The Use of Cannabis for Chronic Neuropathic Pain: A Grounded Theory Exploration of Patient Experience

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Abstract

Cannabis has been approved in 29 states within the United States and is being used therapeutically for many conditions, but little is known about the phenomenon of it being used for chronic neuropathic pain. This constructivist grounded theory study utilized primary data (N=20) to explore the experience of using cannabis to alleviate chronic neuropathic pain. A theory of negotiating power over pain was generated to describe the underlying etiology for the use of cannabis. The central process of solo navigation describes cannabis use without the oversight of healthcare providers. Cannabis is being used as a harm reduction strategy to avoid prescription opioid medication in people with chronic neuropathic pain. This dissertation adds to the understanding of medical cannabis use for improved quality of life. Researchers, nurses, healthcare providers, and policy makers need to consider cannabis as a harm reduction strategy, while continuing to monitor its harms by promoting rescheduling of cannabis on the Controlled Substances Act, developing education about the endocannabinoid system, and promoting research and prescribing standards.

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The participants in this study openly discussed their vulnerabilities with me, shared stories about pain, dehumanization, and use of a substance that is federally illegal. Without them, this research would not exist.

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Chapter 1

Introduction and Statement of the Problem

There has been an increasing appreciation for the complexity of pain control, as well as visibility of encompassing issues in light of the “opioid crisis”. Concurrently medical cannabis is approved for use in specific diagnoses, such as chronic pain, in 29 states. There is preliminary evidence that cannabis may alleviate symptoms in some types of chronic neuropathic pain (CNP) (Abrams et al., 2007; Andreae et al., 2015; Berman, Symonds, & Birch, 2004; Boychuk et al., 2015; Desphande et al., 2015; Ellis et al., 2009; Fontelles & Garcia, 2008; Karst et al., 2003; Koppel et al., 2014; Nugent et al., 2017; Nurmikko et al, 2007; Ware et al., 2010; Wilsey et al., 2008; Wilsey et al., 2013), but studies have methodological shortcomings such as small samples, non-standard dosing, and in consistent testing for efficacy or side effects.

Another issue is that the use of cannabis remains federally illegal. A literature review of state medical cannabis (MC) laws and their potential association with prescription opioid medication (POM) use suggests that MC has potential to improve pain management, reduce healthcare costs, and reduce prescription opioid mortality in states with MC laws (Vyas, LeBaron & Gilson, 2018). However, cannabis research is limited by federal policy restrictions and has not undergone traditional federal investigations for drug approvals. Despite this, over 50% of states have legalized MC without traditional oversight by the medical community. This decision leaves pain patients and healthcare providers (HCPs) to maneuver the healthcare system in new and unfamiliar ways. Patients often seek pain relief in two different contexts. They use existing traditional pain treatments utilizing HCPs and prescribed medications, and a non-traditional way of navigating MC with information sought through informal sources such as social media and online searches.

The National Academies of Science, Engineering and Medicine (NASEM, 2017) published a comprehensive review on the health effects of cannabis, and recommended a national cannabis research agenda to further delineate short and long term effects, modes of delivery, concentrations, and sub-populations of those who may benefit from its use. There are significant challenges with cannabis research. There are restrictive federal regulatory barriers, cannabis supply is only available through federally approved sources, limited funding, no standardized drug delivery, and challenging placebo use for effective blinding, all making it difficult to perform large, randomized or controlled studies (Nutt, 2013; FDA, 2017; NIDA 2017; NASEM, 2017).

Despite the lack of standardized research patients have received unfettered access to cannabis in some states in both recreational and medical forms, but are relying on primarily non-medical personnel for route, dosing, concentration, and efficacy information (Haug et al., 2016). Without a traditional drug development process, this is unprecedented for any other substance being used by patients as medication available in the U. S. As an initial step we need to understand how people with CNP are using cannabis to treat their pain. There is a significant knowledge gap about the patient experience with using cannabis for CNP.

Purpose of the Study

The purpose of this qualitative study was to address critical gaps in the literature on the impact cannabis had in the CNP population, their experience using alternative therapies such as cannabis for pain, and how they believe it has affected their pain, quality of life, and opioid use. Utilizing constructivist grounded theory methodology, the specific aims were to explore patient decision making in using cannabis to alleviate CNP and identify conditions that contribute to their use. An additional aim was to describe patient explanatory models (patient explanations) for how cannabis use impacts pain, quality of life, and opioid use.

Theoretical Underpinnings

This study utilized grounded theory (GT) methodologies, paired with symbolic interactionism (SI) as the theoretical underpinning. The method and theory are often referred to as a theory-methods package. The reference to a theory-methods package means that when GT methodology is used, SI typically informs how to make meaning of the social processes being studied, in this case the social process is the use of cannabis to alleviate CNP. The underpinnings use a lens to consider the social process at work, such as asking ‘how is meaning being made’?

Symbolic interactionism is a micro-level theory developed as a reaction to the dominant positivist approaches of the early 20th century (Carter & Fuller, 2015). George Herbert Mead laid the foundation for the SI approach, and argued that humans are active agents constructing meaning, interpreting interactions and uniquely able to see each other’s perspectives (Pawluch, & Neiterman, 2011). The premise of SI is that individuals derive meaning from interactions with others. The derived meanings can be different for each individual, and each interaction occurs within a particular social and cultural context (Blumer, 1969). Three fundamentals of SI include: 1) Human beings act towards things (objects, situations, people and themselves) on the basis of their constructed meanings, 2) the meaning of things arises out of social interaction and cultural context, and 3) meaning of things is modified through interpretation as additional stimuli is encountered (Pawluch & Neiterman, 2011; Handberg, Thorne, Midtgaard, Nielsen, & Lomborg, 2015).

SI is commonly used to understand human health behavior because it is so closely related to an individual’s own context. For example, where a person lives, how they were raised, their social interactions, and experiences all impact health behavior (Handberg et al., 2015). Cannabis use in people with CNP is closely related to their individual context, how and what they choose to share, and their ability to interpret their decision-making.

Specific Aims

Specific Aim 1. Using constructivist grounded theory methodology, explore patient decision making in using cannabis to alleviate CNP and identify conditions that contribute to their use.

Specific Aim 2. Describe patient explanatory models (patient explanations) for how cannabis use impacts pain, quality of life, and opioid use.

Definitions

Chronic Neuropathic Pain (CNP)

CNP affects approximately 7-10% of the general population in the United States (U. S.) (van Hecke et al., 2014) and is associated with estimated costs around $160 billion for care (Gilron & Dickerson, 2014). Chronic pain is defined as “ongoing or recurrent pain, lasting beyond the usual course of illness or injury more than 3 to 6 months, and adversely affects the individual’s well being” (Dowell et al., 2016; American Chronic Pain Society, 2017, p.10). Neuropathic pain is defined as “pain arising as a direct consequence of a lesion or disease affecting the somatosensory system” (Treede et al., 2008, p.1631). CNP can result from nerve injury, inflammatory processes, trauma, viral infection, diabetes, tumor invasion, and metabolic disorders (Eisenberg, McNicol, & Carr, 2005; Dworkin, et al., 2010). It is a maladaptive pain syndrome including allodynia, hyperalgesia, and anxiety, depression, and motor deficits that is often refractory to standard treatments for nociceptive pain (Finnerup, Sindrup, & Jensen, 2007; Costigan, Scholz, & Woolf, 2009). Patients with CNP experience a substantially lower quality of life, and lower levels of health utility defined as a reflection of “references of groups of persons for particular treatment outcomes and disease states” (Cramer & Spilker, 1998, p.27; Meyer-Rosberg et al., 2001; Doth, Hansson, Jensen, & Taylor, 2010). They also visit their physician more frequently, report pain that interferes with daily functioning despite receiving active treatment, have a greater number of missed work days, and poorer overall employment status, and are considered high economic burden for the individual and society (McDermott, Toelle, Rowbotham, Schaefer, & Dukes, 2006; Doth et al., 2010; Finnerup et al., 2015).

Standard, first line treatments for CNP include selective serotonin reuptake inhibitors and tri-cyclic antidepressants, which also aid in the treatment of depression, calcium channel α_{2-}

δ ligand, such as gabapentin or pregabalin (Finnerup et al., 2015). Less than half of people with CNP experience significant relief from pharmacotherapy, and for patients without an adequate response to first line therapies, second line treatments such as lidocaine or capsaicin patches, or tramadol are recommended. Opioid analgesics serve as third-line pharmacotherpeutic agents, but can be somewhat beneficial (Dworkin et al., 2010; Finnerup et al., 2015). There is also evidence that cannabinoids improve pain, quality of life, sleep, and allodynia in some CNP patients (Abrams et al., 2007; Berman et al., 2004; Ellis et al., 2009; Karst et al., 2003; Koppel et al., 2014; Nurmikko et al, 2007; Ware et al., 2010; Wilsey et al., 2008; Wilsey et al., 2013). There are other non-traditional treatments used to alleviate CNP such hypnosis, acupuncture (Hamza et al., 2000), transcutaneous electrical nerve stimulation (TENS) (Kilinç, Livanelloglu, Yildirim, & Tan, 2014), and virtual reality for spinal cord injury without substantial improvements in quality of life or pain (Pozeg et al., 2017).

Cannabinoids

Pharmacological properties. Cannabinoid refers to a class of compounds unique to the *Cannabis sativa* plant (Small, 2015). The most commonly recognized cannabinoids are delta-9-tetrahydrocannabinol (THC), and cannabidiol (CBD) (Russo, 2007). There are two subspecies within the plant called *indica* and *sativa*. Like opioids, cannabinoids interact with receptors found in the central nervous system. Two of these receptors, CB1 and CB2, are found in the endocannabinoid system, which plays a part in pain control in neuropathic pain (Maldonado, Baños, & Cabañero, 2016). CB2 is found in peripheral nervous system immune cells after injury or inflammatory response. CB1 is a receptor found in the brain, spinal cord and other neuronal tissue (Howlett, et al., 2001; Atwood & Mackie, 2010; NASEM, 2017).

Cannabinoids hold particular interest because of the intricacies of the endocannabinoid system, which includes selective cannabinoid receptors implicated in both central and peripheral nervous systems functions. Modulating activity of the endocannabinoid system holds therapeutic potential for neuropathic pain, as well as other diseases such as multiple sclerosis, spinal cord injury, cancer, stroke, hypertension, glaucoma, obesity/metabolic syndrome, and Parkinson's, (Pacher, Bátkai, & Kunos, 2006).

Cannabis has been stigmatized in the past as a purely recreational drug causing psychotropic effects, however of the 60 or more cannabinoids present in cannabis, only THC is psychoactive (Grotenhermen, 2004; Mechoulam, Parker, & Galily, 2002; Vaccani, Masi, Colombo, Rubino & Parolaro, 2005). Medical cannabis is often sold as part THC, and part CBD concentrations. Unlike THC, CBD does not cause any psychoactive symptoms (Thomas et al., 2007), has been shown to have neuroprotective properties (Scuderi et al., 2009), and therapeutic value in disorders such as epilepsy (Hofmannn & Frazier, 2013), anxiety (Bergamaschi et al., 2011), multiple sclerosis (Lakhan & Rowland, 2009), and movement disorders (Iuvone, 2009).

State cannabis laws. In states that have passed medical cannabis laws, patients can purchase cannabis products at dispensaries much like a pharmacy. Cannabis-derived products are sold in various forms such as inhaled, edible, vaporized, and liquid. The concentration of THC and CBD varies per product and within each form there are many choices for concentration and ratios of THC: CBD. The average potency of herbal (versus synthetic) cannabis is around 8 percent THC (Fabritius et al., 2013). Bioavailability differs between forms of cannabis; for example inhalation quickly diffuses THC to the brain, whereas edible products take 30 minutes to 2 hours but last much longer due to first pass through the liver (Huestis et al., 1992). The onset, intensity, duration of effect, and negative consequences are all affected by the concentration/dose and route of administration (Ehrler et al., 2015).

Federally approved synthetic cannabis. The Federal Drug Administration (FDA) has approved several cannabinoid-based medications including dronabinol and nabilone, synthetic THC products indicated for nausea, and vomiting associated with chemotherapy. Dronabinol is also approved for those with anorexia due to AIDS wasting syndrome (Davis, Maida, Daeninck, & Pergolizzi, 2007). An oromucosal spray called nabiximols has been approved in 27 countries, but is not approved in the US. It is used for multiple sclerosis symptoms and analgesia in cancer patients (Pertwee, 2012). The FDA recently allowed investigational use of a concentrated CBD oil (brand name Epidiolex®) for seizure disorder caused by Dravet and Lennox-Gastaut syndromes in pediatric patients (FDA, 2018; GW Pharmaceuticals, 2018). Of note, none of the currently FDA approved cannabis products are approved for use in pain management.

Cannabis use. Cannabis is currently the most commonly used illicit drug in the U. S., with 22.2 million Americans (12 years and older) having reported using cannabis in the past 30 days (CBHSQ, 2016). Cannabis use remains primarily recreational across the U. S. (Schauer et al., 2016), with approximately 10% (self-report) only used for medical reasons. In Colorado, 94% of medical cannabis ID cardholders indicated 'severe pain' as their reported medical condition and reason for use (Light, Orens, Lewandowski, & Pickton, 2014), and Bonn-Miller et al. (2014) found that 82.6% of cannabis users self-reported they were using it primarily to relieve pain. Each state has different medical conditions for which cannabis can be prescribed, but because of its federal status, healthcare providers cannot write a prescription but rather only make a recommendation for participants to use medical cannabis.

Dissertation Overview and Organization

This dissertation comprises a synthesis of scholarly work on the use of cannabis to alleviate CNP. The dissertation offers analysis of interview data using a constructivist grounded theory approach to explore patient experience in using cannabis to alleviate neuropathic pain and identify conditions that contribute to patient use without the oversight of a medical provider. It will also describe patient explanatory models for how cannabis impacts pain, quality of life, and opioid use. To my current knowledge, there is no published literature addressing these gaps in knowledge.

The dissertation is formatted in accordance with the University of Virginia, School of Nursing's dissertation manuscript option. The manuscript option includes six chapters: Chapter One is the introduction to the dissertation topic. Chapter Two is the proposal defense as approved by the committee and modified as requested. Chapter Three is a literature review on what is known about the use of cannabis in place of POMs for chronic pain. The manuscript has been published by *Nursing Outlook* with the title "The use of cannabis in response to the opioid crisis: A review of the literature". Chapter Four is an extensive findings manuscript to be submitted for publication. Chapter Five is a manuscript highlighting one of the themes identified in the results manuscript as "selective disclosure" and the clinical practice applications. Chapter Six is dedicated to discussion and conclusions, as well as implications for nursing, policy, education, practice, and limitations.

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Chapter Two: Revised Proposal

Specific Aims

The annual economic toll of chronic pain in the United States (U. S.) has been estimated around $560-635 billion for care associated with the 116 million people with chronic pain (IOM, 2011). Neuropathic pain has been described as a type of chronic pain often refractory to substantial relief from common pain relieving modalities such as anti-inflammatories and prescription opioid medication (POM). POMs have been commonly used and can be effective in reducing the intensity of neuropathic pain, but use can lead to addiction and other serious complications, such as a 200% increase in rate of overdose since 2000 (Dowell, Haegerich, & Chou, 2016; Eisenberg, McNicol, & Carr, 2005; Rudd, Seth, David, & Scholl, 2016). The efficacies of POM for neuropathic pain and the risks associated with use have resulted in patients with neuropathic pain seeking alternative therapies, such as cannabinoids, for pain relief and improved quality of life.

The study of cannabinoids, or the chemical compounds found within the cannabis plant, had shown promise over the last several years as a possible alternative therapy for pain relief. The National Academies of Science, Engineering, and Medicine (NASEM, 2017) published substantial evidence that cannabis is an effective treatment for chronic pain in adults. There have been at least 15 randomized controlled trials showing evidence of significant reduction in neuropathic pain with cannabinoid use. However, cannabis research has presented a challenge due to the federal status of cannabis as a Schedule I drug (DEA, 2017), researcher access to study products (NIDA, 2016a), and funding for cannabis research (NIDA, 2016b). In addition to the need for more research in the treatment of neuropathic pain with cannabinoids, there has been evidence that states allowing use of medical cannabis there is a decrease in POM overdose deaths (Bachhuber, et al., 2014, Powell, Pacula, & Jacobson, 2015), a decrease in opioid use (Boehnke, Litinas, & Clauw, 2016), decrease hospital admissions for POM use disorder (Shi, 2017), and a possible $2 billion savings in Medicare, and Medicaid in those states (Bradford & Bradford, 2016a; Bradford & Bradford, 2016b). Yet in many states without medical cannabis laws, patients were left to self-treat their pain and we do not know enough to maintain safe practice.

There have not been any qualitative studies addressing why patients are choosing to self-treat with these alternative therapies without medical guidance. It has been imperative for providers to understand what patients are using, if and why they are self-dosing with cannabinoids, and how to maintain safe and effective care for chronic pain patients. There was a *critical gap* in knowledge of the impact of cannabis on pain and quality of life (QoL) in the neuropathic pain population. There was also a *critical need* to explore therapies other than POMs for palliation of neuropathic pain and whether or not they provide any true improvement. A pilot study was performed and showed neuropathic pain patients were using cannabinoids to self-treat their pain, but the study was expanded into this qualitative grounded theory study.

The purpose of this qualitative study was to address critical gaps in the literature on the impact cannabis had in the neuropathic pain population and how it impacted quality of life and opioid use. The research question was what is the experience of people with neuropathic pain using alternative therapies such as cannabis to self-treat their pain, and how do they believe it has affected their pain, quality of life, and opioid use? The unexplained phenomenon was why patients with neuropathic pain were seeking alternative therapies to self-treat their pain. To explain the phenomenon, investigation was completed looking into what was involved in the process, what actions and conditions contributed by developing codes, categories, and themes to eventual conceptual integration and abstraction with the following aims:

Specific Aim 1. Using contemporary grounded theory methodology, explore patient decision making in using cannabis to alleviate neuropathic pain and identify conditions that contribute to their use.

Specific Aim 2. Describe patient explanatory models (patient explanations) for how cannabis use impacts their pain, quality of life, and opioid use.

Background and Significance

Impact. The Institute of Medicine (IOM) estimated at least 116 million adult Americans have common, chronic pain conditions (IOM, 2011). They called pain a significant public health problem that cost society at least $560-$635 billion annually, or approximately $2,000 per person living in the US. There were five reported reasons for the increase in pain prevalence. The aging of the population, the rise of obesity (and therefore diabetes), the progress in saving the lives of those with catastrophic traumatic injuries, post-surgical pain being poorly managed due to the increase in ambulatory surgeries, and the greater public understanding of chronic pain.

The chronic neuropathic pain population has been associated with being female, of older, age, disabled and individuals with low socioeconomic status (Taylor, 2006). Neuropathic pain has been commonly associated with reduced physical and emotional functioning, and patients with neuropathic pain were more likely than those with non-neuropathic pain to be taking POMs and multiple medications for pain, however, they reported less pain relief from those medications (Torrance, Smith, Watson & Bennett, 2007). The use of POMs have been increasing over the last 10 years, resulting in an epidemic of POM misuse, abuse and overdose, and those most likely to use POMs, such as neuropathic pain patients have been at risk. As of 2016 there were over 2 million people in the U.S. with opioid use disorder (OUD) involving POMs (SAMHSA, 2016). The CDC (2016) estimated that in some states there were more prescriptions written for POMs than the number of people in the state. The economic impact of the epidemic has been evidenced by the $55 billion in health and social costs related to prescription opioid abuse each year (Birnbaum et al., 2011), with an average of 78 deaths per day in the U. S. from to opioid-related overdose (Rudd et al., 2016). Chronic, neuropathic pain patients have been particularly susceptible because lack of alternative therapies to treat the refractory pain to most common pain treatment modalities. Patients with chronic neuropathic pain should be considered at risk for developing tolerance, addiction, overdose of POMs and other negative side effects from substances meant for pain relief (Bostwick, 2012; Koppel et al., 2014; Volkow, Baler, Wilson, Compton & Weiss, 2014; Zvolensky et al., 2011).

