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Cannabis as a Safer Alternative to Opioid Management of Chronic Pain

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Walden University

College of Health Sciences

This is to certify that the doctoral study by

Loren Nedelman

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
2020

Abstract

Cannabis as a Safer Alternative to Opioid Management of Chronic Pain

by

Loren Nedelman

MSN, Uniformed Services University of Health Sciences, 2013

MA, Webster University, 2009

BSN, Florida Atlantic University, 2004

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

May 2020

Abstract

Chronic pain affects approximately 100 million American adults and costs the United States upwards of $635 billion each year in medical treatments and lost productivity. Opioid prescription for pain has increased exponentially over the past several years, with the CDC estimating 20% of prescriptions lasting longer than 3 months for patients with noncancerous pain. Opioid addiction has become a national public health crisis with mortality surpassing 100,000 deaths annually due to overdose. As States have begun to deregulate the use of cannabis and cannabis derivatives for medical purposes; oversight and regulation by the federal government on its use as a Schedule I medication has been found to be lacking. Medical centers that derive funding from federal sources are unable to continue using this substance without forfeiting funds. The purpose of this systematic review was to explore available peer-reviewed evidence related to the use of cannabis as a potential alternative to opioids in the treatment of chronic pain. The Johns Hopkins Nursing Evidence-Based Practice model was used to review 32 peer-reviewed articles published between 2008 and 2018. Findings suggest cannabis as a promising alternative to opioids and supports the medical use of cannabis as a safer first-line pharmacological treatment for chronic pain compared to opioids. The use of cannabis as a safer alternative to opioids can promote social change directly and indirectly across a variety of social and economic dimensions due to increased access to medication at reduced cost, elimination of opioid-related death due to overdose, diminished individual and social harms related to cannabis. A medical alternative to opioids may also lead to a reduction of the inequitable incarceration of cannabis users across demographic categories of ethnicity and race.

Is Cannabis a Safer and Equally Effective Medication for the Treatment of Chronic Pain as Compared with Opioids?

by

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MA, Webster University, 2009

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Dedication

I would like to dedicate my project to my family for enduring my late nights, and vacations interrupted by myself completing this project.

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Section 1: Nature of the Project

Introduction

According to Brownstein (1993), most scholars believe that the use of opioids can be attributed to the Sumerians about 3 B.C.E. near present-day Iraq. There is some debate whether Homer described the euphoric substance in *The Odyssey* around 9-10 B.C.E. Although early function of the poppy plant was to cause euphoria during religious ceremonies, scientists in 1806 were able to isolate morphine from poppy plants and used it for pain control (Brownstein, 1993). The addictive quality of this compound forced researchers to seek a nonaddictive pain reliever, and in 1898 they first synthesized heroin (Brownstein, 1993). Many patients with chronic pain had no other options. But given the addictive qualities of opiate substances, once they started using them, they could not stop. Further studies on cannabis have shown it to be positively correlated with the reduction of pain, in some cases up to 30% (Kondrad, 2013).

Problem Statement

As in the past, nonmedical use of opioids has continued, and the National Survey on Drug Use and Health estimates that in 2014, more than 10 million people in the United States used prescription opioids for nonmedical use (Wickramatilake et al., 2017). Drug overdose deaths overtook automobile accidents as a leading cause of mortality in 2015, with over 33,000 lives lost (Wickramatilake et al., 2017). The problem addressed by this study is the need for a safer alternative for [chronic] pain relief than opioid medications. Cannabis may be that safer alternative for treating chronic pain. By using cannabis instead of opioids for chronic pain, many unwarranted deaths may be avoided.

The resources used to combat this epidemic could then be allocated on other public health initiatives and free nursing practice to address other areas of interest or concern.

Purpose Statement

The potential positive impact of reducing opioid prescribing would include better pain management with alternatives that are safer and effective, and reduced costs to insurers and other health care plan beneficiaries (Franklin et al., 2015). By promoting the *appropriate* use of these medicines will enhance health care and society as a whole.

The purpose of this project was to objectively review the current evidence on the use of cannabis for pain. Many states have enacted laws to allow for medical marijuana, but it remains illegal to use or study under federal laws (NCSL, 2017). Many facilities in states where cannabis is legal are unable to use this modality as a treatment due to federal funding (NCSL, 2017). Many patients with low income or no insurance could benefit from the use of cannabis, but hospitals cannot prescribe it (Tax Foundation, 2016). The outcome of the study should give policy makers and the scientific community evidence on how to make evidence-based changes. This project could propose further study on cannabis and the target populations that could benefit the most from it.

Nursing practice could benefit from this study by allowing nurses to educate their patients on alternative ways to treat their pain. With further research, nurses would have better clinical guidelines on how to carry out provider orders on the appropriate dose and route of cannabis. As more potent synthetic opioids are being used, nurses, doctors, and other health care professionals are being placed in delicate situations both dealing with

pain and during emergency resuscitations. If fewer people are abusing opioids because they are using cannabis for pain, the cost of healthcare could be lowered.

Nature of the Doctoral Project

This systematic review of the evidence used the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model. Evidence was analyzed using the Research Evidence Appraisal Tool. It was collected via a computerized search of the Google Scholar, Cochrane Database of Systematic Reviews, PubMed and CINAHL databases. The abstracts were reviewed and classified for level of quality, categorized between A and C (Newhouse et al., 2007). The evidence was then entered into a spreadsheet with the following information (to provide a rationale for why the data were kept or discarded): citation, design type, level of evidence, relevance to the problem statement, and lastly rationale for keeping or rejecting. The evidence was then synthesized in a table using a hierarchy of evidence, levels I-VI (Melnyk, Fineout-Overholt, Gallagher-Ford, & Stillwell, 2011) and the results presented.

There are studies which have been conducted showing some benefit from the use of cannabis for chronic pain. This author does believe there is a significant gap in large studies indicating the efficacy of using cannabis for chronic pain and other diseases. The use of smoked cannabis is not without its risks and may be partly the reason large scale randomized controlled trials have not been performed. The other reason is the FDA classification of cannabis as a Schedule 1 drug. The designation causes strict controls on clinical trials which make it difficult for researchers to get approval for their studies (Kondrad, 2013). If, as anticipated, there are few high-quality trials, this would be one

finding from this study to communicate to researchers and policymakers to help increase their awareness of evidence which could allow for changes on continuing research and safe effective use of cannabis or not allowing its use.

