p>Medical Cannabis Laws and Opioid Analgesic Overdose Mortality in the United States</p> <p>Non research, data analysis</p> <p>An analysis of trends from 1999 to 2010 comparing medical cannabis laws and overdose mortalities related to opioid analgesics. As new legislature was passing each state was accounted for the following year. States that had medical cannabis laws were compared to states that did not. Overall opioid overdose mortalities were significantly lower in states that had medical cannabis laws accounting for both prescription and illicit opioid usage.</p>	<ol style="list-style-type: none"> <li>1. There is a direct causal link between reduced state-level opioid overdose mortalities and medical cannabis laws.</li> <li>2. In the past decades, opioid prescriptions for noncancer pain has doubled, and with it overdose deaths have skyrocketed.</li> <li>3. The mean rate of opioid analgesic overdose deaths was 24.8% lower in states that implemented medical cannabis laws.</li> <li>4. Patients with legitimate prescriptions for opioid analgesics from a single provider make up the majority of opioid analgesic overdoses at 60%.</li> </ol>
Kaskie/ Ayyagari/ Milavetz/ Shane/ Arora/ 2017	<p>The increasing Use of Cannabis Among Older Americans: A Public Health Crisis or Viable Policy Alternative</p> <p>Non research, Policy Study</p> <p>This article reaches to examine the population of older Americans using the age-period-cohort paradigm to explain the rise in cannabis usage. It examines the current policies in place for the use of medical marijuana and the implications it may have on opioid therapy and end of life care. It concludes with an open call to examine federal policy, public opinion, and biomedical efficacy of medical marijuana.</p>	<ol style="list-style-type: none"> <li>1. The older adult population within the United States is expected to double over the next two decades.</li> <li>2. The baby boomers as a generation are notably more tolerant and like to use cannabis both recreationally and for symptom management.</li> <li>3. The primary demographic for cannabis usage includes unmarried, white men with a history of cannabis usage prior to the age of 30.</li> <li>4. According to recorded antecedents of cannabis users over the age of 50, the benefits of cannabis are experienced without any negative outcomes.</li> </ol>



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