Neuropathic pain. Neuropathic pain has been considered a maladaptive pain syndrome that is often refractory to standard treatments for nociceptive pain (Costigan, Scholz, & Woolf, 2009). Neuropathic pain can result from nerve injury, inflammatory processes, trauma, viral infection, diabetes, tumor invasion, and metabolic disorders and is commonly seen and treated in primary care, neuroscience and physical medicine and rehabilitation practices (Dworkin, et al., 2010). Patients who experience neuropathic pain commonly described their pain differently than nociceptive pain and frequently report inadequate control over their symptoms. Patients with neuropathic pain experienced a substantially lower HRQoL, and lower levels of health utility (Doth, Hansson, Jensen, & Taylor, 2010). They also visited their physician more frequently, report pain that interferes with daily functioning despite receiving active treatment, have a greater number of missed work days, and poorer overall employment status (McDermott, Toelle, Rowbotham, Schaefer, & Dukes, 20006).

Standard treatments for neuropathic pain included selective serotonin reuptake inhibitors and tri-cyclic antidepressants, which also aided in the treatment of depression, calcium channel $\alpha_{2-}\delta$ ligand, such as gabapentin or pregabalin, and even topical lidocaine 5%. For patients with an inadequate response to first line therapies, second line treatments such as POMs could be beneficial (Dworkin et al., 2010). There was also evidence that cannabinoids improve pain, quality of life, sleep, and allodynia in some neuropathic pain patients (Abrams et al., 2007; Berman, Symonds, & Birch, 2004; Ellis et al., 2009; Karst et al., 2003; Koppel et al., 2014; Nurmikko et al, 2007; Ware et al., 2010; Wilsey et al., 2008; Wilsey et al., 2013).

Cannabinoids held particular interest because of the intricacies of the endocannabinoid (EC) system, which included selective cannabinoid receptors implicated in both central and peripheral nervous systems functions. Modulating activity of the EC system could hold therapeutic promise for neuropathic pain, multiple sclerosis, spinal cord injury, cancer, stroke, hypertension, post traumatic stress disorder, obesity/metabolic syndrome, Parkinson's, and myocardial infarction (Pacher, Bátkai, & Kunos, 2006; NASEM, 2017). Cannabis has been stigmatized in the past as a purely recreational drug causing psychotropic effects, however of the 60 or so cannabinoids present in cannabis, only Δ^9-tetrahydrocannabinol (THC) is psychoactive (Grotenhermen, 2004; Mechoulam, Parker, & Galily, 2002; Vaccani, Masi, Colombo, Rubino & Parolaro, 2005).

As of 2016, cannabis was the most commonly used illicit drug, with 22.2 million Americans (12 years and older) reported using cannabis in the past 30 days (CBHSQ, 2016). In Colorado, 94% of medical marijuana ID cardholders indicated 'severe pain' as their reported medical condition and reason for use (Light, Orens, Lewandowski, & Pickton, 2014). Bonn-Miller et al. (2014) found that 82.6% of cannabis users self-reported they were using it primarily to relieve pain, and 16% of those using medical cannabis met dependence criteria (Nunberg, Kilmer, Pacula, & Burgdorf, 2011).

Access to cannabinoids had been steadily increasing, with 29 states and the District of Columbia (D. C) having legalized cannabis for some medical conditions, and eight states and D. C. have legalized it for recreational use (National Council of State Legislators [NCSL], 2017). Despite increased state access, the federal government enforced restrictive policies and regulations on research into the health benefits as well as harms to cannabis users in most states. The imposed barriers left clinicians, researchers, and policy makers without sound evidence to make decisions on the future of cannabis, creating a public health risk (NASEM, 2017).

Researchers seeking to obtain any cannabis product for research had to receive permission from the National Institute on Drug Abuse (NIDA) drug supply program, which was the only supply permissible by the NIH (NIDAa, 2016). The only research grade cannabis supply used by the NIDA was found at University of Mississippi, and although there was a $66,078,314 investment by the NIDA in cannabis research, only $10,923,472 was used for therapeutic cannabinoid research (NIDAb, 2016). The University of Mississippi had provided the NIDA with a variety of concentrations of THC and CBD, but there was no consistency between what was provided by the University and the strains/concentrations found in dispensaries and on the street (Thomas & Pollard, 2016). The dispensaries carried far more potent concentrations of cannabis than the research-grade materials (Stith & Vigil, 2016).

The complexities of conducting research on a federally illegal substance, and its status as a Schedule I drug (DEA, 2017) presented methodological, theoretical, and ethical challenges to researchers. The field of chronic pain had been changing; researchers had been working towards new treatments for pain, all the while considering addiction and the risks of existing pain treatments. Researchers dedicated to the field of chronic pain had been searching for harm reduction strategies, while continuing to find methods of pain relief patients could use to improve QoL.

Literature Review

Cannabinoids for neuropathic pain. Relief from chronic pain had been the most common condition cited by patients for the medical use of cannabis (Ilgen et al., 2013; Light, Orens, Lewandowski, & Pickton, 2014). There have been seven systematic reviews or meta-analysis on the use of cannabinoids for neuropathic pain syndromes (Campbell et al., 2001; Iskedijan, Bereza, Gordon, Piwko, & Einarson, 2007; Andreae et al., 2015; Boychuk, Goddard, Mauro, & Orellana 2015; Deshpande et al., 2015; Hill, 2015, Nugent et al., 2017). Campbell et al (2001) performed a qualitative systematic review of 9 RCTs and found cannabinoids no more effective than codeine in treating acute or chronic pain. Iskedjian, et al. (2007) reviewed 6 articles and 1 RCT and concluded that cannabidiol/THC buccal sprays are effective in treating neuropathic pain in MS (p=0.018) when data were pooled. Andreae et al. (2015) performed a meta-analysis of 178 participants in 5 randomized controlled trials (RCTs) that inhaled cannabis rivaled any other medication on the market in effectiveness for pain control. Other findings included participants reporting effective analgesia from various forms of cannabis products

(Boychuk, et al., 2015), and Deshpande et al., (2015) reviewed 6 randomized controlled trials (N=226), and found evidence for the use of low-dose medical cannabis in refractory neuropathic pain in conjunction with traditional analgesics. Hill (2015) found high-quality evidence supporting the use of cannabis for chronic pain, neuropathic pain and spasticity (Hill, 2015). Nugent et al. (2017) reviewed 27 chronic pain trials, and among them found evidence for the use of cannabis in neuropathic pain in some patients. All of the systematic reviews recommend additional quality research on the use of cannabis for neuropathic pain.

There have been 19 RCTs examining the use of cannabis to treat a variety of neuropathic pain syndromes (Table 1). Out of the 19 RCTs, 15 of them found a decrease in pain with the use of various concentrations of cannabis. For example, Karst et al. (2003) found a significant decrease in pain after 3 hours using oral THC compared to placebo (-11.54 versus 9.86, *p*=0.02) using a population of 21 patients with chronic neuropathic pain. Similar results were found with 48 patients with brachial plexus avulsion injuries using oromucosal spray in two different concentrations (THC/C, -0.58, 95% CI, *p*=0.005); THC, -0.64, 95% CI, *p*=0.002). One of the concentrations included THC alone and the other included THC combined with CBD (Berman et al., 2004). Additional RCTs examined patients with peripheral neuropathic pain using oromucosal spray vs placebo and found a significant decrease in pain among the 63 participants (*p*=0.004, 95% CI, -1.59—0.32) (Nurmikko et al., 2007), or when using smoked cannabis in patients with Human Immunodeficiency Virus (HIV) there was a significant decrease in pain when compared to placebo ((*p*=0.03); 52% cannabis group vs 24% placebo reported >30% pain reduction (*p*=0.04)) (Abrams et al., 2007).

More recent studies have also compared multiple different doses of cannabis to placebo and evaluated for differences in pain outcomes. Wilsey et al. (2013) used concentrations of 3.53% and 1.29% smoked cannabis and found different pain relief with each concentration. Hoggart et al. (2015) evaluated patients with diabetic peripheral neuropathy and found that over 50% of the users of oral cannabis responded with 30% improvement of pain or more. Among the 19 RCTs there was a lack of consistency in the pain scale utilized, the concentrations of cannabinoid product, the route of administration, or the effect on HRQoL. None of the trials measured any long-term outcomes or evaluated whether patients were able to decrease their use of opioids while using cannabinoids.

Randomized controlled trials evaluating the efficacy of cannabis to alleviate neuropathic pain had small sample sizes, used inconsistent types of cannabis products, had only short term follow-up, did not use consistent outcome measures, and tested a variety of specific diagnoses within the neuropathic pain group of pain syndromes. It was difficult to make conclusions about the safety and efficacy. The key gaps included understanding the phenomenon of cannabis use for neuropathic pain,

Cannabis and opioids. There has been some evidence that states with more liberal cannabis laws, opioid use changes. Powell, Pacula, & Jacobson (2015) studied the impact of medical cannabis laws on opioids by measuring treatment admissions for opioid addiction and state level overdose deaths from 1999-2013 and found that states permitting medical cannabis dispensaries had a relative decrease in both opioid addictions and overdose deaths compared to states that did not. They did not find a decrease in states that did not allow dispensaries, which suggests actual access to cannabis via a dispensary is the factor that reduces opioid overdose and addiction levels, not simply having a law that permits access.

Bachhuber, Saloner, Cunningham, & Barry (2014) analyzed data from three states who had medical cannabis laws prior to 1999 (California, Oregon, and Washington), as well as ten states that implemented medical cannabis laws between 1999 and 2010, and nine states that did not have medical cannabis laws effective until after 2010. They reported that age-adjusted opioid mortality rate was 24.8% lower in states with medical cannabis laws (p=0.003). Their findings suggest that medical cannabis laws could be associated with lower opioid analgesic overdose mortality among those using opioids for medical reasons.

Another research group examined whether using medical cannabis for chronic pain changed patterns of opioid use by using an online questionnaire and retrospective survey of 244 medical cannabis patients in Michigan. They found that among participants, medical cannabis use was associated with a 64% self-reported decrease in opioid use, decrease in side effects, and improved quality of life (Boehnke, Litinas, & Clauw, 2016).

There have been several examples of policy literature that indicated therapeutic cannabis use may have offered a decline in POMs. Bradford and Bradford (2016a) found an association between medical cannabis laws and the average number of prescriptions filled by Medicaid beneficiaries. The use of prescription drugs was lower in states that had passed medical cannabis laws. They further applied this to the country and estimated that if all states had medical cannabis laws in 2014 there would be a $1.01 billion savings. This analysis did not specifically look at POMs, but the authors selected nine clinical areas to study, all of which association with the use of cannabis. The same authors also evaluated the use of medications by Medicare Part D recipients and found that the use of prescription drugs for which cannabis could be an alternative fell once medical cannabis laws were initiated (Bradford & Bradford, 2016b).

One study analyzed the associations between state medical cannabis policy and hospital admissions related to cannabis and opioids. Medical cannabis legalization was associated with a 23% and 13% reduction in hospitalizations for opioid abuse disorder and opioid overdose, however there was no decrease in cannabis-related hospitalizations (Shi, 2017). One potential explanation for this phenomenon could be that there are behavioral, anatomical, and biochemical similarities between the opioid receptor system and the cannabinoid receptor system (Bushlin, Rozenfield, & Devi, 2010). This could have implications not only for the replacement of some POM use with cannabinoids, but also a reduction in POM use with the addition of cannabinoids. Although the long-term risks of cannabis legalization for medical use had been unknown, there were nearly zero reported deaths directly related to cannabis. Meanwhile, there were 33,091 deaths related to POMs in 2015, an increase from 28,647 in 2014 (Rudd et al., 2016).

The gaps in the literature included the absence of qualitative data exploring the patient experience and their decision-making regarding the use of cannabis as an alternative therapy, and data identifying the patient perceptions of how cannabinoids impacted their pain, quality of life, and opioid use. A pilot study with three participants was completed to address these gaps in the literature by the author of this dissertation. The preliminary data identified common themes that participants identified including fear of pain and of who was controlling access to their pain medication, self-reliance on information seeking for alternative therapies for pain. They had a feeling of helplessness related to loss of QoL. They were desperate for anything that could restore their QoL and improve their pain.

Theoretical Underpinnings

A theory can be described as set of concepts and their relationships used to explain a phenomenon. In grounded theory (GT) methodology the theoretical underpinning used as a basic process were called symbolic interactionism (SI). The method and theory have become so intertwined that they are often referred to as a theory-methods package. Qualitative research does not generally make *a priori* assumptions. The reference to a theory-methods package means that when GT methodology is used, SI typically informs how to make meaning of the social processes being studied. Researchers do not test concepts of SI in the hypothesis, but the questions are action-oriented. The underpinnings use a lens to consider the social process at work, such as asking 'how is meaning being made'? SI is related to the epistemology of the work, how people know what they know, and how knowledge is generated.

Symbolic interactionism is a micro-level theory developed out of the dominant positivist approaches of the early 20th century (Carter & Fuller, 2015). George Herbert Mead laid the foundation for the SI approach, and argued that humans are active agents constructing meaning, interpreting interactions and uniquely able to see each other's perspectives (Pawluch,

& Neiterman, 2011). Herbert Blumer, a student of Mead, cited the premise of SI while maintaining Mead's philosophy on the agency of human decision-making (Blumer, 1969). Another student of Mead, Everett Hughes, bridged classic SI with more contemporary perspectives by imparting the value of fieldwork in uncovering social process (Hughes, 1984). The premise of SI is that individuals derive meaning from interactions with others. The derived meanings can be different for each individual, and each interaction occurs within a particular social and cultural context. Each meaning can be constructed and co-constructed and interpreted differently with each interaction, and the study of behavioral patterns can be framed as a social phenomenon centering on what individuals do together in units (Blumer, 1969). Three fundamentals of SI include 1) Human beings act towards things (objects, situations, people and themselves) on the basis of meanings, 2) the meaning of things arises out of social interaction, and 3) meaning of things is modified through interpretation additional stimuli is encountered (Pawluch & Neiterman, 2011; Handberg, Thorne, Midtgaard, Nielsen, & Lomborg, 2015).

SI is commonly used to understand human health behavior because it is so closely related to an individual's own context. For example, where a person lives, how they were raised, their social interactions, and experiences all impact health behavior. The health behavior should be seen through the context of the people themselves as opposed to the researcher's applied theoretical model, but SI offers an enhancement by allowing for multiple meanings to explain a pattern (Handberg et al., 2015).

Methods

Research design. This study used a constructivist GT methodology to explore the phenomenon of patients using alternative therapies to self-treat their neuropathic pain as well as the phenomenon of why they chose to seek alternative therapies, how, and what actions contribute. A constructivist grounded theory (GT), qualitative research design was used to answer the following specific aims:

Specific Aim 1. Using constructivist grounded theory methodology, explore patient decision making in using cannabis to alleviate neuropathic pain and identify conditions that contribute to their use.

Specific Aim 2. Describe patient explanatory models (patient explanations) for how cannabis use impacts their pain, quality of life, and opioid use.

Grounded theory methodologies can help to explain not only the phenomenon of patients with neuropathic pain using alternative therapies as a basic social process (Strauss & Corbin, 1994), but also to describe the variation of the process and structures describing opioid use, neuropathic pain quality, and quality of life in patients with neuropathic pain (Clarke, 2005). GT methodology, classically described by Glaser & Strauss (1967) offers an approach to social research without the positivist quantification, theory verification, and deductions from a priori assumptions (Pawluch & Neitherman, 2011). A more contemporary view of GT sees the researchers' *construction* of GT "through their past and present involvements and interactions with people, perspectives, and research practices," (Charmaz, 2014, p. 17).

A constructivist approach allows the researcher to recognize potential bias, and recognize that concepts and events are limited by time, place, position and interaction, and that the researcher interpretations and the participant's contributions are partial views of the phenomenon in question (Clarke, 2005; Charmaz, 2014). A constructivist epistemology allowed the researcher to approach the data from a standpoint of assuming that participants construct their own world and make sense of experiences through interactions they have in their world. It also allowed for recognition that people make their own meaning and the researcher role is to understand and deconstruct the meaning of the phenomenon being studied (Charmaz, 2014).

GT is different from other qualitative methods by the approach, data collection, data analysis and approaches to rigor. In grounded theory the researcher discovers the concepts and how to explain them through data analysis. These tenants fit with the research question and will help provide a guide to find meaning and give voice to the people experiencing the phenomenon. GT approach provides a framework for qualitative inquiry.GT was used to inquire about the social process of cannabis use for neuropathic pain. Development of an explanatory model of how people with neuropathic pain navigate their experience of pain and make choices to use non-traditional therapies. This approach will give words to the phenomenon of using cannabis for pain and provide a clear guide for future inquiry.

Setting, sampling plan, and procedures for recruitment.

Setting. The primary site for recruitment was an outpatient neuroscience clinic where the investigator was employed. The neuroscience clinic routinely treated people with neuropathic pain from various etiologies including, but not limited to: surgical complications, nerve injury, low back/sciatica, brachial plexus injury, peripheral neuropathy, trigeminal neuralgia, and cancer related neuropathic pain. Additional recruitment was done through social media based support group site for those suffering from neuropathic pain, a pain clinic that provides epidural steroid injections to people with pain, and through snowball technique, or referral from other participants).

Sampling plan. The sample size continued until gathering data no longer reveals additional theoretical insight, or new properties of core categories (Charmaz, 2006). Although there are no consistent guidelines for estimating an a priori adequate sample size in qualitative research, the predicted sample size needed was between 20-30 participants, or until data saturation was reached (Morse, 1995; Sandelowski, 1995).

The inclusion criteria:

- Patients with neuropathic pain with diagnosis such as spinal cord injury, diabetic neuropathy, peripheral neuropathy, sciatica, post-laminectomy syndrome, trigeminal neuralgia, tumors from cancer and non-cancer etiologies, and vitamin deficiencies. Patients may also have neuropathic pain as a secondary diagnosis such as diabetic peripheral neuropathy and/or sciatica.

- Male or female participants between the ages of 30-65
- Participants with a diagnosis of chronic neuropathic pain by a clinical provider or through patient self report (> 3 months since diagnosis)
- Admitted to using cannabis or other alternative therapies.
- Have used prescription opioid pain medications in the past or presently

The exclusion criteria includes:

- Lack of English fluency
- Unable to provide consent or agree to the waiver of consent (example: non-verbal)

Procedures for recruitment in person. The following procedures for recruitment were used:

1) All patients were screened for a neuropathic pain diagnosis at the time of their visit.
2) Patients with the appropriate diagnosis were referred to the investigator by other clinicians for consideration of participation in the study.
3) The investigator approached patients referred by other providers, or patients who volunteered information to the provider for participation in the study.
4) Brochures describing the study were placed in a visible area in the waiting room for patients to browse (see Appendix A).
5) If participants were interested they were encouraged to reach out to the primary investigator through a telephone number, secure e-mail address, or information provided on the brochure.

6) Upon initial contact a discussion of the inclusion and exclusion criteria was completed and a consent was obtained
7) A certificate of confidentiality was obtained through the National Institute of Health (NIH) to protect participants who disclosed the use of cannabis, a federally illegal substance.
8) If the participant desires anonymity the right to consent was waived as approved through the IRB.