Significance

This project could have several stakeholders who might have significant beneficial positive impacts by the use of cannabis for pain. The use of medications, both natural and synthetic, have been used for centuries to cure disease, injury, and illness (Brownstein, 1993). If safer substances could be found to be beneficial to a patient and safer, this would seem to have a positive impact on the recovery of a patient. In the early 1990s it was found that the human body carried receptors now known to be the endocannabinoid system (Kondrad, 2013). The CB1 and CB2 receptors are regulators of the nociceptive pathways and inflammation which control the pain pathways to the brain (Kondrad, 2103). The ongoing war on drugs would be another significant area which might be affected if cannabis were decriminalized so federal and state agencies could target other crimes.

The Tax Foundation (2016) estimates taxation on marijuana could generate as much as "$28 billion in tax revenues for federal, state, and local governments, including $7 billion in federal revenue: $5.5 billion from business taxes and $1.5 billion from income and payroll taxes." With many cities and state budgets dwindling, this new taxation would be a positive trend which cities, states, and the nation could exploit (Tax Foundation, 2016). The decriminalization of cannabis would also mean a decrease on spending for prosecution and imprisonment of persons who use marijuana. Instead,

money could be used for mental health services and addiction treatment and counseling. As cannabis does have addictive qualities, taking a proactive view and begin programs to address addiction it could be an even greater problem when legalized.

The use of cannabis for medical conditions and guidelines for prescribing would allow medical providers to address pain with a less risky option than opioids. Cannabis use for recreational purposes should be reviewed very carefully before a state decides to allow it. Recreational use may pose a threat to one's health, as most forms of cannabis ingestion are from smoking the dried leaves, buds, resins or oils (Fischer et al., 2017; Kuddus, Ginawi, & Al-Hazimi, 2013). The study of the dose and concentration of cannabis products to allow the greatest effect, with least harm would be most beneficial. Nurses could better deliver the medication with further research on the effective dose and routes.

Drug companies could be affected in many ways with the use of cannabis. Their sales may be impacted, but I would assume they have been already, given the decrease in many areas of providers who prescribe opioid medications. The funding for further development of other alternatives which are less harmful, or addictive could be one area where the pharmaceutical industry would begin to look. There are current efforts to find ways of limiting the addictive qualities of cannabis: reducing this adverse effect may address the opposition to this substance being declassified by the FDA (Fischer et al., 2017; Ware et al., 2015). Nurses could play a large part in helping to educate their patients on the appropriate dosing of cannabis, once the right chemical components and

dose/route are found useful. The nurse is often the point of contact the patient seeks to get further information on how to use their medication.

Politicians would be other stakeholders involved in or impacted by the use of cannabis for pain. Politicians would need to set aside their personal views on the substance and provide meaningful legislation on the use of cannabis. As the industry expands, laws previously enacted would destabilize efforts to use profits from the sale of cannabis or hinder trade, making new technology for cannabis. If evidence does exist for the beneficial use of cannabis, then laws may need to be adjusted to allow or regulate the use of cannabis products.

With different state and federal banking regulations for marijauna, legal businesses which work with cannabis cannot get loans or use banks as other legitimate businesses do. This is a direct result of current federal laws (SNS, 2017). Currently, there are bills in Congress which are trying to address these legitimate business needs (SNS, 2017). The further objective of looking into the validity of using cannabis for medical purposes could help provide evidence that these laws should be changed in favor of legitimate businesses trying to make a living through cannabis. It is imperative in my view that the federal government take a look at current laws and amend them for these entities to continue with cannabis sales, research, and technological advances.

The hindrance of some existing laws does make it a challenge for the use of cannabis in our society today, as well as research. The safety of businesses is affected by the inability to bank as other businesses conduct themselves. The current laws make it impossible for many of these business to do financial transactions by any other means

than with cash (SNS, 2017). This means carrying large amounts of cash to and from their businesses, putting them at harm.

Many businesses have begun to develop technologies (which would have been used for other purposes) specifically for cannabis (Dantes, 2018). With increased use for pain, this growing industry could be affected by the changes in the use of cannabis. As research develops, maybe new ways of delivering cannabis or a chemically synthetic form may be introduced, and technology to deliver it or test it could be impacted. Farmers who would usually grow food crops could turn to growing cannabis if it is easier and more profitable.

Some third-world nations have had a similar problem with illegal substances, such as heroin or cocaine (Walt, 2005). This could be different in the United States as many farmers are subsidized to grow food crops. The cannabis plant could be exempt from these subsidies, making it costly to produce, but if profits are generous, it might not make a difference in choice of crops the farmers grow. Cannabis and its cultivation are known to have been used in Asia and in particular, India, around 900 B.C. (Kuddus, Ginawi, & Al-Hazimi, 2013). There are approximately 538 chemical compounds in cannabis which include: terpenoids, cannabinoids, sugar compounds, fatty acids, simple acids, amino acids, simple ketones, hydrocarbons, simple aldehydes, esters and lactones, proteins, glycoproteins, and enzymes, steroids, simple alcohols, pigments, and vitamin K (Kuddus, Ginawi, & Al-Hazimi, 2013). Any of these could be exploited by other researchers for development of food products, new fibers for clothing, and other uses for which the plant and its derivatives may be useful to our world.

Medical systems are also stakeholders in this debate of the use of cannabis for pain. As current policies stand, they would not be able to provide medical cannabis to their patients without the threat of losing federal reimbursement for services. They could do so, however, if the use was under the umbrella of research. The medical system could also harvest and produce their own cannabis for the use of patients if policies were changed. The non-profit medical systems would most likely see a revenue string which could see it able to subsidize health care for many low-income or under insured patients.

Summary

This project's problem statement was as follows: Is cannabis an effective medication to treat chronic pain? There is an opioid overdose epidemic which is sweeping the nation currently, and a viable medical treatment for chronic pain which is safer and effective is needed. Cannabis may be a promising treatment which has been used for centuries and with less risk than opioids. The gap in evaluating the effectiveness of cannabis for chronic pain needs to be filled. By objectively reviewing current data, it is the objective of this project to provide evidence for further research and policy changes which will allow for a better understanding for the medical uses of cannabis.