Procedures for recruitment from support group

1) Recruitment brochure was posted on the social media support group site
2) Participants could contact the primary investigator through e-mail, telephone, or through the support group site
3) At initial contact, inclusion and exclusion criteria were reviewed and a waiver of consent was obtained.
4) The interview was scheduled through telephone communication.

Data collection procedures.

Detailed procedures for patient <u>initial</u> visits included:

1) The University of Virginia and Inova Health System Institutional Review Boards (IRBs) approved the setting, recruitment, and procedures.
2) After the consent or waiver of consent was complete, the PI conducted one or more semi-structured interviews with the participant lasting approximately 30-60 minutes. The rationale for the interview was to enhance the narrative regarding the participant's pain course and the different modalities used. It included questions about pain prior to any alternative therapies (if applicable), and how they made the decision to use alternative therapies, and how their use has impacted opioid use and quality of life.
3) The interview was recorded utilizing two separate recording devices (one handheld, and one iRecorder as approved by the IRB).

4) Participants were given $20 Visa gift cards upon completion of the interview, even if they decided not to participate without completion.
5) At the completion of the interview, the recording was transcribed for analysis. Field notes were collected throughout the interview to identify non-verbal cues during the interview.
6) Reflexivity notes were recorded after the interaction and throughout the data collection and analysis procedure as memos
7) Memo writing was performed throughout the data collection and analysis procedure to serve as a record of emerging concepts.

Data analysis. Data from the interviews were analyzed using NVIVO (13.0) qualitative analysis software program.

Inductive data. Contrasted with deductive approaches to research, inductive data collection and analysis referred to allowing themes, concepts, and theory to arise from the data. Instead of using an *a priori* theoretical framework to guide data collection and analysis, the researcher allowed the data to drive identification of analytic categories as they emerge (Pope, Ziebland, & Mays, 2000). As opposed to hypothesis testing, inductive data was hypothesis generating, and used inductive abstract analytic categories through an iterative process instead of sorting topics for systematic data analysis (Charmaz, 2014). Inductive coding includes the research going line-by-line and asking ‘what am I seeing here, what is going on?’ There was no predetermined hypothesis driving the research question and allowed the data to generate the concepts and theory.

Simultaneous data collection and analysis. To collect and analyze data simultaneously required that the researcher amended interview guides, explored different processes, and focused in on salient themes through an emergent design. The alternative was to gather all of the data prior to starting analysis, which did not allow for constant comparison, theoretical sampling, or emergent design. Data were continuously analyzed and collect data throughout the research. The interviews were transcribed, and initial coding began while still conducting additional interviews.

Theoretical sampling and constant comparison. Theoretical sampling allows the researcher to decide what data will be gathered next to answer questions based on the data and reflect on the answers. Theoretical and methodological verification occurred by articulating the process and member checking in the final interviews. Constant comparative method was used for analyzing data in order to develop a theory, and not only refers to comparison of concepts within one interview, but also between interviews and among the entire group of interviews (Glaser & Strauss, 1967). My sampling technique started with purposive sampling and moved into theoretical sampling to continue to collect pertinent data and allow for refinement of categories and the formation of emergent theory.

Coding. Grounded theory coding included constructing analytic codes and categories from the data. My coding techniques began with open coding and moved towards focused coding once deeper conceptualizations were found in the data. A code book kept all of the codes, which were eventually sorted into categories As data expanded, sorting and merging categories and concepts allowed for more abstract conceptualization by forming clusters of thought (Charmaz, 2014). The goal was for deeper conceptualization to generate an explanatory model of why participants with neuropathic pain were using alternative therapies to treat their pain.

Memoing. Memos served to record emerging concepts in an iterative way, and to develop conceptualizations, pull things together, helps decide what is highly salient. Memoing was done throughout data collection and data analysis procedures. Memoing started after the first interview and continued throughout data collection and analysis. Memos were kept in the codebook and reference between salient codes and memos were constantly compared.

Timeline

The research study timetable was presented over a 13-month period, with estimated dates for each phase of research (see Table 2). The start up began in April 2017 with

Institutional Review Board approval, preparation of brochures and culminated with committee approval of the project. Patient enrollment took place from July 2017 through January 2018 with a total of 20 participants enrolled. Data collection and analysis overlapped, as indicated in Table 2. Data analysis, transcription of the interviews, and memoing occurred simultaneous with continued data collection. The writing phase took place after data collection and utilized memos created throughout the collection and analysis process. The goal of the timeline was in line with completion of all tasks related to the project by May 2018. Continued publication, and submission of the project took place after the completion of the dissertation phase.

Limitations

Please see Table 3 for an additional list of procedural barriers. There were limitations in relation to recruitment. There was a lack of available participants in the neuroscience clinic. In order to address this limitation recruitment techniques were enhanced through an IRB amendment requesting the use of online support group recruiting in addition to in-person and snowball techniques. The online support groups ended up being the primary source for recruitment. There was also a risk of participant attrition, and to address this all data collection was done at one time. Participants were be asked if they are willing to be contacted for additional questions, but demographic data were collected in one visit.

There was a risk that participants felt hesitant to discuss interventions they use without the prescriptive authority of a provider, or their use of illegal or illicit substances. To address these concerns the certificate of confidentiality through the National Institute of Health provided additional security. Throughout the consenting process, or during description of the study, participants were assured that nothing they share will be recorded in a medical chart or shared with anyone else, and that no identifying information will be kept.

Recruitment took place over a short time period, and there was a risk that data saturation would not be reached. However, data saturation was reached after interviews no longer generated new and data verification procedures were implemented during the analysis phase of the study in subsequent interviews. Data verification occurred by taking data interpretations back to participants in the study for them to confirm the credibility of the analysis. This type of member checking was done with the final 8 interviews. Salient codes and themes were reviewed with participants for accuracy (Lincoln & Guba, 1985).

Methodological barriers

There can be implementation issues with any method, but several commonly cited barriers to qualitative research include lack of methodological knowledge, drowning in data, and not allowing for flexibility within the method (Holloway & Wheeler, 2010). A lack of understanding of the methodological complexities of grounded theory could result in an interview guide that does not follow a grounded theory approach, interactions between data analysis and data collection that are not constant comparative and simultaneous, or the lack of theoretical sampling. Qualitative researchers can drown in data and need to have a plan for implementing a data reduction phase. I used initial codes to give direction and preliminary ideas, memos to explore those ideas along the way, and then the unification of ideas analytically as theoretical meanings as techniques to limit data overload (Charmaz, 2014).

Some grounded theory critics believe the method is in danger of losing its integrity due to a multitude of grounded theory studies that ignore the fundamental tenets. Jones and Noble (2007) suggested that researchers should state the school of grounded theory to which the research will follow, pay attention to the generation of a core category, and follow the core procedures including simultaneous data collection and analysis, theoretical sampling, constant comparison, category development, and systematic coding, memoing, saturation and sorting to combat the loss of integrity. The pilot data collected informed the direction of my research. I defined my epistemology, and did not narrow my focus early to any codes but identified some salient themes that were explored throughout data collection and analysis.

Barriers to findings

There were several limitations I foresaw in regards to my findings. If recruitment continued to be a challenge, there was a risk of not reaching theoretical saturation with the data. One of the assumptions in grounded theory is that saturation is reached and that continued interactions only confirm knowledge, or allow for theoretical verification (Charmaz, 2014). Although there is not a predetermined sample size, it was ideal to reach theoretical saturation and data will continue to be collected until it is reached. Theoretical saturation was reached at the end of the data collection period.

An additional limitation was the potential bias I have as a researcher. The interview guide included probing into the limitations of pain, the use and misuse of POMs, and the use of cannabinoids or other alternative therapies. The primary investigator worked as a nurse practitioner who prescribed medications such as POMs and alpha-2-ligands. Reflexivity aided in identifying bias from clinical practice, such as assuming side effects were real, or making judgments that they were not real. Participants often exhibited behaviors or statements that could be consistent with addiction, but as a researcher it was important to avoid diagnosing or deciding based on one or two interviews. During data collection and analysis the investigator continuously asked ‘what else could be going on, and what else could this be’? The practice of reflexivity throughout data collection and analysis helped to address this limitation.

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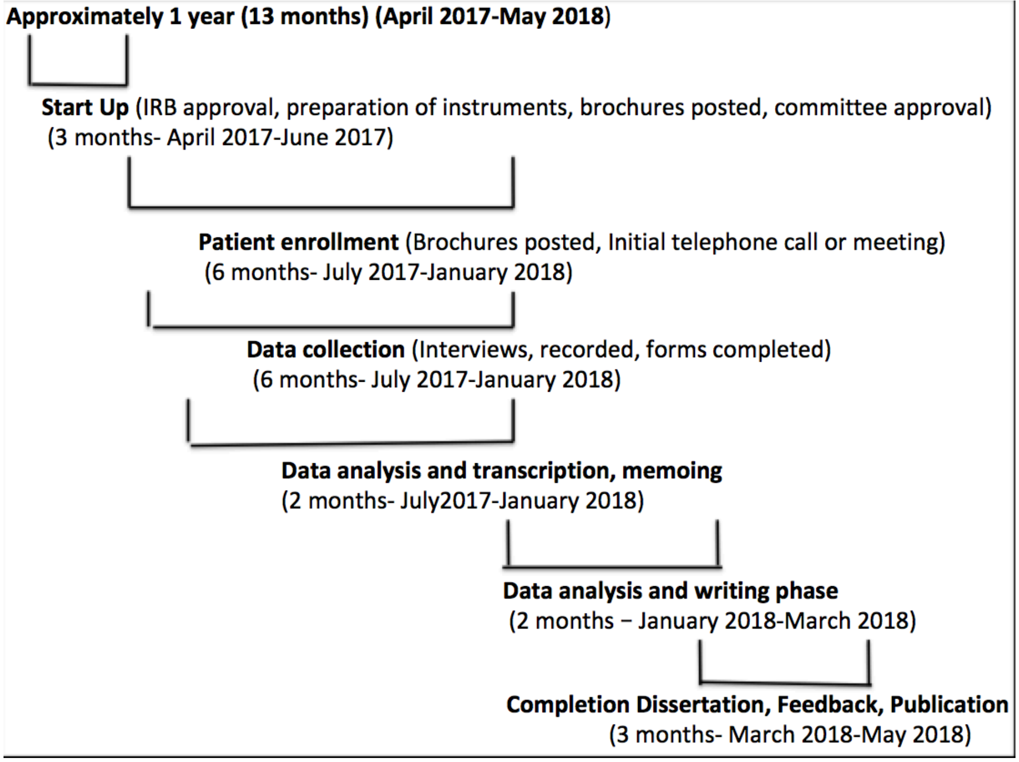
Table 1 Literature Review of Randomized Controlled Trials Cannabis and Neuropathic Pain

Source	Diagnosis	Drug (Max) Route	Control	Sample Size	Primary Outcome	Results
Karst et al. (2003)	Chronic NP	CT-3 (1' Dimethylheptyl-Δ^8-tetrahydrocannabinol-11-oic acid Oral	Placebo	N=21	VAS and verbal rating scale for pain	Significant decrease in pain 3 hours after intake vs placebo (-11.54 vs 9.86, *p*=0.02)
Notcutt et al. (2004)	Chronic NP	2. 5 mg THC/ 2.5 mg CBD Oral Spray	Placebo	N= 34 Crossover	Efficacy, tolerability, safety and dosages	Side-effects common, acceptable, no diff than pain med
Berman et al (2004)	Brachial plexus avulsion	Nabiximols: THC (129.6 mg/ CBD (120mg) Oromuc spray	Placebo	N=48 Crossover	Mean pain severity	Significant decrease in pain (THC/C, -0.58, 95% CI, *p*=0.005); THC, -0.64, 95% CI, *p*=0.002
Rog et al. (2007)	Central NP in MS	Sativex®	None	N=66 RCT N=63 Open label ext	Long term tolerability, effectiveness	51% experienced perceived benefit
Nurmikko et al (2007)	PNP	Nabiximols: THC (30mg)/ CBD (27.5 mg) oromuc spray	Placebo	N=63 Nabiximols N= 62 Placebo	Change in pain intensity	Significant decrease in pain (*p*=0.004, 95% CI, -1.59—0.32)
Abrams et al. (2007)	HIV PNP	Cannabis (3.56% THC) Smoked	Placebo	N=27 Cannabis N=28 Placebo	VAS, percent achieving >30% pain	Significant decrease in pain (*p*=0.03); 52% cannabis group vs 24% placebo reported >30% pain reduction (*p*=0.04)
Frank et al. (2008)	Chronic NP	2mg Nabilone Or 240 mg dHC	None	N=96 Crossover	Pain (difference between nabilone and DHC)	Dihydrocodeine better pain relief than nabilone (*p*=0.03)
Wilsey et al. (2008)	NP	Cannabis (7% THC) Smoked	Placebo	N=38 crossover	VAS	Significant decrease in pain (-0.0035; 95% CI, -0.0063 to -0.0007 (*p*=0.02)
Ellis et al. (2009)	HIV PNP	Cannabis (1%-8% THC) Smoked	Placebo	N=34 crossover	Change in pain intensity	Significant decrease in pain (*p*=0.02)
Rintala et al. (2010)	Chronic NP related to SCI	Dronabinol vs diphenhydramine	Diphenhydramine	N=7 Crossover, pilot	Pain scale 0-10	No sig difference dronab (0.20-0.87, diphen (-1.8-2.4) p=0.102
Toth et al. (2010)	Diabetic peripheral neuropathy	Nabilone	Placebo	N=26	Pain	Sig reduction in pain w nab 1.27, 95% CI 2.29-0.25, *p*=0.02
Ware et al. (2010)	Post-trauma neurop	2.5%, 6%, and 9.4% THC Smoked	Placebo	N=23	Pain intensity	Significant decrease in pain with 9.4% vs placebo (0.7, 95% CI, 0.02-1.4 (*p*=0.023)
Langford et al.	Central NP	Sativex	Placebo	N=339	Pain NRS	Sig dec pain at 10wk (OR

(2012)	related to MS					1.51, 95% CI 1.01-2.57: *p*=0.046
Wilsey et al. (2013)	NP	3.53%, 1.29% cannabis Smoked	Placebo	N=38	VAS pain and NP pain scale	Significant decrease in pain with both doses vs placebo. Low dose 57% pain reduction (95% CI, 41-71%, *p*=0.0069), Medium dose 61% pain reduction (95% CI, 45-75%, *p*=0.0023)
Lynch et al. (2014)	Chemo induced neuropathy	Sativex	Placebo	N=16	Pain intensity 0-10	NNT=5 for average decrease 2.6 compared to 0.6 plac
Serpell et al. (2014)	Peripheral NP	Sativex	Placebo	N=303	Pain NRS 0-10	Sig decrease in pain 30% (95%CI 1.05-3.7, *p*=0.034)
Wallace et al. (2015)	Diabetic Neuropathy	1%, 4%, or 7% THC Smoked	Placebo	N=16	Pain over time	Sig diff between doses and vs placebo (*p*=0.031, 0.04, 0.001)
Turcotte et al. (2015)	MS induced NP	Nabilone vs gabapentin	Placebo	N=15	VAS pain intensity and impact	Significant decrease in pain over time with combo (*p*<0.001

Table 2 Timeline for Major Tasks of Dissertation Study by Month



Approximately 1 year (13 months) (April 2017-May 2018)

Start Up (IRB approval, preparation of instruments, brochures posted, committee approval)
(3 months- April 2017-June 2017)

Patient enrollment (Brochures posted, Initial telephone call or meeting)
(6 months- July 2017-January 2018)

Data collection (Interviews, recorded, forms completed)
(6 months- July 2017-January 2018)

Data analysis and transcription, memoing
(2 months- July2017-January 2018)

Data analysis and writing phase
(2 months – January 2018-March 2018)

Completion Dissertation, Feedback, Publication
(3 months- March 2018-May 2018)

Table 3. Potential Barriers to Implementation

Procedure	Barriers	Implementation strategies
Recruitment	1. Lack of available participants	1. Enhance recruitment techniques by increasing snowball methods and adding online social media and support group recruiting
	2. Participant attrition	2. Perform all data collection in one meeting except for additional phone calls.
Informed Consent	1.Fear of confidentiality breach	1. Certificate of confidentiality obtained from NIH
	2.Fear of repercussions from pain doctor	2. No medical information placed in chart, no identifying information kept except consents
Data Collection		
1. 30-45 min interview	1.Length of time, ability to collect quality data	1. Obtain permission to contact the participants at a later date for theoretical verification or additional questions
2. Interview approach	2.Grounded theory approach to collection	2. Inductive data collection- will not start with hypothesis or *a priori* theoretical frame
3. Sampling	3. Grounded theory sampling approach	3. Purposive into theoretical sampling to collect pertinent data and refine categories. Goal of sampling is to reach saturation.
Data Analysis Rigor		
1. Coding	1. Grounded theory approach to coding	1. Begin with open coding and move towards focused coding once deeper conceptualizations are found
2. Record keeping	2. Grounded theory approach to record keeping	2. Memoing to record emerging concepts in iterative way. Develop conceptualizations throughout data collection AND analysis
3. Verification	3. Rigor	3. Theoretical and methodological verification, constant comparative methods; member checking. Reflexivity for recognition of bias.
Protection of Human Subjects	1.Voluntary withdrawal	1. Informed consent
	2. Emotional response during interview	2. Interviews provided in a quiet, private, non-judgmental space. If harmful situation such as abuse, neglect, suicidal ideation, or potential overdose is encountered, participant will be referred to proper authorities/resources

UVA IRB# 2016-0201-00
Inova IRB# IRB00002273
Approved until 5/1/2018
Contact with questions
Marianne Beare: 703-508-8974

Appendix A.

UNIVERSITY of VIRGINIA
SCHOOL of NURSING

Seeking participants with neuropathic pain using alternative therapies

- Do you experience neuropathic pain?
- Has your pain been chronic requiring opioid/ narcotic pain prescriptions prescribed by a physician or provider?
- Have you used any alternative therapies to help with neuropathic pain (examples: herbal products, kratum, treatments you ordered online)?
- Do you want to share your experience with alternative therapies?

Participants in this study will share approximately one hour of their time to meet in person or over the telephone with a nurse researcher to discuss quality-of-life, pain experience, experience with opioids/narcotics and alternative therapies. If you are interested in participating, please contact the number or email below, or post a reply to this message.

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Chapter Three: Review of the Literature

Title: The Use of Cannabis in Response to the Opioid Crisis: A Review of the Literature

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Abstract

Background: A staggering number of Americans are dying from overdoses attributed to prescription opioid medications (POMs). In response, states are creating policies related to POM harm reduction strategies, overdose prevention, and alternative therapies for pain management, such as cannabis (medical marijuana). However, little is known about how the use of cannabis for pain management may be associated with POM use.

Purpose: The purpose of this article is to examine state medical cannabis (MC) use laws and policies and their potential association with POM use and related harms.

Methods: A systematic literature review was conducted to explore U.S. policies related to MC use and the association with POM use and related harms. Medline, PubMed, CINAHL, and Cochrane databases were searched to identify peer-reviewed articles published between 2010 – 2017. Using the search criteria 11,513 records were identified, with 789 abstracts reviewed, and then 134 full-text articles screened for eligibility.