The implication for nursing practice is the availability of alternative therapies for chronic pain relief. Nurses can better educate their patients on the optimum use of cannabis once research is available to present clinical guidelines for its use. If the data shows the effectiveness of cannabis for chronic pain the use of opioids should decrease, and deaths from opioid overdose decrease as well. The senseless loss of life due to opioid

overdose should be avoided and allow for nurses to look at other ways to increase patients' health and spend less time with grieving loved ones.

The project used a computerized search of databases to systematically review the literature. The database results were ranked by hierarchy and level of evidence. The evidence may be limited due to the FDA classifying cannabis as a Schedule I substance, which limits its availability for research. The policies which are currently in place may limit how medicinal cannabis is used in states which have legalized cannabis. A critical analysis should "assess the potential studies for rigor, and ensure they are free from significant methodological issues which may impact on the quality of the review findings" (Butler, Hall, & Copnell, 2016).

Stakeholders may find many positives in the use of cannabis for chronic pain. The patient will have an alternative to opioids to control their chronic pain. The taxation of cannabis may allow for other public health initiatives be realized in the community. The community may also achieve a benefit with the decriminalization of cannabis and fewer resources needed to police for cannabis drug offenses. The new technology built for the delivery of cannabis products and farming will also create new and exciting industries. At the same time, though, pharmaceutical companies may need to switch from their strategic planning on current medications to research cannabis. Medical systems may be able to harvest their own medicines or produce at low cost to the community. The use of this substance could decrease health care costs in the U.S. and the world.

The agricultural community could have both positives and negatives with the increased use of cannabis. The crop may cause farmers to switch from lower yielding

crops to cannabis. This may mean fewer food sources, although the cannabis plant does have some nutritional value. The 538 chemical compounds known to exist in cannabis may lead to other benefits which can be exploited. The use of the crop could yield such products as an alternative to wheat in making bread, fiber to use for clothing and other uses for the plant not yet found.

With the endocannabinoid receptors linked to the pain pathway, cannabis should be a substance medical providers can exploit to treat pain. The use of cannabis for the treatment of chronic pain appears to be a less dangerous alternative to opioids. By introducing a less hazardous substance which does not have psychoactive components and still works on the pain receptors, helthcare providers may just might decrease opioid overdose deaths and treat chronic pain.

Section 2: Background and Context

Introduction

The purpose of this project was to ascertain whether the literature supports cannabis as an effective medication for the treatment of chronic pain. The goal was to critically identify if evidence exists as to the efficacy of cannabis in treating chronic pain. The further research and policy changes which would be affected by the legalization or change in drug schedule of this substance would be a benefit of this project. It is postulated that cannabis is effective and that policy and research would be advanced by this study.

Concepts, Models, and Theories

The project loosely follows Dobbins's framework for dissemination and use of research models (White & Dudley-Brown, 2012). The framework for this model consists of five stages: knowledge, persuasion, decision, implementation, and confirmation (White & Dudley-Brown, 2012). The project will provide for research dissemination and lead to evidence-based decision making when published. It may further work at the local level in the use of the research or help in the effort to promote research.

Relevance to Nursing Practice

Pain management in the inpatient/outpatient populations can be entirely different, but opioid overuse continues in both settings (Becker et al., 2018). To address the overuse of opioids, a DNP-educated nurse leader needs to look at alternate methods which are evidence-based to control pain in both contexts. Specifically, many states are looking at the use of cannabis as a medical treatment. There is conflicting evidence that

cannabis could be used to combat chronic pain (Degenhardt et al., 2015). Opioid use may still be useful in acute pain, cancer or end-of-life pain management, but with increasing deaths and addiction with opioids?, a safer alternative is needed (Frank et al., 2014; Franklin et al., 2015). Healthcare providers must empower patients to manage their pain appropriately, which may mean lifestyle modifications, including exercise, specifically stretching, such as yoga and other non-pharmacologic therapies and treatments (Frank et al., 2014; Franklin et al., 2015).

As DNP-prepared nurses, we must take a leadership role and ensure continued advocacy for our patients by (a) applying best evidence practices to our daily work, (b) ensuring policies and guidelines are updated to use evidence-based practices to guide our care (White & Dudley-Brown, 2012), and lastly (c) standing by strong evidenced based practices which are safer and can benefit our patients even when this may mean systemwide changes and legal ramifications. By transforming our behaviors and using this to guide our approach to others, healthcare providers can change the status quo and use the current evidence to guide practice (Menaker, 2009).

Local Background and Context

In a Washington Post/University of Maryland poll, almost 35% had family members or knew someone who was addicted to opioid prescription medications or heroin (Hicks, 2017). The author is currently working and living in Maryland and found it of concern for current practice implications. Maryland deaths from opioid prescription medications totaled 317 from January 2016 through September 2016, almost 41% greater than the same period in 2010 (Hicks, 2017). The study shows the number of heroin

deaths during this same 9-month period was 918, four times greater than the same period in 2010 (Hicks, 2017). The governor of Maryland declared a state of emergency in March of 2017 and pledged to ask the state senate for $50 million dollars over the next 5 years to combat this epidemic (Hicks, 2017). The National Institutes of Health, National Institute on Drug Abuse (2017) estimated in 2015 that there were over 35,000 deaths in the U.S. from some type of opioid. The overall drug-related deaths in 2015 were almost 65,000 (NIH, 2017).

The prescribing of opioid medications was at its highest in 2010 with approximately 782 morphine equivalent milligrams per capita prescribed: it has since decreased to 640 morphine equivalent milligrams per capita in 2015 (Guy Jr. et al., 2017). Although prescribing has decreased, the number of deaths continues to rise, and the morphine equivalent dose per capita is higher than 1999 levels (Guy Jr. et al., 2017). With this level, an alternative needs to be found. These medications do serve their purpose but must be carefully prescribed by health care providers in all communities. A one size fits all prescribing pattern may not be the best approach to continue with using opioids for pain control.

A current issue I have seen in the context of my clinical worksite is the inability of patients to obtain cannabis for medical use while using hospitals, clinics or other health centers which are funded or rely on reimbursement by the federal government. Many states have enacted some type of laws to allow medical use of cannabis or its derivatives. According to NCSL (2017), over 29 states have implemented or are in the process of providing their states a cannabis program. Seventeen states allow low THC

(the psychoactive compound) and high cannabidiol cannabis for certain medical conditions (NCSL, 2017). The facilities in these states are unable to continue cannabis treatments for inpatients which makes it very confusing to both providers and patients alike. This inconsistency in policy is what researchers should come up with an answer that benefits patients and does not cause harm to the patient.

As a provider, it is frustrating, as cannabis may be beneficial to a pain patient, but because policies have not been unified the patient has to guess at dosing or find alternative ways to get cannabis products. As more states pass medical marijuana laws and begin legalized growing, I have concerns that patients who are unable to get cannabis will go to unauthorized places for cannabis, or use products which others have and treat their own pain. This can be dangerous and unhealthy,with practitioners who have little education on the drug giving unproven doses to patients. By providing clear, concise guidelines on the use of cannabis and the best route healthcare providers can adequately address both the patients pain and the opioid overdose crisis.

Role of the DNP Student

I have been interested in pain management for most of my nursing career. I have found pain to be a common denominator among men and women. Many cultures react differently to pain. Some are stoic, not showing pain, while others cry out with even the hint of pain. As I began my journey into the profession of nursing, I thought I would go into anesthesia as a certified registered nurse anesthetist but found I could address pain and other issues without this specialized training. I found that using opioid substances for conscious sedation can be a challenge, and afterward the patient may want even more. I

have found through the years that pain management is a challenge, it is neither science nor art, but both at the same time. Scientifically a medication or treatment should work, but it is not always the case. Many patients need several modalities to treat their pain.

I have embraced treating pain with differing modalities, both traditional western methods and eastern philosophies. Acupuncture, yoga, guided imagery or opioids all have a place in treating a patient with pain both chronic and acute. I hope by taking a critical look at the current evidence and sharing it with my local community and others it will allow policy changes and further research to take place. By conducting and disseminating research DNP students can all enjoy a higher quality of living, and safer nursing care as we age. I do have a bias in the belief that cannabis does have a place in treating various diseases and illnesses, and in particular chronic pain. In reviewing the literature, I will need to ensure high-quality evidence both positive and negative is included in my analysis. It may be easy to throw out literature which is negative to the use of cannabis, but if using the same standards for positive data, I must include it and rationalize its potential to investigate the use of cannabis. I do not use this substance but have friends and colleagues who have, and they believe it can and does help with their pain.

Summary

This project is guided by Dobbins's framework for dissemination and use of research models (White & Dudley-Brown, 2012). It is the intent of the project to bring a non-biased objective look at the current literature on cannabis as a safer, effective treatment for chronic pain. The research should be disseminated to guide policy, clinical guidelines and further research implemented by this study. The DNP educated nurse must

continue to look for better ways to provide care and educate their clients. By looking at alternatives, the DNP nurse can help influence practice by producing policy papers, clinical guidelines, and evidence for areas of interest in their field of nursing. The dissemination and further study of evidence is paramount to provide the nursing profession with increased knowledge and striving to help the community they are a part of stay healthy. By transforming our behaviors and using this to guide our approach to others, we can change the status quo and follow the current evidence to guide practice (Menaker, 2009).

There must be an alternative to the use of chronic opioid therapy to reduce pain. In the first nine months of 2016 over 1235 deaths in Maryland were attributed to prescription drugs or heroin (Hicks, 2017). The total death toll from opioids of any form is estimated to be 35,000 in 2015 (NCSL, 2017). An alternative treatment must be implemented to resolve this epidemic. Cannabis may be one answer, but current regulations at the federal level hamper patients, providers, and researchers from exploring and treating chronic pain.

Currently, there are over 29 states with some form of cannabis laws and /or programs, but they have continued hurdles to overcome. With states saying yes, they do think cannabis may be an answer to both the budget crisis and opioid overdose epidemic, the evidence should support changes in policies. The reimbursement and use in states which allow medical use of cannabis should be allowed under federal regulations. Educating politicians and providers on the evidence of cannabis effectiveness for chronic

pain or other diseases or illness should be assisted with the dissemination of research such as this paper.

The DNP student should tackle issues relevant to their practice and interests, by reviewing current data and evidence on the subject and encouraging a dialogue of available alternatives. If there are none, the student should look at designing a study or enlist the help of others to tackle the problem. As the DNP student grows and becomes a practitioner, looking at areas within their community to improve care should be just as important as providing high-quality care.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of this project was to ascertain if the literature supports cannabis as an effective medication for the treatment of chronic pain. The further research and policy changes which would be affected by the legalization or change in drug schedule of this substances would be a benefit of this project. It is postulated that cannabis is effective and that policy and research would be advanced by this study.

With over 35,000 deaths in 2015 from opioid drugs, including heroin, an alternative to prescription opioids must be implemented (Franklin et al. 2015). These substances do have their role in pain management. As research is produced and evidence amassed, it should be disseminated for clinicians to analyze and objectively look at policies and procedures. If the new evidence is objective, well-reasoned and safe, it should be considered for implementation. Policies that are currently followed should be changed to reflect the emerging evidence for constituents. Having two policies which contradict each other makes it difficult for anyone to properly assess usage.

Practice-Focused Question

The practice-focused question for this study was as follows: Is there evidence to show statistically significant difference [say what the comparison is?] in the use of cannabis in treating chronic pain? The purpose of this project was to find evidence, positive or negative, on the effectiveness of cannabis in the treatment of chronic pain. The focus was on current literature from previous or current studies on the subject of chronic pain and cannabis use in any form. The effectiveness of cannabis may vary by

study and scale used, but if there is evidence of statistical differences, positive or negative, it will help answer the question.

Sources of Evidence

This doctoral project used studies collected through a computerized search of Google Scholar, Cochrane Database of Systematic Reviews, PubMed, and CINAHL databases using the key words ‘‘*Cannabis*’’ and “*pain*” or ‘‘*Marijuana*”, or “*Chronic Pain and Cannabis*’’, or “*Safety and Cannabis*”. A search of Pubmed and CINAHL databases using Boolean/Phrase**:** marijuana AND chronic pain OR cannabis results in 17,140 articles. Cochrane database search found 14 articles and Google scholar found 15,400. Articles.