Results/Discussion: Out of 134 articles, 10 articles met inclusion criteria. Four articles were cross-sectional online survey studies of MC substitution for POM, 6 were secondary data analyses exploring state level POM overdose fatalities, hospitalizations related to MC or POM harms, opioid use disorder admissions, motor vehicle fatalities, and Medicare and Medicaid prescription cost analysis. The literature suggests MC laws could be associated with decreased POM use, fewer POM-related hospitalizations, lower rates of opioid overdose, and reduced national healthcare expenditures related to POM overdose and misuse. However, available literature on the topic is sparse and has notable limitations.

Conclusions: Review of the current literature suggests states that implement MC policies could reduce POM associated mortality, improve pain management, and significantly reduce health

care costs. However, MC research is constrained by federal policy restrictions, and more research related to MC as a potential alternative to POM for pain management, MC harms, and its impact on POM related harms and healthcare costs should be a priority of public health, medical, and nursing research.

Background and Significance

The United States (U.S.) is currently in the midst of an opioid crisis, with an estimated 3.8 million adults misusing prescription opioid medications (POM) (Center for Behavioral Health Statistics and Quality [CBHSQ], 2016). . Reports suggest that POM misuse can progress to heroin use (Jones, 2013; Muhuri, Gfroerer, & Davies, 2013; Cicero, Ellis, Suratt, & Kurtz, 2014; Rudd, Aleshire, Zibbel, & Gladden, 2016), and a 200% increase rate of death from opioid overdose (Rudd, Aleshire, Zibbel, & Gladden, 2016) POMs were involved in over 15,000 deaths in 2015, and the most common POMs involved were oxycodone, hydrocodone, and methadone (Rudd et al., 2016; Centers for Disease Control [CDC], 2016). A public health state of emergency has even been declared in at least six states within the U. S. (Schneider, 2016; Turque, 2017; Allen, 2017). However, despite the national demand for harm reduction strategies such as reforming prescribing practices, using reversal drug naloxone, and finding alternatives to POMs for pain, the opioid epidemic remains a major public health crisis (National Institute on Drug Abuse [NIDA], 2015); CDC, 2016).

The Institute of Medicine's (IOM) 2011 report estimated pain affects at least 100 million American adults, costs society up to $635 billion annually, and reduces quality of life (IOM, 2011). Interestingly, even when considering the misuse of POMs (e.g., taking not as prescribed, for example taking more tablets than directed), research shows that the most common motivation is to relieve physical pain (Hughes et al., 2016). Therefore, an integrative approach to pain management, involving safer, non-addictive, alternatives to POMs, are essential to continue to treat patients in pain.

Cannabis has been studied as an emerging therapy for pain control (Abrams et al., 2007; Andreae et al., 2015; Wallace et al., 2015; Ware et al., 2010; Whiting et al., 2015; Wilsey et al., 2013), and patients are using it for pain control both with and without concurrent POM use (Perron et al., 2015). Cannabis remains a Schedule I controlled substance under federal law; nonetheless, cannabis is currently the most commonly used illicit drug with 22.2 million Americans (12 years and older) self-reported as current users (used in the past 30 days), either for medicinal or recreational purposes (CBHSQ, 2016). The National Academies of Science, Engineering and Medicine (NASEM) concluded that there is “substantial evidence that cannabis is an effective treatment for chronic pain in adults,” (NASEM, 2016, p.90). Medicinal use of cannabis (MC) is not without risks, and more research is needed to formalize dose, route, concentration, and safety information. Research on cannabis remains challenging, however, due to restrictive policies related to its status as a controlled substance under federal law (NIDAa, 2016; NIDAb, 2016; Thomas & Pollard, 2016). Despite this need for further research, cannabis has become legal for medicinal use in 29 states and the District of Columbia (D.C.) (National Council of State Legislators [NCSL], 2017). There is a critical knowledge gap regarding how MC policies will affect pain management and POM use across the U.S. To address this gap, a systematic review of the current literature was conducted to explore the research question: Is there an association between MC laws and POM use and harms?

Methods

Search Strategy

The term ‘opioid epidemic’ can refer to both POM and illicit opioids (such as heroin). This review and the articles selected focus on POMs and POM-related harms such as overdose, opioid use disorder (OUD) and the associated healthcare costs -- not on harms related only to illicit opioids.

A literature review was conducted by searching the electronic databases Medline, CINAHL, PubMed, Cochrane Review, and Google Scholar. The keyword opioid was used with additional MeSH terms including opioid analgesic, opioid-related disorders, prescription drug misuse, opioid use disorder, opioid policy, overdose, and prescription pain medication. Cannabis and medical marijuana were also used as a keyword search terms, including MeSH terms of cannabis and pain, cannabis and opioids, alternative therapies, substance use disorder, cannabis use disorder, and cannabis policy. After separate searches of terms related to cannabis and terms related to opioids were completed, the two searches of opioid and cannabis were combined to find articles with both terms utilized. The health sciences librarian replicated the literature search for completeness.

Inclusion search criteria included peer-reviewed articles published in English between 2010 and July 2017 with applicability to the research question, as well as policy overview articles addressing state level statistics related to costs, overdose, opioid or cannabis use disorders in states with MC laws. The publication timeline was selected to: 1) encompass the period when POM sales peaked and began to decline as a result of national recognition of the public health risk they posed (Staffa, 2017); 2) the publication of the landmark IOM (2011) report identifying pain as a major public health problem requiring treatment; 3) and the date by which (2010) approximately half of the current state medical cannabis laws had been initiated (NCSL, 2017). Articles were excluded if they were not peer-reviewed, discussed laws and policies of countries other than the U.S., covered topics related either to POM or MC, but not to both, related only to illicit opioids (e.g., heroin), did not include an analysis after the state passed MC laws, or were not relevant to the research question.

Sample

A total of 11,513 possible articles were identified through the initial keyword search. After duplicates were removed, 789 article abstracts were screened for applicability. Out of 789, a total of 379 articles were removed for lack of peer review, because they were editorial/opinion articles, or because they did not relate to the research question. Of the 410 articles remaining, abstracts were screened and 276 articles were excluded for being either single subject (opioids or cannabis), or not applying to the research question. The first author completed a full-text review of the remaining articles (n=134) to verify they met eligibility criteria (Table 1), resulting in 13 articles. When each of the 13 publications were reviewed, three were removed for being international studies. As a result, a total of 10 articles fully met inclusion criteria and comprise the sample for this review.

Findings/Results

Table 2 summarizes the 10 studies that met the inclusion criteria. It is important to note that articles use various terms to describe related, but not necessarily identical, concepts, such as opioid misuse versus opioid abuse. For clarity, the terminology used in the original article is utilized throughout this report.

Of these 10 studies reviewed, two studies specifically addressed the substitution of MC for POM (Sexton et al., 2016, Corroon et al., 2017). Sexton et al. (2016) found that in a survey of MC patients (n=1429) in Washington, nearly 60% reported substituting cannabis for any prescription drug, and 25% specifically for pain medication, including POMs, many doing so without physician supervision. Corroon et al. (2017) surveyed 2,774 MC patients online and through a Washington state dispensary. 46% reported using cannabis as a substitute for prescription drugs, most commonly POMs. When states with MC laws were compared to those without, there were no differences in prescription drug substitutions based on access to MC (Corroon et al., 2017).

In addition to substitution of MC for POMs, two studies reported MC use was associated with decreased POM use (Boehnke et al., 2016; Reiman, 2017). Boehnke et al. (2016) studied changes in opioid use and quality-of-life in MC users in Michigan through an online survey and found MC use was associated with a 64% decrease in POM use, and 45% improvement in quality-of-life. Reiman et al. (2017) found that 97% of those MC users surveyed in California reported decreasing use of POMs when concurrently using MC, and 93% reported preferring MC to POMs for pain relief without a specific reason cited.

Powell, Pacula, & Jacobson (2015) studied the impact of medical cannabis laws on opioid related harms by reviewing treatment admissions for POM abuse and state level POM overdose deaths from 1999-2013; they concluded states permitting medical cannabis dispensaries had a relative decrease in both POM addictions (as measured by treatment facility admissions) and POM overdose deaths compared to states that did not. Powell, Pacula, & Jacobson (2015) found a decrease in POM overdose and POM addiction only in states with MC dispensaries, suggesting actual availability of MC is the factor that reduces POM overdose and addiction levels, not simply having a MC law that makes it legal to use.

Bachhuber et al. (2014) analyzed POM overdose deaths from three states that had medical cannabis laws prior to 1999 (California, Oregon, and Washington), as well as ten states that implemented medical cannabis laws between 1999 and 2010, and nine states that did not have medical cannabis laws effective until after 2010. The authors reported that the age-adjusted opioid mortality rate was 24.8% lower in states with MC laws (p=0.003) and concluded MC laws could be associated with lower rates of POM overdose deaths.

The policy literature includes several examples of analyses indicating that access to MC use may result in a decline in POM prescriptions and expenditures. Bradford & Bradford (2017) found Medicaid beneficiaries filled fewer prescriptions, including those for POMs, in states that passed MC laws. They extrapolated their findings nationally and estimated that if all states had MC laws in 2014 there would be a $1.01 billion savings in prescription drug costs. Importantly, this analysis did not differentiate cost savings specifically related to POM, but the authors performed a sub analysis in nine broad clinical diagnosis areas (e.g., anxiety, depression, glaucoma, nausea, pain, psychosis, seizure, sleep, spasticity), all of which were associated with the use of cannabis and found a significant difference in those in a pain management category (p<0.01). The same authors also previously evaluated the use of prescription medications by Medicare Part D recipients and found that the use of POMs, declined once MC laws were initiated in the state (Bradford & Bradford, 2016).

A recent study by Shi (2017) analyzed the association between state MC policy and hospital admissions related to cannabis and opioids in 27 states. MC legalization was associated with a 23% and 13% reduction in hospitalizations for opioid use disorder related to POM, and opioid overdose, respectively. There was no evidence that MC policy implementation was associated with subsequent increase in cannabis-related hospitalizations (Shi, 2017). Kim et al. (2016) analyzed drivers in fatal car accidents in 18 states before and after MC laws were initiated; they found a significantly decreased number of opioid positive tests among 21-40 year olds in states after MC laws had been passed (OR-0.50; 95% CI, 0.67; interaction p<0.001).

However, the authors did not differentiate opioid positivity from POM versus opioid positivity from illicit opioids, such as heroin.

Discussion and Recommendations

All 10 studies reviewed indicate a connection between MC and reduced POM harms. The key outcomes measured included opioid related overdoses, fatalities, POM abuse, hospitalizations, use, and cost. POM abuse was typically operationalized as admission to treatment facilities or hospitalizations for POM related harms. States with laws allowing MC use were found to have lower POM overdose mortality rates (Bachhuber et al., 2014), especially in states with active, legal MC dispensaries (Powell et al., 2015), a decrease in POM use (Boehnke et al., 2016; Sexton et al., 2016; Corroon et al., 2017; Reiman et al., 2017), cost savings for prescription drugs for which cannabis could serve as an alternative (Bradford & Bradford, 2016; Bradford & Bradford, 2017), a decrease in opioid positivity in fatally injured drivers (Kim et al., 2016), and reduced POM related hospitalizations (Shi, 2017). This literature review is consistent with international research from Canada (Lucas et al., 2013; Lucas & Walsh, 2017) and Israel (Haroutounian et al., 2016) that concluded patients are substituting MC for POMs as an alternative pain management strategy (Lucas et al., 2013, Haroutounian et al., 2016; Lucas & Walsh, 2017).

One potential explanation for these findings is that there are behavioral, anatomical, and biochemical similarities between the opioid receptor system and the cannabinoid receptor system (Bushlin, Rozenfield, & Devi, 2010). This could have implications not only for the substitution of POMs with MC, but also a reduction in POM use when patients use MC. Although the long term risks of MC legalization are unclear, there have been zero reported deaths directly related to cannabis overdose, whereas there were 33,091 deaths related to all opioids in 2015, over 15,000 of which were attributed to POMs such as hydrocodone, oxycodone and fentanyl (CDC, 2015; Rudd et al., 2016). However, Colorado, a state with both liberal MC and recreational cannabis laws, has seen an increase in tetrahydrocannabinol (THC, the primary psychoactive component of cannabis) positive drivers in traffic fatalities, (Reed, 2016).

This review underscores the importance of multiple harm reduction strategies, including exploring integrative and alternative therapies for pain management, to reduce the number of deaths associated with POM. To our knowledge, this is the first literature review to examine if there is an association between MC laws and POM use, abuse, cost, and overdose in the U.S. More research is needed to strengthen preliminary empirical findings that access to MC is a viable pain management strategy for creating positive risk/benefit profiles for patients with chronic pain while reducing POM associated harms from therapeutic use.

Limitations

There are important limitations to the 10 studies reviewed. The primary limitation involves study design. Four studies exclusively relied upon self-report survey data to evaluate whether MC patients were reducing their POM use and why. Participants providing self-report data through Internet surveys can be subject to both selection bias and recall bias. The self-report data presented in these studies provides little clarity regarding the reasons patients substituted MC for POM; for example, pain level or side effect profiles were not primary reasons discussed in any of the studies, and quality-of-life was an outcome in only one study (Boehnke et al., 2016). Additionally, there is no ability to differentiate outcomes resulting from recreational use, as compared to medical use, of either cannabis or POMs.

These studies were all descriptive, and did not empirically test the effectiveness of MC in actually reducing pain, or the impact of potential MC related harms, which would be important considerations for clinical practice. None of the studies considered the influence of clinical diagnosis (e.g., are results different for participants with myofascial pain versus pain from the disease of cancer?). Additionally, outcomes measures were conceptualized and operationalized inconsistently across studies, making it difficult to compare findings or draw general conclusions. For example, "opioid abuse" or "problematic opioid use" was determined by admissions to treatment facilities (Powell et al., 2015), opioid related hospitalizations (Shi, 2017), or a combination of Treatment Episode Data Set (TEDS) and National Vital Statistics System (NVSS) data (Powell et al., 2015). Finally, clear differentiation between licit opioids (such as POMs) and illicit opioids (such as heroin) is lacking in several of the studies.

Most importantly, the literature reviewed compared the medical use of cannabis to POM related harms. This is problematic for two key reasons. First, there was a lack of equal consideration for MC related harms in the study designs. Second, POM harms such as overdose, admission to treatment facilities, or hospitalizations are most often consequences of *non-medical* (or recreational) POM misuse, versus legitimate POM use for medical reasons. Therefore, conclusions based on comparing medical versus non-medical use and harms of two different substances must be interpreted with significant caution.

Implications for Nursing Practice.

Health practitioners need to be a strong voice urging policy makers and research funding entities to support further investigation of MC as an alternative pain management and harm reduction strategy for patients. Recent large scale NIH funding for MC research is an important first step (NIH, 2017). Nurses should be advocates for patient-centered, integrative pain management approaches, which may include the safe and appropriate prescribing of POMs when needed, and conceivably the use of MC as further information becomes available, which is already being done in some states. However, there is still much unknown regarding the potential harms of MC, and more data are needed to understand potential complications of MC such as respiratory disease, substance abuse, psychiatric disorders and impaired cognitive function.

The official American Nurses Association (ANA) position statement on MC is that cannabis should be reclassified as a federal Schedule II controlled substance for purposes of facilitating research. The ANA also advocates for the development of prescribing standards with specific dose, route, side effect profile, and indications for cannabis preparations, as well as evidence-based standards for its use (ANA, 2016b). It is important for nurses to remember that MC is still illegal under federal law, and tolerance of more liberal state cannabis laws can change at any time given national politics and the interests of the sitting Attorney General. Federal prosecution against practitioners who prescribe or dispense MC is always possible as long as cannabis remains federally classified under Schedule I, and this risk must be taken into consideration prior to making any clinical recommendations.

Conclusions

The opioid epidemic is a public health crisis that is at least partially driven by harms associated with POM use. States are passing laws allowing use of MC and patients are using MC, but currently there is little understanding of how this influences POM use or of MC related harms. This literature review provides preliminary evidence that states with MC laws have experienced reported decreases in POM use, abuse, overdose, and costs. However, existing evidence is limited by significant methodological shortcomings, so general conclusions are difficult to draw.

The use of MC as an alternative to POMs for pain management warrants additional empirical attention as a potential harm reduction strategy. NASEM (2016) recommends more clinical trials to elucidate appropriate forms, routes of administration, and combination of products for treating pain, but access to MC products to fully evaluate these questions is challenging due to federal regulations. However, the recently funded National Institute of Health longitudinal study to research the impacts of MC on opioid use is a critical step in the right direction (NIH,2017; Williams, 2017). MC's potentially as an alternative treatment modality, to help mitigate the major public health opioid crisis, could be a missed opportunity if data on safety, efficacy, and outcomes are not collected and explored. Healthcare practitioners, particularly nurses who are charged with ensuring patient comfort, have a vested interest in providing viable alternatives to POMs when appropriate, as part of an integrative approach to pain management, and must advocate for more research to better understand the public health implications and risks and benefits of such alternatives.