The articles were analyzed duplicates thrown out, then the articles title and abstracts reviewed systematically and accepted if it answered the problem statement. The systematic review helped the studies’ readers gain knowledge on the subject and characterize what the evidence is showing us. The inclusion criteria were as follows: published in English, peer reviewed, and published between 2008 and 2018. In an attempt to decrease bias, studies funded by the U.S. government were not included. Incarcerated subjects, subjects under the age of 18 years of age, and those who have used cannabis recreationally were not included. Evidence which is rated at Level VI and Level VII on the Hierarchy of Evidence rating system were also excluded (Melnyk et al., 2011).

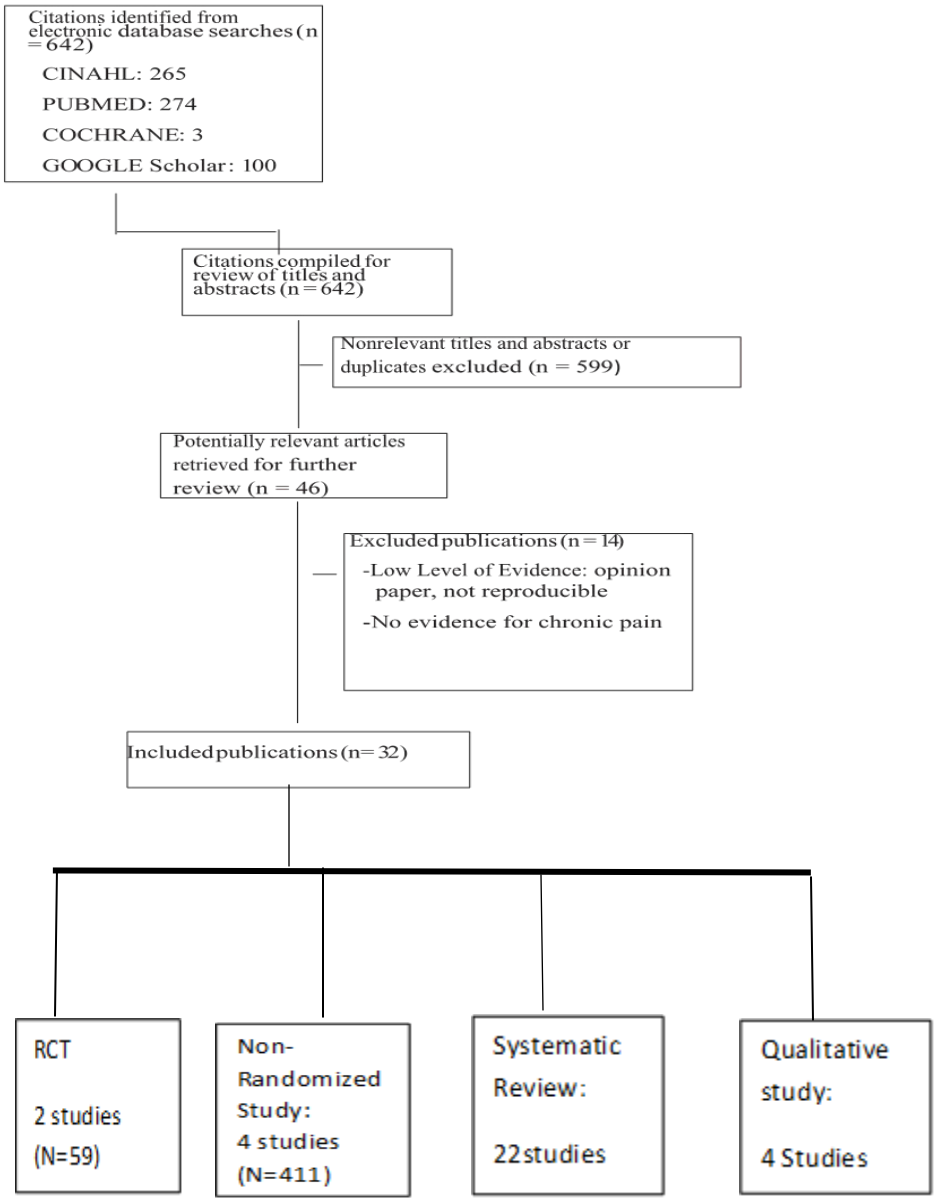


Figure 1. Identification of the extant literature.

Analysis and Synthesis

An analysis of the data was made in stages after a computer-generated list of queries is made (Butler, Hall, & Copnell, 2016). The article's abstract was reviewed, and if found to be relevant, the Johns Hopkins Nursing EBP Research Evidence Appraisal

Tool was used. In addition an Excel spreadsheet will serve as a literature review matrix that will include the article title, authors, level of evidence, hierarchy of evidence, and whether it will be kept. The studies will be scrutinized by hierarchy of evidence and level of quality; lower quality levels of hierarchy articles will be excluded. If it is unclear whether an article is relevant, it will be kept at this second stage. This critical appraisal in this stage will be accomplished by the author, with articles being ranked with hierarchy of evidence (Melnyk et al., 2011) and quality levels which will be accomplished using the JHNEBP Research Evidence Appraisal tool.

The Critical Appraisal Skills Programme (CASP) will be utilized as a final step in the synthesis of thesedata (Butler, Hall, & Copnell, 2016). The CASP checklists will help author assess the studies and ascertain hiearchy level of the research. The checklists used will look at the full text. Does the article PICO or problem statement match the inclusion criteria of the review? The checklist will look at the data and synthesize its findings. Another important aspect of the checklist will be to review the article for any bias, or recommendations from the authors.

The question to be asked for studies using qualitative or quantitative methodology would look at the article's research design and data collection methodology used. Is the study appropriate to the research question and are there ethical considerations or recommendations for further studies made in the articles? These will be included in the review. Do the authors recognize bias or possible limitations to their study? Lastly, once completeness is obtained, a computer-generated list and Excel spreadsheet will be

captured electronically if not already completed and saved on hard drive. The completed worksheets were scanned and saved electronically for future reference if needed.

Once articles meeting inclusion criteria have been ascertained, data will be collated according to themes and findings. The collective findings will then be summarized to explain the phenomenon identified, namely is cannabis a safe and effective alternative to opioids for the treatment of chronic pain. The data will also be summarized in their collective recommendations and the common themes placed in order of duplicity. Ethical considerations used during the studies will also be ascertained and noted. The paper will then be completed and sent for editing and review. After any changes made the document will be presented for publication.

Summary

The practice focus for this project looked for evidence on the statistically significant effectiveness of cannabis in treating chronic pain. A computer search of common databases will be completed using key words ‘‘Cannabis’’ and “pain” or ‘‘Marijuana,” or “Chronic Pain and Cannabis,’’. The evidence was data collected from 2008 to 2018, in the English language in peer-reviewed publications. An abstract which seems to answer the practice-focused question will be further scrutinized, and a worksheet completed which includes a hierarchy of evidence and level of quality of the study. A summary of the findings will be written, and dissemination for the paper will be put for publication with recommendations on knowledge generation, dissemination and policy recommendations.

Section 4: Findings and Recommendations

Introduction

After receiving approval from Walden University's IRB (Approval No 02-13-18-0632650), a systematic review of the literature was performed. The aim was to find high-quality evidence to answer the study question: Is there evidence to show that the use of cannabis is a safer alternative to opioids in treating chronic pain? Currently, 29 states and 3 US territories have medical marijuana programs that require continued evidence to support or refute the effectiveness of cannabis products for a variety of diseases and illness (Bellnier, Brown, & Ortega, 2018). After reviewing 642 articles that initially met parameters, 32 studies were kept for analysis. The articles were appraised by the author, ranked according to hierarchy of evidence (Melnyk et al., 2011) and quality levels, based on the JHNEBP Research Evidence Appraisal tool and CASP (Butler, Hall, & Copnell, 2016).

Many studies not utilized were reviewing differing concepts with the use of cannabis which did not directly answer my study question. One article, Xiong et al., (2012), looked at rodents' response to pain while systemic and intrathecal administration of cannabidiol (CBD), appears to have suppressed chronic inflammatory and neuropathic pain. This study was not acceptable under the parameters for this study but show promise for human studies.

Findings and Implications

The highest level of evidence found in the 32 studies analyzed was of Level I—a randomized, double-blind, placebo-controlled crossover design study. The study looked

at the effectiveness of smoked cannabis on neuropathic pain. Ware et al. (2010) recruited n= 23 participants from 116 applications of which n=21 completed the study, which was broken down into four periods. Each period was 14 days long and began with a five-day study on cannabis use followed by a nine-day "washout period" (Ware et al., 2010). This study used four differing potencies of the component, tetrahydrocannabinol (THC), at the following doses: 0%, 2.5%, 6.0% and 9.4%. The study found that 9.4% THC, smoked three times daily, had a modest mean reduction of pain from 6.1 to 5.4 on 10cm scale, with increase in sleep interval (Ware et al., 2010). This study weaknesses were noted in three areas: small participant size, short duration only five-day periods, and use of other therapies. The participants were refractory to other therapies to begin with but showed that smoked cannabis is relatively safe with minimal side effects in controlled dosing.

Wilsey et al. (2008) recruited 42 participants of which 32 completed the entire protocol of 3 study periods. The study participants had a standardized protocol for smoked cannabis cigarettes with either high dose (7% THC), low dose (3.5% THC), or placebo (0%THC), groups were double-blind and randomized. The primary outcome of pain relief was scored using standardized VAS score 0 to 100mm, and secondary outcomes were measured for degree of pain relief with a standard 7-point patient global impression of change scale and Neuropathic Pain Scale which measured several pain descriptors (Wilsey et al., 2008). The data showed VAS scores significant relief of pain at the 120- to 180-minute mark after smoking 2, 3, and 4 puffs of high- and low-dose cannabis (Wilsey et al., 2008). The data pointed to almost equal analgesia in the low- and high-dose trials.

The study did show some adverse effects with use, but no participants stopped the protocol because of them. The adverse effects noted were seen at the high dose level (7.5% THC) and consisted of the psychoactive component of the drug and making participants feel "high." The study limitations were small sample size, and possibly not attempting to use alternate means of providing the same dose, such as vaporized or oral dosing.

The next level of evidence reviewed for this project was at a Level II with good to high quality. Four studies were found in the literature with a total study participation (*N* = 411). Haroutiunian et al., (2016), recruited 274 participants in this open-label study of which 176 participants completed the protocol. The study showed modest decrease in pain symptom scores but had issues with 2 participants not completed protocol due to side effects, and with the non-randomization, the study may have missed factors which led to the decrease in pain. The study also allowed self-administration and concurrent use of opioids. They did decrease opioid use with concurrent use of cannabinoids.

This study was a larger sample then their initial pilot study in cannabis use for pain (Haroutiunian, Rosen, Shouval, & Davidson, 2008). In their pilot study Haroutiunian et al., (2008), had n= 13 participants with 5 noting moderate pain relief. The pilot study used 10-15mg oral cannabinoids and using Health Related Quality Life (HRQOL) and TOPS (treatment outcomes of pain survey) questionnaires which are validated monitor pain outcomes surveys. A limitation to this small pilot study is the open-label design, continued use of other medical therapies and small sampling, which could not be generalizable to the population.

Several studies reviewed for this analysis were looking at differing vehicles to delivery standardized cannabinoids dosing with many looking at thermal Metered dose device (Eisenberg, Ogintz, & Almog, 2014). These devices decrease potential harm from smoking the plant itself. A single 15.1-mg dose of cannabis was inhaled via the Syqe Inhaler device and blood levels at baseline and timed intervals. The n=8 patients who completed the protocol found the optimal pain relief within 20 minutes of inhalation and blood samples concur with levels similar to other methods of inhaling cannabinoids. Minimal side effects were noted, and pain scores seemed to resume pre-application levels. The single dose approach was effective in decreasing pain, but patients were unable to modify dose or route. The relatively small sample and patients continuing their current medication regime were also a limitation of this study.

A European study by Poli, Crestani, Salvadori, Valenti. & Sannino (2018), prospective non-randomized single-arm clinical trial which obtained data over 12-month period N=338 but only 214 participants completed the protocol over a 12-month period. A standardized THC: CBD ratio 19 %:< 1% via Cannabis Flos 19% was used in increments of 5mg/day and titrated to mean 10mg/day per patient effect (Poli et al., 2018). It is interesting to note that the procedure for preparing the oral solution consisted of making a tea simmering 200ml water for 20 minutes and then adding 30ml of whole milk. The authors report combining lipids with oral cannabis increases absorption (Poli et al., 2018).