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Table 1. Literature search flow diagram

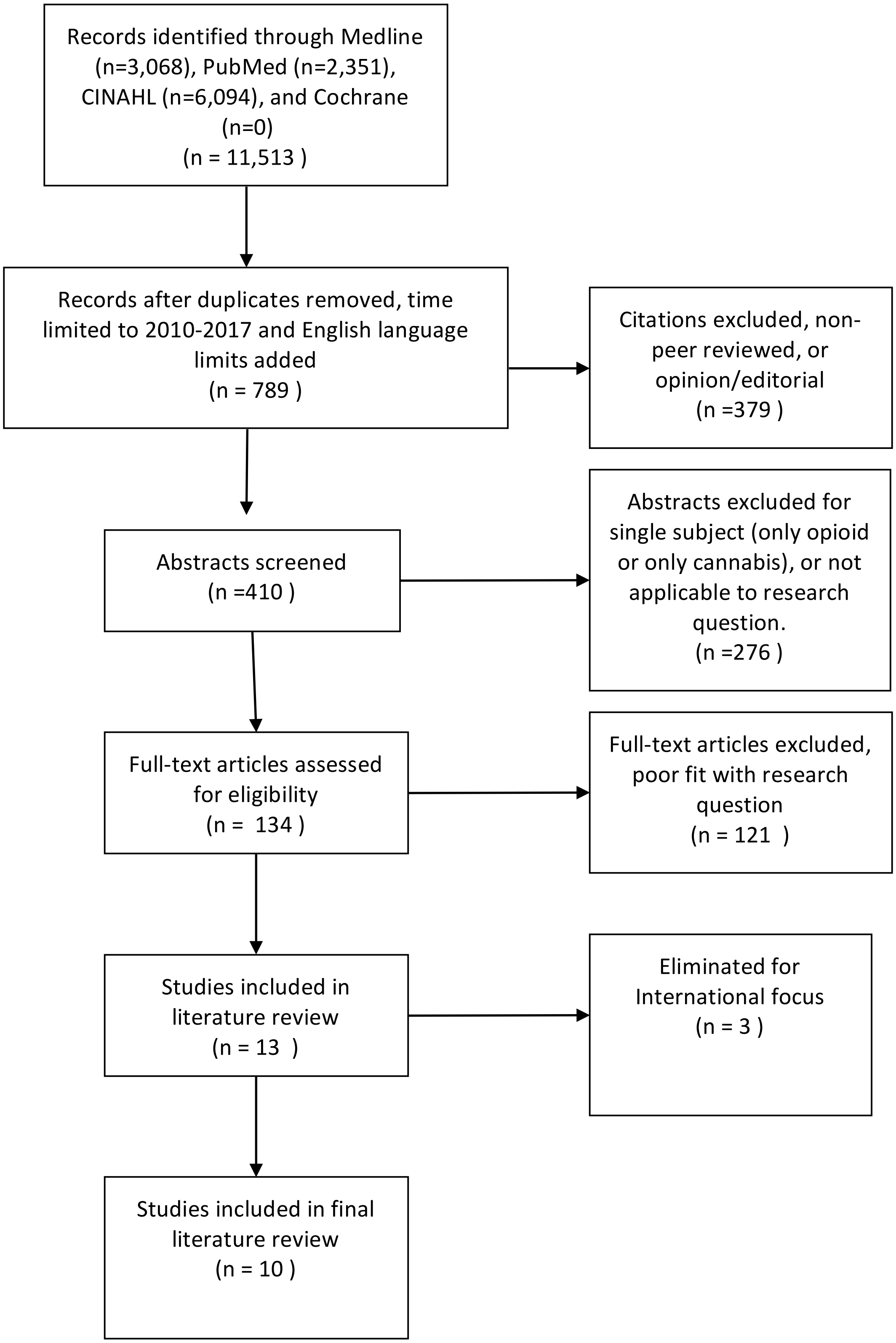

Table 2. Literature Table

Study/Title	Purpose	Study Design	Data sources	Location	Sample	Outcome Measure	Key Results and Conclusions
Bradford & Bradford (2017) Medical marijuana laws may be associated with ad decline in the number of prescriptions for Medicaid enrollees	Address the association between MC laws and number of prescriptions filled by Medicaid beneficiaries	Primary explanatory bivariate model	Medicaid fee-for-service prescription data, state drug utilization data	24 states	24 states with medical marijuana law; 9 clinical areas of prescription drugs for which MC could be a substitute	State Drug Utilization from CMS[3] Medicaid enrollees in nine condition categories,	Medicaid cost savings associated with MC laws =$19.825 million per state = Total of $3.89 billion nationally if all states had MC laws. Medicaid beneficiaries in states with MC laws will fill fewer prescriptions
Corroon, Mischley, & Sexton (2017) Cannabis as a substitute for prescription drugs- a cross-sectional study	Survey cannabis users for intentional substitutions of cannabis for prescription drugs	Cross-sectional survey	Anonymous questionnaire	WA, CA, OR, CO; recruit via social media and cannabis dispensary in WA,	N=2,774	Anonymous online survey, self selected	46% used cannabis as substitute for prescription drug, most commonly POM. No diff between states with medical cannabis laws vs none. Substitutions are happening, state laws may not influence individual decision making
Reiman, Welty, & Solomon (2017) Cannabis as a substitute for opioid-based pain	Data gathering about the use of cannabis as a substitute	Cross-sectional survey	Self reported data HelloMD database, using	CA	N=2,897	E-mail survey to 67,422 MC patients. Demographics, conditions	97% reported decreased POM consumed when concurrently using cannabis, 93% prefer cannabis to POM.

medication: patient self-report	for opioid and nonopioid-based pain medication		modified TOPS[1] instrument			for use, method of ingestion, substitute for POM, non-POM efficacy	Clinical outcomes needed for MC as POM substitute; consider MC for treatment of POM dependence.
Shi (2017) Medical marijuana policies and hospitalizations related to marijuana and opioid pain reliever	Associations between state MC policy and hospitalizations related to cannabis and POM	Linear time series regression	State inpatient databases, state-level annual admin records of discharges 1997-2014	27 states	382 state-year observation	Rates of hospitalization involving marijuana, opioid, abuse and POM overdose. State, year effects	Medical cannabis legalization was associated with 23% reduction in hospitalizations for opioid abuse or dependence and 13% reduction in POM overdose. MC policies associated with reduced POM related hospitalizations.
Boehnke, Litinas & Clauw (2016) Medical cannabis use is associated with decreased opiate medication use in a retrospective cross-sectional survey of patients with chronic pain.	Does medical cannabis use for chronic pain changes individual patterns of opioid use	Cross sectional, retrospective survey	Online questionnaire survey	Michigan	N=244 MC dispensary patients with chronic pain who use MC	Demographic, change in opioid use, quality of life, medication classes used, medication side effects before and after MC initiation.	Medical cannabis use associated with 64% decrease in POM use and 45% improvement in quality-of-life. MC for chronic pain may benefit some patients, may improve quality-of-life. Confirm with longitudinal studies
Bradford & Bradford (2016) Medical marijuana laws reduce	Does Implementing state MC laws change	Regression modeling	Medicare Part D enrollees from 2010-	24 states	24 states with medical marijuana	Nine clinical condition categories covered by	$165.2 million reduction in costs of prescription drugs for which MC could serve as

prescription medication use in Medicare part D	prescribing patterns and expenditures in Medicare Part D		2013		law; 9 clinical areas	state medical cannabis laws, drug data with at least one on-label use	alternative per year in 2013. Availability of MC has significant effect on Medicare Part D expenditures.
Kim et al., (2016) State medical marijuana laws and the prevalence of opioids detected among fatally injured drivers.	Association between MC laws and positive opioid test	Multilevel logistic regression	FARS[2] data from 18 states that tested for alcohol and other drugs	18 states	N=68,394	Fatality analysis data from 18 states in 80% of fatal car accidents.	Significant reduction in opioid positivity for drivers 21-40 years old. MC laws associated with reductions in opioid positivity among 21-to 40-year old fatally injured drivers and may reduce opioid use and overdose.
Sexton, Cuttler, Finnell, & Mischley (2016) A cross-sectional survey of medical cannabis users: patterns of use and perceived efficacy	Inform practice, research, and policy, identify between medico-legal and patient outcome discrepancy	Cross-sectional survey	Author developed survey, 44-item, including 10 item PROMIS® global health short form	WA state cannabis dispensary	N=1429	Anonymous online survey, self selected	59.8% substituted for prescriptions 25% substituting for pain meds including opioids. Patient reported outcomes favor MC use for broad diagnoses, largely unsupported by formal research. Discrepancy between approval of MC and actual use.
Powell, Pacula & Jacobson (2015) Do medical marijuana laws reduce addictions and deaths related to	Impact of medical cannabis laws on POM misuse.	Differences-in differences, event study, and synthetic control group	POM abuse treatment admissions TEDS[3], State POM overdose	24 states with MC laws, 18 with protection against	Multiple database	Opioid treatment admissions, opioid overdose deaths, non-	Presence of MC dispensary decreases treatment admissions for POM addiction, reduces deaths due to opioid overdose. Access to MC

pain killers?			deaths. NVSS[4] ARCOS[5], and NSDUH[6]	MC dispensary		medical use ARCOS NSDUH	has potential benefit of reducing POM abuse.
Bachhuber, Saloner, Cunningham & Barry (2014) Medical cannabis laws and opioid analgesic overdose mortality in the United States, 1999-2010	To determine relationship between state MC laws and POM overdose mortality rate	Time-series analysis; Regression models for state policies	State death certificate and medical cannabis laws, and opioid analgesic overdose mortality	13 states; 1999-2010	3 states with laws prior to study, 10 states with laws initiated during study period	POM overdose deaths	MC laws associated with 24.8% lower state-level POM overdose mortality rates compared to states without. MC may intersect with policies to prevent POM overdose

[1] TOPS: Tilray Observational Patient Survey

[2] FARS: Fatality Analysis Reporting System

[3] TEDS: Treatment Episode Data Set

[4] NVSS: National Vital Statistics System

[5] ARCOS: Automation of Reports and Consolidated Orders System; monitors and records controlled substances

[6] NSDUH: National Survey on Drug Use and Health: state level data on self-reported nonmedical use of prescription pain reliever

Chapter Four: Negotiating Power Over Pain: A Grounded Theory Inquiry of Using Medical Cannabis to Alleviate Chronic Neuropathic Pain

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Abstract

This qualitative study utilized a constructivist grounded theory approach to explore medical cannabis (MC) use among people with chronic neuropathic pain (CNP). Participants (N=20) with CNP who used MC were recruited through neuroscience clinics and online support groups. The primary source of data were semi-structured interviews designed to explore: 1) the process of how patients make decisions regarding use of MC, and 2) the impact of MC on quality of life, pain, and use of opioids. Using constant comparative analysis, the central perspective identified was: negotiating power over pain. MC use is associated with negotiating power over pain by seeking control to regain quality of life. Prescription opioid medication (POM) use was associated with stigmatization and assumptions of addiction in the context of the nationwide opioid crisis, and MC was used as a harm reduction strategy but bypassed healthcare providers in the process. This article contributes to a greater understanding of why MC is used in CNP populations, and how healthcare providers can remain involved in the care of patients using MC.

Introduction

Changes in pain management strategies have become necessary as a response to the growing opioid crisis in the United States. Concurrently, cannabis has been approved for medical use in 29 states, the District of Columbia, and the U.S. territories of Guam, and Puerto Rico, with pain being the most frequently cited qualifying condition (Ilgen et al., 2013; Light, Orens, Lewandowski, & Pickton, 2014; CDPHE, 2017; National Conference of State Legislators [NCSL], 2017; OHA, 2017). Medical cannabis (MC) has been legalized in over 50% of the country, but without the traditional rigorous oversight by the Food and Drug Administration (FDA) and the medical community, leaving sufferers of chronic pain to maneuver the healthcare system in new and unfamiliar ways.

There are 22.2 million Americans who have used cannabis within the past month (CBHSQ, 2016). Those who utilize MC for pain move between traditional/legitimate and non-traditional/ illegitimate worlds of pain treatment, and are forced to seek information about MC without the guidance of HCPs. Research suggests MC may be effective in alleviating some types of chronic pain, such as chronic neuropathic pain (CNP) (Abrams et al., 2007; Andreae et al., 2015; Berman, Symonds, & Birch, 2004; Boychuk et al., 2015; Desphande et al., 2015; Ellis et al., 2009; Fontelles & Garcia, 2008; Karst et al., 2003; Koppel et al., 2014; Nugent et al., 2017; Nurmikko et al, 2007; Ware et al., 2010; Wilsey et al., 2008; Wilsey et al., 2013), but federal regulations pose challenges to access for all patients who could benefit. MC also has the potential to improve pain management, reduce healthcare costs, and reduce POM mortality in states with MC laws (Vyas, LeBaron, & Gilson, 2017), but whether or not it works to relieve pain is mostly anecdotal and difficult to prove.

With so many people using MC for pain, in order for practicing HCPs to continue safely prescribing for people with CNP, it is imperative to understand the phenomenon of cannabis use in CNP. In some states patients with CNP have received unfettered access, but are relying on non-medical personnel for appropriate dosing, route, efficacy, and treatment of their medical conditions instead of this information coming from their HCP, with evidence based on a traditional drug development process. As an initial step HCPs and medical communities need to understand how people with CNP are using MC as a replacement or adjunct to POMs to treat their pain.

There is a significant knowledge deficit regarding the experience of those using MC and POMs to alleviate CNP. The purpose of this qualitative study was to examine MC use in the CNP population. The specific aims were 1) to explore patient decision-making in using MC to alleviate CNP and identify conditions contributing to their use, and 2) describe patient explanatory model for how MC impacts pain, quality of life, pain and POM use.

Methods

Design

A constructivist grounded theory methodology was used to guide our examination of MC use in the population with CNP. Grounded theory allows for exploring the phenomenon of patients with CNP using MC as a basic social process and to describe the variation of the process and actions contributing to changes in quality of life (Strauss & Corbin, 1994; Clarke, 2005).

Our grounded theory methods began with inductive data collection, used iterative analytic techniques, and allowed for frequent return to the data throughout our analysis process (Charmaz, 2014). Data collection and analysis occurred simultaneously using constant comparative methods to draw on the data to develop conceptual categories with the goal of continued abstraction. There was an emphasis on theory construction as opposed to application of existing theories, and theoretical sampling and emergent design were used to facilitate the development of concepts and their relationships.

Epistemology. A constructivist approach allowed the PI (MB) to recognize positionality and potential biases, and recognize that experiences and events were limited by time, place, position and interaction, and that the researcher interpretations and the participant's contributions were situated and partial views of the phenomenon of MC use (Clarke, 2005). This approach was chosen because the investigators believe people construct their own experience of pain, have an individual interpretation and experience, and reasons for using cannabis. Our research team has clinical background in pain management, CNP etiologies, grounded theory and qualitative methodologies. This presented the ability to offer a unique interpretation of the data as well as recognize that the participant's construction of what they presented was representative of their individual pain journey.

Participants and Setting

Institutional Review Board approval was obtained at both the University in which the primary investigator was affiliated, and through the hospital system based clinic where patients were recruited. A certificate of confidentiality was obtained through the National Institute of Health to protect participants who provided information about use of illicit substances.

Recruitment for the study occurred in 2 clinical settings (a neuroscience outpatient clinic affiliated with a large hospital system, and a general, free-standing pain clinic) and on-line forums (support groups for people with chronic neuropathic pain and nerve pain). In the clinical settings, an informational flyer was placed in a neuroscience outpatient clinic, a pain clinic, and through online support groups for people with CNP. Participants contacted the first author through e-mail, phone, or messenger to request more information. The brochures were also posted on two different support group websites. The participants who reached out were screened for the inclusion and exclusion criteria via telephone, and consented for participation if they met the criteria. Participants who wished to be interviewed in person were scheduled to meet at a location of their choice. Participants preferring a telephone interview were either interviewed at the time of consent, or scheduled for the interview at a future time.

Participants met inclusion criteria if they verified by self-report having CNP for greater than 3 months, were between the ages of 30-65, identified as using alternative therapies, such as MC, to treat pain and were or had used POMs for pain relief. Participants were excluded if they lacked English fluency or were unable to provide written or verbal consent. Initially purposive and snowball sampling were used, and as analysis progressed, theoretical sampling was employed to maximize the range and variation of participant experiences.

Data Collection Procedures

Data for this grounded theory study were collected between February 2016-January 2018 using semi-structured interviews with open-ended questions. Basic demographic data were also collected at the time of the interview. Participants were interviewed in person or on the telephone, based on their preference and proximity to the first author (MB). MB conducted the interviews and identified herself as a nurse practitioner and researcher interested in their experiences of CNP and decision to use MC.

The semi-structured interviews lasted 60-90 minutes and were audio-recorded (Appendix 1). The demographic form was collected, and reviewed verbally with assistance from the first author (see Appendix 2). Participants were given the option for additional contact with the first author. Participants were offered a $20 gift card upon completion of the interview. The first author and a registered transcriptionist transcribed the interviews.

Data Analysis

Data analysis was performed simultaneously throughout data collection (Strauss & Corbin, 1994) and began with initial coding and progressed to focused, axial, and theoretical coding (Charmaz, 2014). During initial coding, the first author analyzed words, phrases, paragraphs, thoughts, and incidents for actions. Initial codes were constructed to name the data by using shorthand labels that represented what was happening and described the emerging actions. Sensitizing concepts such as action, meaning, process, agency, situation, identity, and self were used as a starting point for initial analysis (Blumer, 1954; Charmaz, 2014). Line-by-line coding was used in early interview analysis to remain close to the data before interpreting meanings. Constant comparative methods established similarities and differences within the interview and between interviews (Glaser & Strauss, 1967).

Focused codes were developed out of the most salient initial codes. Focused codes were tested throughout data analysis and helped conceptualize the phenomenon identified in initial coding. As major categories emerged, axial coding was used to convert codes into concepts so as to expand them prior to organizing them into contexts, conditions, actions/interactions, and consequences (Strauss & Corbin, 1998). Theoretical coding was used to relate the substantive codes to each other (Glaser, 1978), but also to keep the description of phenomenon moving in a theoretical and conceptual direction (Charmaz, 2014). Salient theoretical codes were each auditioned as the central process in an explanatory matrix, with the rest of the codes organized as context, conditions, processes/actions, and consequences accordingly (Kools, McCarthy, Durham, & Robrecht, 1996).

The initial explanatory matrix was reviewed with the research team, modified, and it was felt additional interviews were needed to reach theoretical saturation and for theoretical verification. Theoretical sampling was used to develop properties of each salient category and elaborate on concepts that required additional development. A conceptual map was developed to show the relationship of the core categories to each other and to the central process. Once the research team determined theoretical saturation had been reached, the abstract categories were reviewed with participants to elaborate and confirm links between categories (Charmaz, 2014).

Rigor. Rigor and credibility relate to the vividness and faithfulness of the description of the phenomenon (Beck, 1993), which can be so vivid that participants could recognize their own voice (Guba & Lincoln, 1989). Strategies to maintain rigor in qualitative research included maintaining trustworthiness and credibility (Guba & Lincoln, 1994). The strategies to maintain trustworthiness and credibility included 1) collecting data until theoretical saturation was reached, 2) conducting peer analysis of interview data and coding, 3) member checking with participants, 4) constant comparison throughout data analysis and collection, 5) theoretical sampling to elaborate and refine categories, 6) memoing ideas pivotal to codes and categories as an auditable decision trail, and 7) reflexivity throughout data collection and analysis (Guba & Lincoln, 1994; Charmaz, 2014). Constructivist epistemology guided our recognition that the findings were situational and provisional based on multiple factors and that a different research team may have different co-constructions with their perspectives. Additionally, we recognized that rather than being a neutral and objective observer, co-construction was occurring throughout data analysis and data collection.

Findings

The purpose of this qualitative study was to examine MC use in people with CNP. This section contains the findings from interview analysis from 20 participants who were using, or had used MC or cannabinoid products to alleviate CNP. Five participants participated in a brief follow up interview in the form of telephone communication, message through the support group, or e-mail. The second interviews occurred because the participant had additional information they wanted to share, or felt would be helpful.

Sample Characteristics

The average age of the sample was 48 ± 8.9. The sample identified as predominately female (n=14; 70%), and White (n=19; 95%). The sample was recruited from online support groups (n=15; 75%), and the neuroscience clinic (n=5; 25%). They resided in states where MC was legal (n=9; 40%), recreational cannabis was legal (n=1; 10%), or illegal (n=10; 50%). Participants had some college (n=7; 35%), or were college graduates (n=7; 35%), and high school graduates (n=4; 20%). The most common specific CNP diagnosis among participants was peripheral neuropathy from various etiologies (n=12; 32.4%), complex regional pain syndrome (n=8, 21.6%), while others had conditions such as sciatica/spinal nerve pain (n=6; 16.2%), peripheral nerve injury (n=5; 13.5%), fibromyalgia (n=3; 8.1%), spinal cord injury (n=2; 5.4%), or trigeminal neuralgia (n=1; 2.7%). Most participants reported a past history of recreational cannabis use (n=17; 85%). Additional demographic characteristics of the participants can be found in Table 1.

Explanatory Matrix

Central Perspective-Negotiating power over pain

Context	Conditions	Processes/Actions	Consequences
•Individual Context • Unwinnable pain battle • Rejecting addict Identity •Social Context • Opioid crisis • Stigma • Discourse re: cannabis as medication	•Totality of pain leads to desperation •Side effect balancing act •Dehumanizing experience of chronic pain •Safety calculation	• Solo Pain Navigation • Creation of credible knowledge	*•Remaining dependent to Gaining control* *•Losing a valued self to finding an empowered identity* *•Selective to total disclosure* *•Languishing in pain to Reclaiming quality of life*

Figure 1. Explanatory Matrix

The central process contributing to MC use to alleviate CNP was identified as "negotiating power over pain." Participants described conditions that diminished their power, and processes and actions they took to gain control, find an empowered identity, and find relief. Negotiating power described the compromise participants reached by seeking control over their pain, and life by stepping outside of traditional HCP recommendations and seeking out MC as an alternative treatment.

Context

To understand the participant's context, the interviews began by asking them to describe their pain, past and present methods of pain control, and factors that influenced their choice to use MC. Two levels of context emerged in the interviews (individual and social), which were both central to the participant's decision to use MC.

Individual context. The individual context of the pain experience began with participant's stories of living in the context of a 1) unwinnable pain battle, and 2) their personal rejection of an addict identity.

Unwinnable pain battle. Unwinnable pain was described as maximal effort to control pain yielding inadequate relief and poor QoL. Traditional medications for CNP were ineffective and had undesirable side effects. There were standard medications familiar to all participants, but they described their HCPs being perplexed if the traditional medications didn't work, often leading to POM prescriptions. An older man with idiopathic small fiber neuropathy described the one size fits all approach he had witnessed from his HCPs.

> All of them just say "well here's your gabapentin, here's your lyrica, here's your amitriptyline" and those medications don't work

POMs were described as effective for short-term relief even though they had side effects and led to unintended consequences. Participants had a negative association with asking for higher or more frequent doses of POMs from their HCPs because it led to more frequent appointments, urine testing for licit and illicit substances, and a feeling of being stigmatized and judged. Participants viewed this as a reflection of the HCP's concern over misuse of POMs. Descriptions of traditional pain management reflected that no matter how empathetic the HCP was there were few other options open to them. Hand in hand with unrelenting pain were escalating doses of POMs, unacceptable side effects, and a feeling of powerlessness and vulnerability, all while defending the existence of their pain.

A 56 year-old woman with peripheral neuropathy described the sensation in her feet as

> "…numbness and burning…an itch I can't scratch. Some days it feels like I am walking

> on gravel. It’s just very painful and I don’t—I never go barefoot because it hurts…There were many nights I just sat and cried because my feet hurt so bad”

She described her medication history as starting with gabapentin (Neurontin), which caused suicidal ideation, then pregabalin (Lyrica), then duloxetine (Cymbalt); all with unacceptable side effects. She tried POMs, which made her sleepy but gave her temporary pain relief. She described a scenario when she was taken off of POMs because she had repeatedly asked for escalating doses and early refills:

> that felt really bad, because I’m a chronic pain patient and I’m not a drug seeker. We’re all in the same boat together, we’re all made to feel like drug seekers when we need pain medication, and when your pain is out of control and you go the emergency room they just look at you like you’re another druggie. And that really pisses me off because when I was in nursing school we were always taught never to judge another person’s pain.

At the time of the interview she had stopped taking POMs and was smoking 2 to 3 inhalations of a small “pin joint” per night for pain, which did not give her any side effects and did not require her to continuously follow up with her HCP.

Another example of the unwinnable pain battle was from a 56 year-old woman with idiopathic peripheral neuropathy, who ultimately chose MC over hydrocodone (Vicodin) because of the following scenario. She described a situation in which she was drug tested by her pain management HCP.

> …if you want their pharmaceutical drugs you will be drug tested not only to make sure you’re not smoking pot or taking anything else but that you are taking the medication as prescribed. So for me, if I have a day where I don’t need a Vicodin, I’m not going to take one. Yet if I go get [urine] tested they’re going to take my drugs away because I’m not

> taking them! Because they think I'm selling them?! Really? (sighs) It's a no win situation.

Rejecting addict identity The participants were balancing their own internal stigmatization of POM use for the sake of pain relief. Some participants described taking POMs as a double-edged sword because not only did they feel like they were seen as addicts, but they also had to suffer the side effects of the medication.

While rejecting the stigma of being an addict, participants worried about becoming physically dependent on POMs. A 49 year-old male who was using only MC for pain control (at the time of the interview) but described his experience with POMs for a peripheral nerve injury resulting in CNP.

> I mean you become very anxious, anxiety, paranoid if you don't have the medication that you need. Granted if I had enough pills in my system, yeah I could turn around and function on a daily basis, however let's just say if you would cut out 1 pill…It does something seriously to your psyche. I really believe that--to your brain. I mean it just seems to me… I was more or less controlled, always thinking "okay am I going to have enough pills, am I going to have enough pills?" You know? Because then I started abusing them and then I was thinking "oh well if I take a couple extra today I can maybe cut back one or two tomorrow, one Wednesday-Thursday and this and that." And then what it becomes is just one big lie.

When asked about her fear of dependency, a woman with trigeminal neuralgia who also had a multifocal pain syndrome described the personal conundrum of POMs and addiction.

> I don’t worry about overdose. I do worry about the possibility of getting, like, dependent on it. …I don’t want to be dependent and I don’t want to be viewed in a negative way. I just want to be able to live life more.

Social context. Pain can be bigger than the individual and exists within a societal context. There were two social contexts influencing the use of MC: 1) a nationwide opioid crisis, and 2) resulting social stigma of POM addiction has influenced HCP practices. The discourse of MC being legal increased awareness and dialogue about incorporating it into pain care from the participant perspective.

Opioid crisis. Participants differentiated themselves from those affected by the opioid crisis because they had legitimate pain and felt they were not misusing POMs. Participants recognized the opioid crisis affected their relationship with their HCPs, resulting in increased scrutiny over their POM prescriptions. A 50-year old woman with complex regional pain syndrome had been on large doses of oxycodone and had been substituting with MC when she could get it, but in her state dispensaries had not yet opened.

> I’m really eager to try to get the opioids down more so it’s the fear of one day you go to the doctor and they’re going to say “Sorry, we’re not prescribing any more.” …I mean I know physically that I am horribly addicted to it because I’ve been on for a couple years and I don’t want to be put in that position. I’d rather do it myself now before.

A 50 year-old woman with fibromyalgia and CNP in her legs has been on POMs for 6 years and takes five daily medications (non- controlled substances) for her CNP (e.g. duloxetine, amitriptyline). She described her experience with HCPs and asking for POMs.

> It’s terrible. Not only is (sic) the DEA and CDC cracking down tremendously. I have a new expression. Every time a street addict dies, a pain patient gets cut off. And, that’s

> just the way it is. We are punished for the addicts. ... I'm terrified because starting Jan 1st the state of Wisconsin is getting in on the gig and threatening the doctor's licenses as well. My GP who prescribes my opioids informed me of this.

She, and other participants felt the opioid crisis created a cultural narrative of all POM use being problematic. What she described was being placed in an undesirable category of "addict" just for being on POMs and viewing this as an unfair stigma created by the attention on the opioid crisis. Participants described being physically dependent on POMs even if they were simultaneously rejecting the stigma of addiction.

Stigma of chronic pain and addiction. Participants experienced the social stigmatization of having chronic pain. They perceived unfair judgment simply for having chronic pain and being on POMs. They described how few HCPs understood what it was like to have CNP. A female participant who struggled with CNP went to the emergency department during an episode of acute pain. She had been using a fentanyl patch for pain.

> the hospital that I've been to they make notes online and it actually stated in there that a person deemed me a pill-seeker and I tried to…I actually sent a letter to the hospital to have that removed and they said that basically they wouldn't unless I filled out some form HIPAA-related or something… And it hurt because I don't want that, it's not me.

Another participant, a 34 year-old female with fibromyalgia and CRPS was substituting cannabis for her POM hydromorphone (Dilaudid) and described the feeling she got when she went to see her HCP:

> I don't like to have to feel like I have to put on a warrior face to go into my doctor's office or feel that I'm going to get verbally attacked…They make you feel like you are the scum of the earth and that you don't even deserve to be alive... But it's just

> unfortunately something that comes with any chronic pain or chronic medical diagnosis. It's a horrible stigma and not everybody falls underneath it and it's so pathetic that we're all being classified under one column when we don't all fall under that column.

Taking POMs was so stigmatized that many participants hid POM use from family, friends and the community because they did not want to be judged. A 50 year-old woman taking oxycodone four times a day for CNP in her arm described why she kept prescriptions a secret.

> Where we live there's a pretty heavy-duty influx of heroin use. We live in a rural area and there's a lot of- how to say it right- new families that have moved in like in the last 10-15 years and they know there's a problem but it's an embarrassment to them so they don't get their kids help. And then when they…you know…somebody let out that I'm using oxy, they'd be like oh well you're the problem. And I don't know if from TV and all the news, you know, I don't know where it's coming from, but I don't tell anybody outside my immediate circle.

She experimented with different types of MC, and was able to stop oxycodone, but didn't have regular access because of her state laws. MC use did not carry the same stigmatization of being an addictive substance as POMs. Instead it was seen as a substance that could help stop reliance on POMs.

Discourse: cannabis as medicine. Participants all described their cannabis use as medicinal. Their informal definition was that they were using it for their CNP related symptoms. However, the formally recognized MC designation from the state was less important for some participants. Those who lived in states without formal MC laws were still using what they referred to as "medical cannabis" but it was coming from online retailers, illegal growers, or friends/family. MC use had become legitimate because it was legal in other states. A woman with nerve pain related to cervical spine disease used ”hemp oil” she ordered online because she lives in a state without formal MC laws.

> Well for one there’s zero—zero—overdoses from medical marijuana and I see the news and I don’t even want to try that crap [POMs] you know? I just don’t. And I’m going to use what works for me. Like if I can have a little bit of cannabis and actually get something done as opposed to laying there not being able to move so good. I think I’d rather do that.

Conditions

There were four individual level conditions or characteristics of the participants contributing to the process of negotiating power over pain and choosing to use MC as an alternative. These conditions were descriptions of power lost, contributed to negotiating power over pain. The conditions were categorized as 1) the totality of pain leading to desperation for relief, 2) a side effect balancing act from different treatments, 3) pain being a dehumanizing experience, and 4) performing a safety calculus on the risks and benefits of cannabis versus POMs.

Totality of pain leading to desperation. Every aspect of participant’s lives was negatively influenced by pain. Participants identified that their CNP caused suffering in the form of sleep deprivation, relationships loss, lack of energy to perform activities of daily living, and diminished hope. Traditional medications, such as POMs, did not address anything but physical pain and therefore did not improve their quality of life. A 61 year-old man with CRPS-II (known nerve injury) describes the impact the pain had on him after surgery resulted in permanent nerve damage. He described himself as very athletic, worked out daily, and followed a vegan diet.

> I'll get flairs and I'll be on the couch for a week as opposed to being working, you know, working out, doing whatever else I want to do. Yeah it just takes over your life, which is unfortunate.

A woman who described her pain as a result of a spinal cord injury and RSD in her legs had been on methadone, oxycodone, fentanyl, and gabapentin for pain. Nothing helped her pain enough, but she described the secondary relief she got from sleep after getting approval to use MC in her state of residence.

> And I went out and got a medical marijuana card. I did that. It doesn't help with the pain, but it helps me sleep. Sleeping is pain relief for me. So that's what I do now.

There were psychological components of pain that contributed to their search for better pain control. The psychological contributors included fear of pain, and loss of power, and a loss of their former self. A woman with CNP resulting from a physical attack at work describes her life before the accident and after.

> it becomes a new type of life that you're living and you feel a sense of loss for the old type of life you lived before you were in pain. Yeah. I call it 'the before the accident' and 'the after the accident.' The pain controls my life.

Social distress contributed to total pain by affecting the ability to work and care for others, personal relationships, isolation, and activities of daily living. A woman with fibromyalgia, peripheral neuropathy and sciatica described how her CNP affects her relationships.

> It's [pain] destroyed my life. I don't have a life anymore. Umm, my friends are all gone, all gone. Nobody wants to be around someone who has a chronic illness and is in pain. Especially someone who at one point was vibrant and fun and brought joy and fun into

> their lives. Nobody wants to be around that anymore. So, they're gone. All my friends are my support group.

Participants wanted help with all aspects of their pain, not just the physical pain, but felt they had nowhere to turn to receive that help, no matter how desperate they were. This led them to start a search for what else they could use to alleviate pain and improve their overall QoL.

Side effect balancing act. Balancing medication side effects contributed to the search for alternative pain relief. A woman with CRPS after a fall at work resulting in a traction injury of her rotator cuff wanted to stop POM use and was smoking MC for pain instead:

> Well for me they [POMs] clouded my brain so much that I actually had to like write down on a piece of paper when I took my pills because if I didn't I would forget and I would take more because they didn't really help my pain anyway...You have the tiredness, the no energy I could never go to the bathroom, ever, it never made me gain weight, but it would hinder me from losing weight, I had hardly no sex drive

There were many descriptions of POM side effects, the harms, and disruptions they caused in their lives. A 56 year-old woman who had tried hydrocodone (Vicodin), ultram, dulexetine, and gabapentin for her CNP talked about her experience with being on multiple medications.

> You take a drug to help a primary problem but then you get prescribed drugs to help with side effects from the drug you've taken for the primary problem. And it just keeps snowballing. I'm to the point now I'm on 4 medications, and only one of them is prescription...that was another reason I didn't like the Vicodin because I would wake up the next day and be so groggy it was awful. So that makes me mad when they think I'm

> drug seeking and I don't like to take these drugs, but it's that or the pain so what do you do?

Side effect management was not limited to POMs. One participant, a 49 year old male with diabetic peripheral neuropathy, was not thrilled about the side effects of the MC he was using either. He bought cannabis from people on the street, so was unable to dependably get a strain with low THC and less psychotropic effects and wished he could buy it in a dispensary so he knew what he was getting.

> I don't want the side-effects of pot; I want the pain-relieving part of it. But if I have to have the side-effects it's better to me than the side-effects of methadone … The fear of always being cut off –which I had been before—the fear of withdrawal, the fear of…I mean look at what methadone is doing to people. You know, it's causing them to get on heroin and shit which I would never do, but when they cut them off of the methadone then they have kind of no choice but to go to the streets… It's their doing and all they're trying to do is get that relief back because it's hell…The pain is hell… In a controlled environment at least I'd get the right amount, the right whatever it takes to give me the, you know, want to continue on see if there's a cure someday.

Dehumanization of pain experience. Societal responses to pain patients lacked sympathy, was judgmental, and unkind. Terms such as feeling "less than human, like drug seekers" during visits with HCPs, and being treated as if they were faking their pain were used to describe the dehumanizing experience. A woman with idiopathic small fiber neuropathy struggled with a diagnosis for 4 years. Along the way one of her experiences with a specialist left her feeling discouraged about her CNP.

> I guess they don't believe you. I mean this is typical. This is a doctor who was very up front about what he was thinking. He did not prescribe pain medications, but he looked at MRIs and said to me "your injuries are cheap" and that's kind of the way I think these doctors think. —and that's probably not the appropriate word, but that's the word he used—don't explain your pain. He couldn't see anything on the MRI that would explain why I say that I was in so much pain.

Some participants described the experiencing of seeking a diagnosis as dehumanizing because their voice was unheard. A woman with CRPS was seeing a specialist to get a diagnosis for arm pain. She described one experience with HCPs that left her feeling vulnerable and powerless.

> It seemed the more specific doctor…like the shoulder doctor only sees black and white shoulder and since nothing he could find is broken then I must be seeking drugs. The spine doctor, after he fixed what was wrong, I should be fine so if it still hurts I must be a drug seeker.

A 48 year-old woman who worked full time and had tried over nine different medications for pain was so sick of seeing pain HCPs she thought about selling her house to try and afford "holistic treatments" for her CNP from failed back surgeries. She talked about a dehumanizing experience she had discussing cannabis products that were legal in her state.

> The treatment that you get, and even at the hospital when I went there one time…. He (doctor) treated me like I was there for drugs. I didn't even ask for pain medicine. The drug testing they do at the clinic I go to…the timing of the random drug testing…its you know…they suspect it. When they reduce me off of oxycontin. I'm supposed to be drug tested every 3 months or at random. So he reduced me for 2 weeks to get me off of it and then he drug tested me. And I knew right then he was drug testing me to see what's in

> my system to see am I taking something else because you are reducing. And the physician assistant, I told them about the CBD oil, brought the bottle to show them. She left the room with the bottle and came back and said ‘if you test positive for marijuana you will be kicked out of pain management.’ I said this is legal in all states, I wouldn’t take anything illegal. Because first because of my job and my husband’s security clearance. But she says, it says right here on the bottle that it does have a warning about the THC. But if you are tested and are under that limit, you are using it legally…. I don’t understand why they would kick you out of pain management for something you are using that is legal.

Safety calculation. A risk-benefit calculation of MC versus POMs occurred within individual and social contexts, both related to the safety profile of the substance itself, and regarding possible legal prosecution. Fear of legal ramifications or prosecution for MC was varied. A participant who was driving out of state to buy MC at a legal dispensary said:

> I think it’s pretty crappy that not everyone has access to it. I feel like it has changed my life so much that I’m a huge advocate for it. I think every state should legalize it; it should be available to every person as an option to deal with their pain versus having to take opioids.

Safety beliefs arose from exposure to cannabis as a youth, most commonly with recreational use. A male participant with diabetic peripheral neuropathy was asked why he chose to use MC, and he described his decision-making and perceptions of safety of methadone versus cannabis.

> Because everybody knows…everybody knows…that it works for pain… I mean, everybody knows. You know, especially being a person in pain, when all of this medical

> marijuana stuff started going on, of course it got my attention. Every time I'd take a methadone I thought I play Russian roulette, well I know pot's not going to kill me

All participants were asked their perceptions of MC safety. A 43 year-old woman with a radial nerve injury and CRPS summed up her beliefs on MC versus POMs,

> With marijuana I think there's virtually no risk at all. Especially when…if you're going to take people's opioids away at least give them marijuana because I mean it doesn't really…the edible stuff helps with the dystonia but I don't think it really helps with the pain that much. I will tell you it potentiates the opioids so you can take a lot less opioids if you smoke a little weed with it it will make them work much, much better. So on their own they're probably not a great pain reliever but it does kind of help you just put the pain on the shelf and like I'm just going to be able to like disassociate from the pain a little bit

Processes/Actions

There were two processes involved in power gained while negotiating power over pain and each had several characteristic actions. The two processes were 1) solo pain navigation and 2) creation of credible knowledge.

Solo pain navigation. The following actions, within the process of solo pain navigation, were used to seek control over pain management: i) titration and manipulation of a finite regiment of pain treatments, ii) data mining solo through online sources, and iii) identifying with a community of similar struggles. Solo pain navigation was a patient driven exploration of alternatives for pain as a result of incomplete relief through traditional care.

A 49 year-old woman describes the year she spent trying to self-diagnose her pain before being diagnosed with chronic fatigue syndrome, neuropathy, and fibromyalgia. She also describes ordering cannabis oil from an online website after finding information on the Internet about using it for pain.

> I spent almost a whole year looking for answers, spent almost every day on the internet "what's wrong with me" going from this site to that site to vitamins to herbs to anything. That's how desperate I was to fix my body. And what happened was that the pain was so bad that I was researching everything: what's wrong with me, what's wrong with me, I thought maybe I had lyme disease. I found this site … where it talks about cannabis for pain and I was so desperate I ordered it (cannabis oil). It did not make me high, it actually…I felt like…I put it under my tongue and I also ordered hand cream that had cannabis in it and I would put that on my arms and my hands and on my neck and put that oil under my tongue along … and it worked. It was the only thing at all. You know I felt like I got normal relief without having to be high. I ordered it from a woman in California. I was really scared 'cause I smoked pot before and that did not do good (sic) for me. I felt like I was so paranoid when I smoked pot so I didn't like it.

Titration and manipulation of finite regiment. Limited supplies of POMs led to rationing, hoarding, counting and manipulating doses. Participants described it as survival to prevent using all POMs before the next appointment to limit suffering. This resulted in an uncomfortable reliance on the pain HCP, which contributed to a loss of power over the pain. A 48 year-old female participant with failed back surgeries described the common practice of counting her pills to make sure she had enough to get through to her next appointment: "I mean a pain patient is going to come back every four weeks to get their drugs, they are going to count their pills like I do and make sure they have enough to get them through."

Another participant, a 36 year-old man living in a state without MC laws described his titration of POMs as driving him to use cannabis for pain because he needed something to use when he had an acute flare-up of this chronic CNP.