Patients followed up at 1-, 3-, 6-, and 12-month intervals and baseline VAS scores decreased. Their baseline mean scores were 8 and between 1 and 3 months of cannabis

use the VAS scores decreased to a mean 5. The limitations of this study are not having a control group, continued use of other medical therapies by participants. The study also had small sample and homogeneity which would preclude generalizing the outcome from this study to the population. The study did find similar to other studies reviewed, side effects such as sleepiness and mental cloudiness which some patients found to be overpowering and stopped the study because of not tolerating. This may need to be looked at in future studies with allowing some dose changes during the design of RCT cannabis use trials.

The final evidence reviewed Level III was made up of systematic review with and without meta-analysis and qualitative standardized survey of cannabis users with chronic pain. Many of the systematic reviews looked at similar studies and have similar conclusions to the question of cannabis effectiveness on chronic pain. A group of investigators in Australia performed a cohort longitudinal study and systematic analysis on the effects of cannabis (Stockings et al., 2018; Campbell et al., 2018). This group did have authors involved in both studies. It is interesting to note that in both studies they found limited benefit or negligible evidence of efficacy. Although Stockings et al., (2018) did find limited efficacy but report further studies of high quality RCT needed.

It is interesting to note that most studies do not agree with Stockings et al. (2018), nor those of Campbell et al. (2018) in their entirety. Piper et al. (2017) found a mean pain relief score of 75% in their survey participants (n=984). I find this interesting as the Australian study was funded by the Australian government and I am unsure if this created bias on their part. A retrospective, mirror-image study conducted by Bellnier, Brown, &

Ortega (2018) found that 28 participants with chronic pain defined by at least 3 months continuous pain when treated with cannabis had decrease in pain when reviewed using " European Quality of Life 5 Dimension Questionnaire (EQ-5D) and Pain Quality Assessment Scale scores at baseline and 3 months." Likewise, a patient-centered survey conducted by Webb and Webb (2014), found their respondents had a 5-point reduction in pain out of a scale of 10. I do though see limitations in this data from these patient surveys such as Webb and Webb (2014) and Bellneir, Brown and Ortega (2018), due to participants may have bias if they desire to continue to use cannabis other than pain relief. These patients provide feedback on renewal exams for continued medical marijuana certifications.

Implications for Policy

As of January 2020, 33 states have legalized the medical use of cannabis products for chronic pain. Health care providers are becoming more and more asked about the use of cannabis and many may wish to begin the use as well. Current policies in many healthcare settings require periodic or random drug testing which includes THC the main psychoactive component of cannabis. Whiting et al. (2015), found cannabis use for chronic pain did show positive benefit although not statistically significant. They also noted the decrease in nausea and vomiting symptoms. Could a provider or other health care worker use cannabis for their pain or nausea symptoms? A significant decrease in symptoms for a patient, although not statistically significant could be enough to relieve pain and allow a patient or health care provider or worker to continue with daily activities

and a productive member of our society. Unfortunately, many policies do not afford protection for persons using cannabis for medical treatment.

Implications for Research.

As more and more people have begun to use cannabis products high quality research is lacking. Aviram & Samuelly-Leichtag (2017) discuss mixed findings in a meta-analysis or 43 studies consisting of 2437 subjects with chronic pain. Of the 32 studies that met the project's parameters, there was no definitive evidence of the benefits of cannabis for chronic pain, but neither negative results. Most of the studies reviewed do show some benefit for pain, especially neuropathic pain. .....

Implications for Practice.

Almost 33 states have approved legalized cannabis products for medicinal use and many others are purported to be looking at legalizing medicinal cannabis as well. Almost everywhere you look CBD or cannabidiol, an active ingredient of cannabis is available over the counter. This component is not psychoactive, but many have begun using it for a variety of ailments. During a visit to their primary care provider or other provider may be discussing medication use with their patient and be asked about use of a cannabis product. Grant, Atkinson, Gouaux, & Wilsey (2012) & Becker, Bair, Picchioni, Starrels, & Frank (2018) show a need for educating both patients and providers. Are providers given tools to help determine if a patient is a candidate for cannabis? If providers don't have sufficient training an opportunity to educate our patients and allow them to make an informed decision will be lost.

Recommendations

I do agree as do much of this literature reviewed there needs to be greater studies performed to truly answer the question on whether cannabis if effective on chronic pain**.** A double-blind, randomized controlled study with large sample size is needed to gather high-quality data on the effectiveness of cannabis in chronic pain. A study which also would look at smoked via cigarette or pipe, vaporized and oral with equivocal doses. The study should be longitudinal and if possible, discourage self-titration of dosing and remove other medical therapies such as opioids, tricyclics, or GABA analogues. By restricting these other medications if possible, may give more specific data on the effectiveness of cannabis.

Recommendations for Policy Changes

Policies need to be updated in two areas. It is almost inevitable that cannabis products will most likely be legalized in most states in the US. The federal statues should be loosened to allow research of cannabis to allow for a larger more definitive body of evidence in its appropriate use. States which have legalized medical use should be allowed to receive federal funding for continued use of cannabis products in hospitals, which current policies do not allow.