> I stick to my schedule; I take my oxycontin, then 3 of my pain pills. Then I take the 2 in the afternoon if I need them and then three more at night. Then the oxycontin at night. And if I don't need the two in the middle of the day, I save them for when I really, really really, really bad pain happens so I … have something for breakthrough pain. But…I usually just bite the bullet and take it, and hope that tomorrow there isn't more horrible pain days coming up…Or I take some marijuana tincture, and that helps

A woman from Oklahoma with nerve damage in her legs described fear of running out of medication right before her back surgery

> Because I was in so much pain … while I was taking the medication that I feared constantly of running out of my medication because if I ran out of my medication I knew that pain would be unbearable to where I would just…honestly if I didn't have kids I wouldn't be talking to you right now. So it was a huge fear.

Out of desperation she started searching for alternative pain treatments online and found someone selling MC capsules on Facebook, so she ordered them. She describes trying several different cannabis products with varying results.

> I was getting the THC oil caps/gel caps from someone off one of those websites on Facebook also. I don't remember what the name of it was, but it was just THC oil capsules that you swallowed and it was really good and then I also did try the CBD oils…I've tried that, but that didn't do anything. I would've probably had to drink half

> the bottle for it to do anything not the two or three drops so it didn’t…It works for a lot of people, but it didn’t do anything for me.

Data mining. The action of data mining describes how participants navigated solo through information about MC without HCP involvement; on the Internet, joining online social media support groups to find out what others were using, and taking recommendations from friends and family. A 65-year-old male who had tried 17 different medications for pain describes his data mining procedure after being asked where he found his information on MC:

> I hate to say it, but Facebook [support group]…I was aware of medical marijuana and I had been for many years but I wasn’t aware that New York—and that’s where I live—is a medical marijuana state. So a particular person pointed me in the direction. I’m very good on the computer so I was kind of surprised and disappointed with myself that I wasn’t aware that our government signed the compassionate care act in 2014.

A woman with CNP who was self-educated about MC recollects how she started learning about what type of products to use for her condition, recognizing that she did not want to experience a euphoric feeling but wanted to gain power over her pain.

> …there’s a group on Facebook, I’d have to find it that deals specifically with using CDB oil and FECO [full extract cannabis oil, very strong] oil and stuff like that. That they talk about different cancer treatments, pain treatments, epilepsy, neuropathies, all kinds of different treatments and different types of oil and one thing that I have found from reading is that if you’re using CBDs, the cannibidal, if you have pain and certain conditions you have to have the THC with it, but if you’re using the CBD that blocks the THC. I mean, it blocks THC from making you feel high.

Identifying with a community with similar struggles. Support groups were a community of others with CNP who shared information about tests, medications, alternatives, and offered validation. A 50-year-old female participant from Maryland described why she used the support group for information and support.

> You don't have to re-explain things to people. They get it. You know if I say, "today's an 8 and I'm having a horrible day" they know what that means. Or if I have this test coming up they know what…I don't have to re-explain myself every day to them.

She received a recommendation for MC from her HCP, but there were no dispensaries open yet, so she had friends buy her cannabis for her out of state.

Creation of credible knowledge. Participants were sifting and winnowing through information on MC, unsure what was credible. It was part of a process of creating credible knowledge out of all of the information they found, which was associated with actions such as: i) questioning where they should seek information on cannabis, ii) becoming informal experts on MC, and iii) reclaiming power over their CNP.

Questioning "where do I turn and what is credible?" Participants determined what was credible out of the vast amount of information on MC. HCPs were no longer the sole source of information, and now the task of determining what internet, family, and Facebook sources were credible was daunting.

A 57 year old male who sustained a spinal cord injury seven years prior struggled with CNP and spasticity in his lower extremities. He was wheelchair bound and was taking 12 medications related to pain and spasticity, none of which gave him significant enough relief. He described the way he discovered MC worked for his pain and spasticity:

> Nothing worked for me. I was only on 5 mg of the…Percocet. And that was doing absolutely nothing. My spasticity at the time was around my lumbar spine and it was driving me nuts. So, a friend of mine came to visit me and said—hey man, you don't mind if I light my J [refers to joint, or smoked cannabis]? I said nah it don't bother me, so he said ok and started smoking. I said man, let me take a hit of that J maybe it will make me feel better. So I started smoking a little of it, and I'll be darned if I started feeling better. So before he left I said give me one of those J's before you leave. So I smoked a little the next day and I'll be darned if I didn't feel relaxed and spasticity was a low point and the pain reduction was unbelievable.

He also described how he determined what information on MC was credible, and how he knew if he was getting a safe and consistent product.

> Now that, I didn't worry about because I was told that…the best marijuana…the more potent the marijuana is the more it's going to help you with your medical condition. That's coming straight from people who smoke it. They like…man, the better the weed is, the stronger it is, …the more it will help you. I notice that the people I deal with always have the best quality because they always test their product before they give it to me. Because they have clientele that depend on them to bring, you know, good quality marijuana, so they have to have the best so they keep the customers.

A 50 year-old female participant with a spinal cord injury and related nerve pain in her arms describes her process for finding out about cannabis, she determined that Internet searches resulted in credible knowledge about MC.

> I did Google™ a lot of information about it … and I went with the information that I got off the Internet. Like I said, it's zero overdoses from cannabis so that's why I can't even

> imagine why anybody wants that other stuff [POMs]. I mean everybody's got different pain levels and different things work for different people I guess, so…everybody is different.

Other participants describe the involvement of their HCPs in their search for alternatives. One woman, 49 year-old from Pennsylvania with small fiber neuropathy, CRPS, and sciatic nerve pain reported being told to use cannabis by her HCP, but because they had not passed MC laws in her state she was unable to go to a dispensary for additional information. She discussed her path to using cannabis, where she obtained the product she used and her HCP's involvement:

> Well I've always smoked cannabis. And my doctors told me that's one of the best medicines for me, or for anybody with pain, or anxiety; Post-traumatic stress and all that which I have. That's one of the best medications for you…and my doctors still do recommend it. It's just the state of Pennsylvania won't get off their behinds to pass it…They just told me to go find a joint…I belong to a cannabis group, so I get a little advice from them [the group]. I have ordered some CBD oil and want to try that… My husband grows it [cannabis] for me.

For some participants, the dispensary was able to provide at least some of the needed information about cannabis, but a 61 year-old male from Indiana with CRPS-II combined the knowledge from the dispensary with his own Internet searches. He discussed whether or not the dispensaries he has visited were helpful:

> The ones I've been to, no. But I've only been to two and I haven't really been to any large scale ones. I mean I went to one in a real small town and…actually they've both been in small towns. I don't think the people there were as knowledgeable as I wanted them to be, but next time I go I'm going to go into a large one in Denver. I've already

> picked it out online basically. They've got dispensaries all over Colorado and they have the information I need. In fact, I can probably just go in there without even consulting anybody and tell what I want because now that I've done enough research online, educated myself…

A man from Louisiana temporarily moved to Colorado to gain access to MC as he was trying to wean himself off of POMs. He described his experience at the dispensary and how he found a product that worked for him.

> I went into [a large dispensary in Colorado], turned around, spoke to a budtender [dispensary worker], told him what was going on and he said, "I'll tell you what. I'll recommend three to four strains of sativa, three to four strains of indica and maybe I'll throw in a couple of hybrids and just give it a try." And he said, "the different strands [sic] whichever ones that'll fit you, well then stick with that." So what I did is that the cannabis actually got me into a routine of I wouldn't do it every morning, but if I felt like I needed it I'd smoke a little sativa and … it got me into a routine of exercise. I walk between 6 and 12 miles a day now.

Becoming an expert. Through searching for knowledge, participants became self-made experts on MC. One example came from a 43 year old-female participant who started making her own cannabutter, or concentrated edible cannabis tincture mixed with butter, for treatment of dystonia associated with CRPS. She talked about figuring out the perfect dose and using the dispensary for information when she needed. She reported obtaining information on how to make cannabuter from the dispensary, but the workers also gave her additional advice:

> … they said the CBD and the edibles. Edibles help with pain a lot more than smoking. Smoking helps more like maybe you sleep or appetite but the edibles help more with like

> the muscle pain and the nerve pain and it definitely helps with the dystonia, because I was kind of experimenting with what is working and what's not and it was definitely making a big difference. …I tried just the plain CBD oil and I did not feel like they helped as much as my homemade cannabutter. With the dose with edibles you do have to be careful because if you have too much you do get very sick, like throwing up sick, stomach cramps and vomiting. So I've made that mistake before and I just kind of realized this is a happy dose: 1.5-1.7 I think its grams of the butter. And then if you go to a dispensary they tell you because they've got it figured out down to a milligram dosage.

This participant's expertise was developed by trial and error with dosing, and when she had trouble she utilized the dispensary as a sort of pharmacy, with the dispensary worker acting as the pharmacists. She did not involve her HCP in any decision-making, but did inform him that she was using MC; as if the roles had reversed and she was educating her HCP. MC was legal in her state, so she had access to different types of MC with defined concentrations of THC and CBD, and did not need to rely on her HCP for information.

A participant from Washington described how she educated her HCP on utilizing MC for patients with CNP. She talked about how the dispensary, not her HCP was her source:

> And just for me personally--because my doctor had never done any research about the good uses for marijuana so he had absolutely no idea what direction to send me. And I just looked right at him and I said, "okay, well I know a place that can help me figure all of this out and I'm headed there [a dispensary] as soon as you give me my card." And he said "okay" and since I was the first medical card that he had ever given out…since me and my progress he's given out four more.

Reclaiming power. Participants were taking steps to control fear by regaining control over pain. Becoming the expert and creating credible knowledge allowed them to reclaim power and be less dependent on HCP and POMs; developing resources for pain control on their own. A 36 year old man from Virginia ended up making his own MC concentrate. He explained concentrates as very potent extractions of the cannabis flower that could have THC concentrations as high as 70-90%. The concentrate, sometimes called "dabs", could be in the form of oil, wax, or a butter type substance. He also pointed out some of the risks of novice use such as getting a product high in pesticides, or butane form the extraction process. He felt the cannabis product he obtained (through growers) was safe.

> It's not like we are getting pesticide ridden stuff. And when the world went to concentrates like 4-5 years ago, 5-6 years ago… I was like, this is like…butane soup. This is all runny, and gross and this is not what it's supposed to look like at all. And so I tried making it at my house, by myself. It's really really simple science you just have to control the temperatures and stuff and make sure you blast your butane outside. Now you don't even have to use butane anymore. There are all sorts of ways to do it. And they grow hydroponically, properly. So I'm not worried about it

Consequences. There were four continuums of consequences for negotiating power over pain: 1) remaining dependent to gaining control, 2) losing a valued self to finding an empowered identity, 3) selective to total disclosure, and 4) languishing in pain to finding relief.

Remaining dependent to gaining control. The consequence of unsuccessfully negotiating power over pain was to remain dependent on POMs or HCPs for pain control; successful negotiation resulted in control by seeking out treatments for pain relief. MC offered participants power to control without being perceived as addicts. Many of the participants felt they could cease all use of POMs if they had full access to MC.

A participant from Maryland summarized her experience with MC by explaining that she was taking five medications for CNP, post-traumatic stress disorder, insomnia, and anxiety. She had intermittent access to MC because dispensaries in Maryland weren't open yet. But, when she used MC she saw a change in her POM use.

> The dispensaries aren't open so I don't have 100 percent accessibility. When I do have it, I don't take the oxy. I don't need it… I'm not able to experiment to see how…until the dispensary opens. So I could go a couple days without it [POMs]

Losing a valued self to finding an empowered identity. A valued self was the version of self before pain, and the choices leading to reclaiming that self formed an identity. Losing a valued self was loss of quality of life and a search for a new identity within new parameters. MC was a component of their search for a valued self. Pain caused a loss of former self that was valued, but using MC was part of a new and empowered identity. CNP caused social isolation and a self-perception of being burdensome and sorrowful. Seeking out MC was part of empowerment that gave participants belief that they had options and control. MC contributed to a new, empowered identity was the result of negotiating power over pain.

A 56 year-old man who sustained a spinal cord injury poignantly described the description of the loss of self. He knew he would never walk again, but described that not only the injury, but the subsequent use of POMs for CNP contributed to his loss of identity:

> Because of the narcotics in me I can't, I mean I need everything done for me. So I sit there and doze off in the chair because of the narcotics. And I look like…like I'm on

> some heavy drugs…I found something [MC] that makes me feel relaxed and … reduced pain and reduced spasticity so I can be myself again and that makes me so happy.

Selective to total disclosure. MC use was selectively disclosed to HCPs as a consequence of individual autonomy over pain. HCPs were not involved in maintenance of MC, and disclosure became obsolete. For some there was also fear of negative consequences of disclosure, such as being kicked out or pain management for MC use. A woman who was using both MC and POMs described the conundrum of dealing with HCPs and traditional pain management.

> The problem with…I don't know if it's everywhere, but in Maryland you have to sign a pain contract, an opioid contract, and you have random urine analysis tests and if you come back positive for cannabis you're out.

A contributing factor was HCPs were seen as uneducated, or unwilling to discuss MC because of the illegal federal status of cannabis. One example was a woman living in a legal MC state who described the new, and uncomfortable feeling of knowing more about MC than her HCP.

> It's a little bit weird to have to go in and explain, you know, how the marijuana works for me to a doctor because I feel like he should already know that. But when it was such a no-no for so many years I kind of understand why none of the doctors around here really knew anything about it.

Even in states with medical cannabis laws, the HCP could lose authority with their patient as soon as a MC referral was made. A 66 year-old man from New York explained how the dispensary changed his HCP's recommendation for MC. This was his first experience with MC and the dispensary gave him multiple choices.

> What happens is the provider prescribes [recommends] and he can let the dispensary use his prescription [recommendation] or they can change it. So the doctor prescribed [recommended] a combination of THC to CBD and the dispensary changed it and gave me something different. They thought it would be better for me…They offered, let's say, nine different flavors and three different methods of administration: vaping, sub-lingual and by mouth. I chose by mouth based on the description of how the administration would work. It just seemed prudent. And it was a smart decision.

Participants described dispensaries that took over the role of pharmacist. This changed the relationship between patient-provider in both positive and negative ways. The participants described it as gaining power by not relying on POMs, not having to go to monthly doctors' appointments, not feeling stigmatized as a drug seeker, and titrating doses by their own choosing. The loss of total disclosure often meant participants had to be careful about using MC prior to pain management appointments so that they did not have signs of THC in their urine. This threatened their ability to continue seeing pain management providers and be prescribed POMs.

Languishing in pain to reclaiming quality of life. Allowing CNP to persist without changing behavior, or overcoming CNP by searching for options were consequences of negotiating power over pain. Participants found relief and empowerment through using MC in different ways, but it was ultimately a better quality of life they were seeking.

The desire for improved quality of life was so obvious to a woman from Virginia that she couldn't understand how HCPs could consider MC negatively compared to POMs she had been using for 10 years.

> …my bag of medicine can give me all the euphoric feeling I need. That's not what we're looking for. We just want the quality of life back, that's it. I didn't think that was much to ask for but apparently it is.

The woman from Pennsylvania described why she prefers MC to methadone for her CNP.

> I don't want to be all drugged out in the bed, asleep. I'm still trying to have a little bit of quality of life. And cannabis does that for me. It gives me back just a little bit of my life. … It helps to calm me, it helps to quiet my mind so that I'm not constantly thinking about the disease, the pain I'm in or how sick I feel.

A male participant who had been on POMs for 16 years described how MC helped him not only stop taking POMs, but also helped him control his pain enough to start exercising. He felt as though he was addicted to POMs both physically and mentally, and that his addiction to them had affected many parts of his life, despite still being in pain.

> I mean I got back the quality of life that I hadn't had for, what, close to 14 years something like that…. Because I had choice that's the key word I had choice [to use MC]… Went into [a dispensary in Colorado], tried a bunch of different strains, the ones that I really fell in love with and what it was is that after a couple of months and with the exercising I was able to purge my body and I got off of the stuff [POMs] thank God because I had choice.

Another description of the relief obtained from MC comes from a 61 year-old male who takes MS Contin, oxycodone, gabapentin, and xanaflex for CNP. He described forgetting to take his POMs when he used MC. He returned to a dispensary in Colorado to obtain products with specific ratios of THC and CBD to optimize relief. He lived in a state where MC is not legal.

> But I take a hit or two of pot in the morning and the afternoon rolls around, it'll all of a sudden be dinnertime and I haven't taken my meds. So I would forget to take my freaking pain meds and so it's just amazing to me. That's what…that's so…I don't know…I haven't quite figured out if it's lessening my pain physically or mentally it's just like "hey it's not bothering me as much." The pain's still there, but it might be a six level pain or something, but it's just not bothering me as much, right, where I'm looking for the opioids to give me relief. So I guess after having experimented –I've been doing this for a while now—it's just like that's what I feel and I know the pot that I have isn't the right CBD-THC ratios. It's too high on the THC.

A woman living in a state with legal MC laws was using multiple types of MC products including topical ointment she was rubbing on her shoulder, and edible MC that she was eating and came in the form of brownies, cookies, and gummy bears.

> So with the medical marijuana I could actually function on a bad pain day instead of just being in a ball on the couch. I could use either the topical or use an edible and I could get up and clean the house and I could go outside and play with my dogs versus not having any of it I would just be on the couch a disaster because it hurt so bad to move.

Summary of findings

Participants were using MC to negotiate power over pain by seeking control. Their individual (unwinnable pain battle and rejection of an addict identity) and social contexts (opioid crisis and stigma of chronic pain) contributed to the need for power. At the same time MC was being used as a medication across the country. Conditions that contributed to power loss included total pain and desperation, a side effect balancing act, and the dehumanization of chronic pain. To balance the loss of power, they took actions that helped increase their power over pain. Participants gained power over pain solo navigation into pain control. Specific actions were data mining and finding online communities of similar struggles. They acted to create information they believed to be credible, becoming self-made experts, and ultimately reclaiming power over their pain. The positive consequences of this included gaining control, finding an empowered identity, being able to disclose their use to HCPs, finding pain relief and reclaiming quality of life. The negative consequences were remaining dependent on POMs and HCPs for pain management, losing their valued self, selectively disclosing MC use, and languishing in pain. The consequences were a continuum as conditions and actions took power away and actions returned power and control over pain.