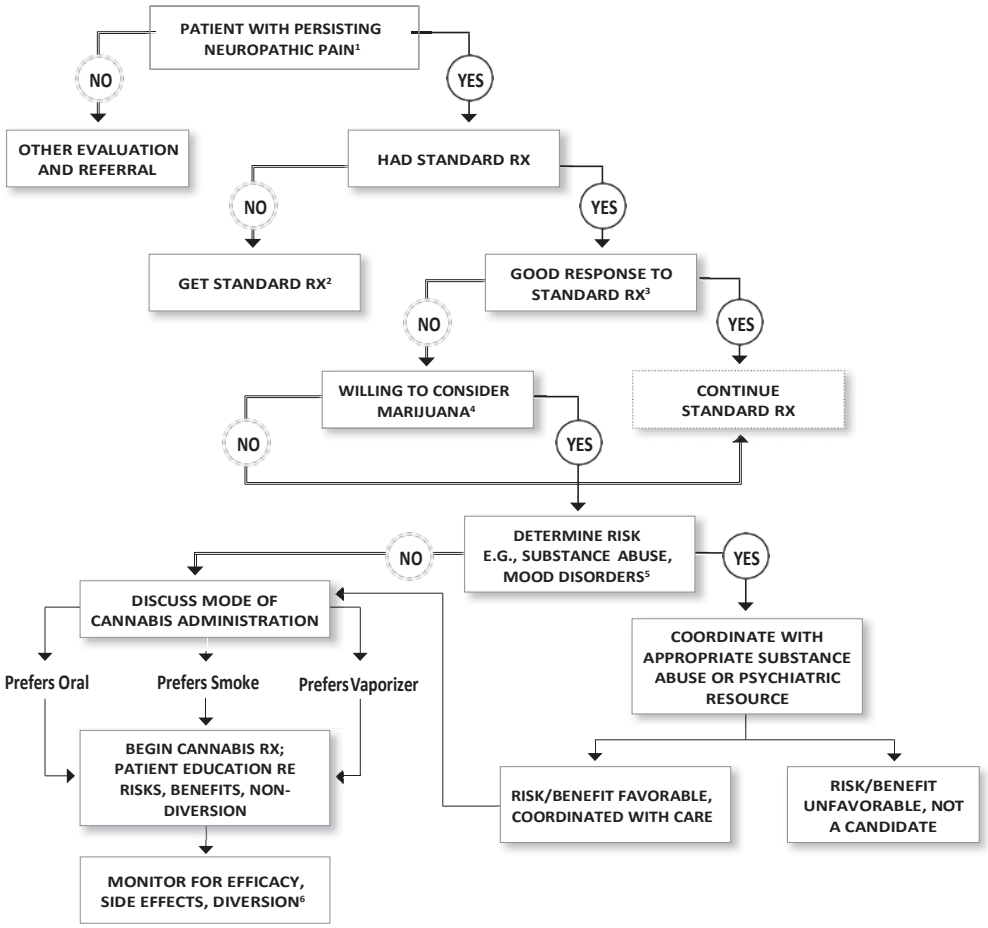
The other policy which needs changing is allowing no repercussions for health care workers whom use cannabis under a provider's direction. We should not penalize health care workers who use this therapy. This policy change should not exempt inappropriate use of cannabis or should an employee be impaired while providing care.

Recommendations for Research

A double-blind, randomized controlled study with large sample size is needed to gather high-quality data on the effectiveness of cannabis in chronic pain. Nugent et al. (2017), found moderate evidence in 27 clinical trials of the efficacy of cannabis for neuropathic pain, but little evidence for other types of pain. I believe this is an area for continued research into other types of pain. Research studies should also use trial of differing routes of cannabinoid and differing preparations such as oral, nasal, inhaled preparations.

Recommendations for Practice

Fischer et al. (2017), proposed the use of Lower-Risk Cannabis Use Guidelines (LRCUG) for patients who use cannabis products. Educating patients who are using cannabis products should be performed by the prescribing provider if that is applicable, but also by primary care providers. This type of guideline would hopefully decrease injury or side effects if cannabis products used appropriately. Grant, Atkinson, Gouaux, & Wilsey (2012) discuss the use of a stepwise approach to identify appropriate patients for the use of cannabis. I recommend using an algorithm like the one below (figure 2) which is evidence based recommended by Grant et al. (2012). By using this easy to use approach will help providers give best evidence when either their patients would like to use cannabis or as an alternative to other therapies. Providers should have tools to allow patients to make an informed decision about their care. Providers would feel more confident in providing alternative therapies and high-quality care which helps the patient heal.



Retrieved from Grant I., Atkinson J.H., Gouaux B., & Wilsey B. (2012).

Figure 2. Decision tree for medical cannabis recommendation

Strengths and Limitations of the Project

The author of this study used validated tools to ascertain which studies met the parameters of the review of literature. Several electronic databases were reviewed to ensure the highest percentage of possible studies could be found to be reviewed and included if they met criteria. One limitation was some data did address pain and the use of cannabis, but some studies were limited to headache pain, HIV pain, or acute pain.

Studies were included regardless of the outcome to ensure no bias toward hypothesis. Another limitation although this was not the main focus was looking at specific routes of drug therapy. Some studies looked at vaporized, smoked and oral. It may be advised to focus on a specific route and pain. The study could have expanded to longer period.

Section 5: Dissemination Plan

Dobbins, Ciliska, and DiCenso (1998) recommend having a face to face dissemination process for research. They report good evidence in literature showing face to face interactions with the intended audience. By doing so the evidence will spread mouth to mouth or integrated into other research projects with similar problems. Part of my plan for dissemination will entail applying to provide my research either via poster or in person or both. By doing both I hope to not only show my evidence but also provide face to face interactions with fellow researchers, health care providers or the public whom attends a conference. I will submit my research to several conferences to hopefully be able to present my work in person via poster presentations, and/or group session. This should allow a larger audience for the dissemination. I also plan to submit an article to peer-reviewed publications. As required for this project, I will also submit my evidence to ProQuest/UMI, and I will submit my research to Academia.edu.

Analysis of Self

Throughout my journey to complete this project I have strived to complete the research in a non-bias manner. I may not like what the research says, but if it is a sound piece of evidence with good framework I must include or take it into consideration. I believe I have and endeavor to pass the research onto to other health care providers and the public. I believe it is strong evidence to support further research into the use of cannabis for pain. We see in the news vaporized use may not be beneficial when looking at a harm/benefit ratio. I have found that talking to people about my project has opened some eyes. This is a very rewarding experience for me, and I feel this is also a way to

disseminate and get others interested in my research. There have been many hardships and I have been able to overcome and be a good example to my children as they broaden their horizons and education.

Summary

Dissemination of research is vital for all projects and should be included in any proposals for the search of evidence. Face to Face is most beneficial, but may not be possible or attainable, especially when trying to reach the greatest number of stakeholders. Walden university requires graduate thesis, projects be submitted to ProQuest/UMI which will allow dissemination. I will also attempt to disseminate my evidence to various scientific organizations via in person conferences or possibly other technology which is becoming a great way to reach others. Poster presentations at local events may also help with my dissemination. I also plan on looking to the cannabis industry to help them understand where the evidence is on using cannabis products for pain. I believe this may be as important to presenting to academia as they may have a larger stake in the use of cannabis.

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