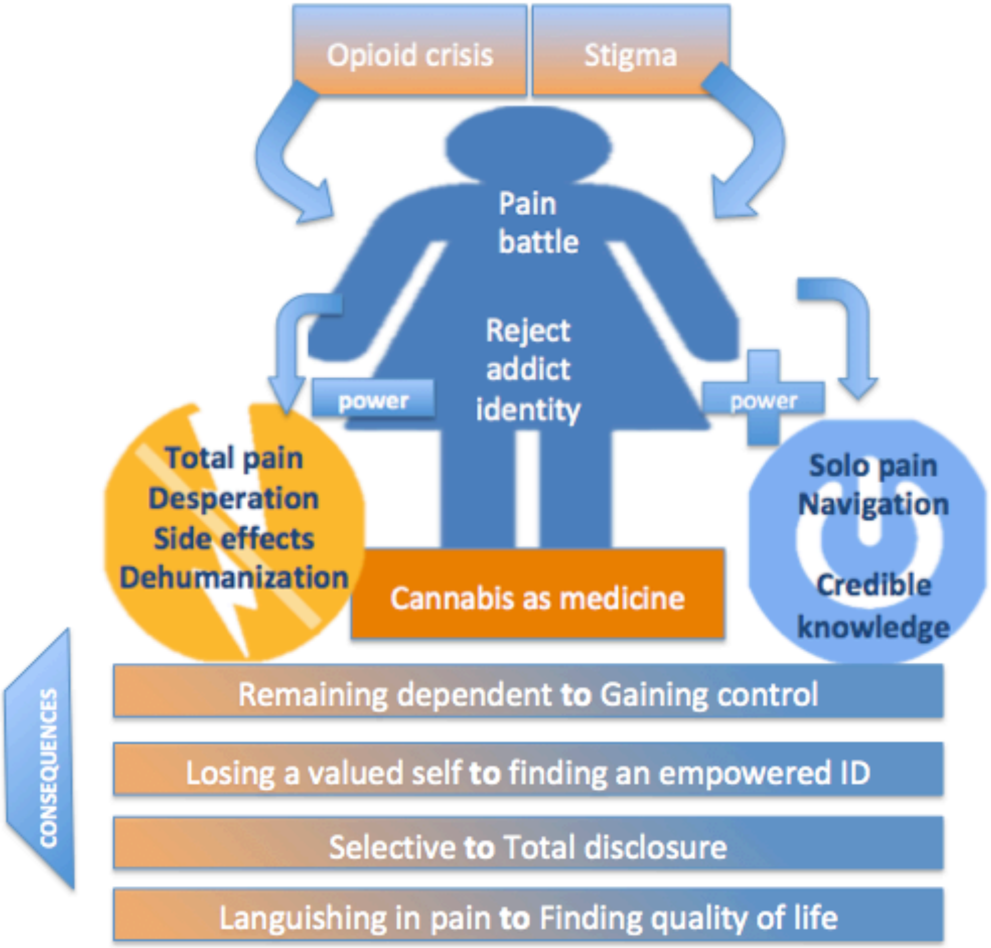

Figure 2. Model of Negotiating Power over Pain by Seeking Control

Discussion

This study is a novel qualitative exploration of the phenomenon of MC use in a CNP population. Twenty participants with CNP were interviewed, and the central process contributing to MC use was identified as "negotiating power over pain". The principal contributions are 1) MC allows power and control over pain, 2) MC is used as a harm reduction strategy, and 3) MC is used without oversight from HCPs.

Medical cannabis allowed power and control over pain. MC gave participants the ability to control their pain without relying on HCPs. MC offered relief, empowerment, and ultimately quality of life improvements where traditional medicine and pharmacology had failed. The factors contributing to a loss of power in this study were: total pain and desperation, side effect balancing act, and the dehumanization of chronic pain.

Total pain. POMs are not indicated for chronic pain, in part because they only improve physical pain (Griffin et al., 2015). Chronic pain affects components of physical, social, psychological, and spiritual well-being, all which contribute to quality of life. Pain that affects all of them has been called "total pain" (Saunders, 1964; Ferrell et al., 1991). Chronically ill people such as those with CNP suffer from broader suffering including the loss of self-image without the development of an equally valued new self (Charmaz, 1983). Loss of self includes social isolation, leading a restricted life, being discredited, and burdening others; all qualities described by participants in this study.

Side effect balancing. Uncontrolled pain has an immensely negative effect on quality of life. Non-pharmacologic and non-POM therapies are the traditional first-line approach to treating chronic pain (Dowell et al., 2016, CDC, 2017), however all participants in our study had failed those treatments. Standard treatments for CNP include secondary-amine tricyclic such as nortriptyline, or a selective serotonin or norepinephrine reuptake inhibitor such as duloxetine (Cymbalta), and calcium channel α_2-δ ligand such as gabapentin (Neurontin) or pregabalin (Lyrica) (Dworin et al., 2011). There are unwanted side effects from some of these medications, causing people with CNP to discontinue use (Quintero, 2017).

Despite POMs not being indicated for chronic pain (CDC, 2017), many people still used them for relief and were experiencing unwanted side effects such as drowsiness, sedation, euphoria, tolerance, and constipation (NIDA, 2017). Participants in this study rarely received formal acknowledgement from HCPs that they had failed all available traditional therapies, but instead were left without options.

Stigmatization of chronic pain. Participants in this study felt the stigmatization of their chronic pain condition. Chronic pain occurs in a sociocultural context, and can be internalized to affect self worth (Waugh, Byrne, & Nicholas, 2014). There are repercussions of chronic pain stigmatization, including low self-esteem, self-worth, depression, and a greater tendency to catastrophize about pain. All of these can lead to underassessment, underestimation, discounting of self-report, and disbelief of pain, and therefore under treatment of pain especially in women (Tait, Chibnall, & Kalauokalani, 2009; DeRuddere et al., 2012; Schäfer et al., 2016). HCPs rapid estimations of trustworthiness and pain are often unreliable (Shäfer et al., 2016), and when combined with MC use may cause further stigmatizations of CNP patients. There is a cultural assumption that chronic pain has a psychopathological component, which can also stigmatize people with pain (Waugh et al., 2014).

Medical cannabis and power. Perceived control over pain can improve psychological and physical functioning in people with pain and actually reduce pain intensity (Vallerand, Crawley, Pieper, & Templin, 2016). Although there have been multiple trials demonstrating pain relief from MC (Abrams et al., 2007; Andreae et al., 2015; Berman, Symonds, & Birch, 2004; Boychuk et al., 2015; Desphande et al., 2015; Ellis et al., 2009; Fontelles & Garcia, 2008; Karst et al., 2003; Koppel et al., 2014; Nugent et al., 2017; Nurmikko et al, 2007; Ware et al., 2010; Wilsey et al., 2008; Wilsey et al., 2013), there could also be a component of placebo effect from MC (Colloca, Klinger, Flor, & Bingel, 2013).

Medical cannabis as a harm reduction strategy. Participants described using MC as a POM harm reduction strategy. They were able to substitute or stop using POMs when MC was available to them. Substitutions of MC for POMs have also been reported across the U. S. (Sexton, Cuttler, Finnell, & Mischley, 2016; Corroon, Mischley, & Sexton, 2017). Reduction in POMs with the use of MC has also been reported (Boehnke, Litinas, & Clauw, 2016; Reiman, 2017). Additional harms, such as treatment admissions for POM abuse and overdose (Powell, Pacula, & Jacobson, 2015), overdose deaths (Bachhuber, Saloner, Cunningham, & Barry, 2014), and costs associated with POMs (Bradford & Bradford, 2016; Bradford & Bradford, 2017) have decreased in states with MC laws (Vyas, LeBaron, & Gilson, 2018).

As opposed to offering only pain relief, participants reported MC was associated with anecdotal positive outcomes such as improved dystonia, anxiety, sleep, reduction in POMs, forgetting about pain, relaxation, and decreased spasm. This is also consistent with reviews looking at outcomes such as anxiety (Bergamaschi et al., 2011; Whiting et al; 2011), sleep (Wade et al., 2004; Rog et al., 2005) and spasm (Wade et al., 2004). However there is no data to support improvement in dystonia (Fox et al., 2002; Zadikoff et al., 2011).

Medical cannabis without oversight. Participants frequently bypassed HCPs because they were not seen as experts on MC. Despite individual HCP familiarity with MC, it is being used whether or not there is oversight. This presents an interesting problem for HCPs and patients. Who should act as the gatekeeper for MC? A large portion of HCP training is in diagnosis, treatment plan, and pharmacology so that patients can benefit from years of intensive study and familiarity with pharmacotherapies. The healthcare community deems this training so important, that the role of pharmacists is as full time support and gatekeepers of medications. There is also recognition among HCPs that making recommendations on MC was not part of training, and would be outside the comfort of most (Brooks et al., 2017; Evanoff et al., 2017). But with MC none of the traditional roles exist, except in the role of the dispensary workers, or "bud tender".

Existing research on dispensary workers indicates that they provide specific recommendations to MC users about strains, route of administration, side effects, benefits, and disease specific information, but have been found to make recommendations that could exacerbate, or are ineffective for the users conditions (Haug et al., 2016). In our study, all of the participants obtaining their MC from a dispensary were given advice about route, dose, strains, and benefits for their disease. However, the advice from dispensaries was based on personal preference, and recognized that various products could offer relief. Additionally, study participants described titrating their MC use based on recommendations from friends and social media-based support groups, but not their HCPs.

There are existing bodies of knowledge about preferred and recommended strains of MC for specific symptoms. For example Pearce et al. (2014) performed a web survey of 95 MC users who preferred *C. indica* for pain, sedation, headaches, neuropathy, spasticity, and sleep, and *C. sativa* for euphoria, energy enhancement. However, the science is rapidly growing regarding therapeutic uses of MC. The understanding of the endocannabinoid system has expanded and become accepted by the scientific community, although it is still not taught in medical or nursing education curriculum (Russo, 2008; Maldonado, Baños, & Canañero, 2016).

Shared decision-making and patient-centered care. This study contributes to evidence that people with CNP perceive benefits from MC, but without consistency of route, dose, strain, or information about efficacy, risks, and long-term outcomes. Incorporating a different conversation into practice could contribute to improved shared decision making between patients and HCPs, which results in improved outcomes and relationships (Charles, Gafni, & Whelan, 1997). Breaking down barriers between HCPs and patients improves care because patients can be given tools that help them understand the options and consequences of their decisions. This must also incorporate the traditional risk-benefit discussion between patients and HCPs. A key finding of this study is that regardless of patient location, CNP patients are using MC despite state or federal laws. HCP should still have the knowledge to discuss risks benefits with their patients.

Implications for health care providers

Practice Implications. There are multiple practice implications for MC use as a harm reduction strategy. The opioid crisis has affected practices, influenced prescribing, and changed the way HCPs think of chronic pain (NASEM, 2017). There are multiple POM risk/harm reduction strategies in place including prescription-monitoring programs (Brandeis University, 2017), revisiting comprehensive pain care (Dowell et al., 2016; Qaseem et al., 2017), increasing access to treatment for opioid use disorder (Haddad, 2015), and utilizing naloxone as an opioid antagonist (Mueller et al., 2015). However, if people with chronic pain are finding relief with MC and decreasing their POM use, MC could serve as a national POM harm reduction strategy. The harms of cannabis are not benign (Volkow et al., 2014), but the risk of death from overdose is far higher with POMs (CDC, 2017).

The differentiation between medical and recreational cannabis was important to participants. The distinction was that MC was used for therapeutic purposes, while recreational cannabis use was used for euphoria or psychotropic sensations. The distinction is important to people with chronic pain because they want the legitimacy of using it therapeutically. The stereotype of people "getting high" and being "stoned" was not palatable, and they felt there was a substantial difference in the cannabis products that caused those sensations. In order for HCPs to understand individual patient use, it would be beneficial to determine if they believe they are using MC or recreational cannabis and the different products available for each type of use. The first step in adding legitimacy was having state laws legalizing MC, but recognition by HCPs that there are different types of use could be important for improving shared decision making and disclosure of cannabis use.

The care of people with chronic pain has been disjointed, with waxing and waning philosophies of how HCPs should treat pain (Eccleston, 2016). Comprehensive pain care has not become a reality in the United States, especially not for people without the financial means to pay for it out of pocket. HCPs can help people with CNP by recognizing that there are multiple components to quality of life, and physical pain is only one component. Chronic pain does not necessarily mean a mental health diagnosis coincides, but recognition and screening for depression, anxiety, isolation, and substance use are all important for comprehensive supportive care.

Policy Implications. People with CNP are using MC to gain power and control over their pain, and improve quality of life. Involvement of HCPs could offer valuable guidance on risk-benefit, efficacy, and dose information. Participants believed MC was safer than and decreases reliance on POMs, and in the midst of a national opioid crisis, MC may offer a way for HCPs to help decrease reliance on POMs, but more longitudinal data would enhance understanding about risks and benefits.

The Schedule I status of cannabis continues to present a barrier across the country. HCPs and the healthcare community should unite in recommending cannabis be moved to Schedule II status, which still recognizes the abuse potential, but would allow for quality research to be performed without the current barriers.

Familiarity with the endocannabinoid system and MC would benefit HCPs in all specialties of healthcare. Medicine, nursing, pharmacy, and mental health workers should receive education on the pharmacology, pharmacotherapeutics potential, and current literature on MC so they feel comfortable discussing its use, risks, harms, and benefits with patients. The risk-benefit conversation is a cornerstone of the provider-patient relationship, and if MC is being used as a medication, HCPs should be involved and be able to inform patients of the risks.

Limitations

This grounded theory study aimed to describe the phenomenon of MC use to alleviate CNP. The applicability of these study findings may be limited to the sample populations of those who willing to openly discuss their MC use. There may be a silent population of CNP patients unrepresented by this study. The cultural context of the opioid crisis may have limited those willing to discuss their methods for pain control. Our sample was homogeneous, primarily Caucasian, female, and recruitment was skewed towards online support groups, which means the sample was inherently looking for support in that location.

This was not a review of whether or not MC was effective in alleviating CNP, but instead focused on participant perception and decision making in hopes that it was representative of a more general population. There were no controls for what types of MC participants were using, or what type of CNP the participant reported. We depended on the accuracy of self- report for their diagnosis, but in some cases were unable to confirm that their diagnosis was accurate. For example, during the interview if the participant said: "they tell me I may have fibromyalgia", we did not judge whether or not this was accurate.

Conclusions

Cannabis is being used for therapeutic purposes in the chronic neuropathic pain population. People using it believe it improves their quality of life, but it also allows them to gain power over their pain by reducing dependence on healthcare providers for prescription medication. The chronic neuropathic pain population is utilizing cannabis as a harm reduction strategy to reduce the need for prescription opioid medication, but it is being used without the oversight of healthcare professionals. The healthcare community should understand the implications of cannabis use and promote comprehensive pain care while avoiding stigmatization of people with chronic pain conditions.

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Appendix 1. Interview Guide

a. We are here to talk about chronic neuropathic pain. Can you briefly describe the type of pain you have and how it limits your life?
b. Tell me about your experience using health care provider (HCP) prescribed treatments for pain (such as prescription opioid medications (POMs)). Are you currently taking any medications for pain?
c. What made you consider using cannabis or non-HCP prescribed treatments for pain?
d. Did you disclose your use of MC / alternative therapies to your HCP? Why or why not?
e. Can you explain the timeline of the treatments you chose to use
f. Can you describe the different things you tried and specifically how they impacted your pain
g. Lets discuss how you felt taking POMs (if applicable), and why you decided to look elsewhere for pain control
h. Have you ever had an experience where you felt vulnerable or uncomfortable asking for help with your HCP?
i. What factors impacted your decision to use medical cannabis?
j. Where do you find the cannabis (if applicable)? Buy online, from a friend, a store?
k. How did you find information about MC?
l. Do you feel POMs impacted your quality of life?
m. Do you feel MC impacted your quality of life
n. If you could go back in time, are there any choices (regarding pain control/treatment) you would not make again?
o. Out of all of the treatments you have tried, what has worked the best for you?

Appendix 2. Participant Demographic Information

Sex	
Male	6 (30%)
Female	14 (70%)
Race	
White	19 (95%)
Black	1 (5%)
Recruitment	
Clinic	5 (25%)
Support Group	15 (75%)
Diagnosis	
Peripheral neuropathy	12 (32.4%)
CRPS I & II (RSD)	8 (21.6%)
Sciatica/Spinal nerve pain	6 (16.2%)
Peripheral nerve injury	5 (13.5%)
Fibromyalgia	3 (8.1%)
Spinal cord injury	2 (5.4%)
Trigeminal neuralgia	1 (2.7%)
Cannabis use	
Past (recreational)	17 (85%)
Present (medical)	18 (90%)
Highest Education	
Junior High	1 (5%)
High School	4 (20%)
Some college	7 (35%)
College	7 (35%)
Graduate degree	1 (5%)

Chapter Five: Understanding Selective Disclosure of Medical Cannabis Use to Healthcare Providers Among People with Chronic Neuropathic Pain

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Background: People with chronic neuropathic pain (CNP) are using cannabis for medical reasons (MC) for symptom relief and improvement in quality of life (QoL), but often without the supervision of licensed health care providers (HCPs). A grounded theory analysis of 20 participants found they selectively disclosed their MC use to HCPs, but little is known about the reasons, nor what sources they used for information on MC.
Purpose/Aims: The purpose is to provide an in-depth discussion of the theme- ‘selective disclosure of MC use to HCPs’, specific to CNP and the relevant clinical applications.
Methods: A grounded theory analysis of semi-structured interview data from 20 participants, recruited through a neuroscience clinic and online CNP support groups, was completed from 2017-2018. Interviews were transcribed and coded; constant comparative analysis of codes resulted in the development of common themes. Salient themes were expanded and ‘selective disclosures’ was explored for clinical significance.
Results: Twenty-five interviews were completed, and three factors were identified as contributing to selective disclosures of MC use to HCPs. 1) fear of potential negative consequences related to disclosure, 2) HCPs seen as uneducated or uninformed about MC, and 3) seeking reliable information about MC from informal sources. Factors that preclude disclosures were the Schedule I status of cannabis and the threat of urine drug screenings. Factors that promoted disclosure were HCP openness, knowledge and acceptance of MC use, and outpatient screening for cannabis use
Conclusion: People with CNP are using MC for pain relief and QoL improvement, but selectively disclosing their use to clinicians. This results in a loss of shared decision making. Nurses and other HCPs should create opportunities to increase disclosure by eliminating the fear of dismissal from pain management for testing positive, participating in continuing education on MC, and advocating for the rescheduling of MC to Schedule II to support research efforts.

Introduction

Cannabis use is increasingly common across the United States (U. S.), with 22.2 million people having used within the past month.[1] Medical cannabis (MC), defined as the use of cannabis for therapeutic purposes to treat illness or relieve symptoms, [2] has been legalized by thirty states. There were 98,063-registered MC users in California alone in 2017, a state that has legalized cannabis for medical and recreational use.[3] Among registered users of MC, chronic/ severe pain was the most common condition cited for use. Those who use MC often consider it to be safer and more effective than prescription opioid medication (POM) for chronic conditions such as chronic neuropathic pain (CNP). [4,5,6] Studies evaluating MC and CNP suggest it could offer palliation of symptoms or improve QoL for CNP patients,[7,8, 9] with no significant increase risk of adverse events.[10]

CNP is a debilitating type of chronic pain that negatively affects 7-10% of the U. S. and costs an estimated $160 billion for care.[11,12] Those with CNP report lower quality of life (QoL), decreased functioning, more missed workdays, and poor employment status.[13,14,15] CNP is often refractory to pharmacotherapy and more difficult to treat than other chronic pain conditions,[16] which often results in escalating doses of prescription opioid medication (POM) for pain relief. With the current opioid crisis in the U. S., changes in pain management strategies, including finding alternative therapies for pain has opened the door for scientific inquiry into MC.

MC legalization in thirty states within the U. S.[17]means that HCPs such as physicians, nurse practitioners, and physician assistants can provide written recommendations for MC to patients if they have a qualifying condition (such as CNP).[18] Of the thirty states, nineteen specifically list chronic pain as a qualifying condition for using MC.[19,] However, traditional prescriptions cannot be written for MC, even if legal in a specific state, because cannabis remains a Schedule I controlled substance under the federal Controlled Substance Act. Instead, HCPs can “recommend” MC for a specified condition.

Schedule I substances are defined as having no accepted medical use and include illicit substances such as heroin, LSD, and the street drug "ecstasy." [20] In addition to its illegal federal status, additional barriers to HCPs recommending MC identified in the literature include lack of formal curricula and preparation to answer questions about MC,[21,22]potential risks of substance use disorder,[23] impaired memory, attention[24] and an increase in motor vehicle accidents with use, [25] controversy regarding risks and benefits of MC,[26] studies with small sample sizes, no long-term follow-up, and appropriate controls,[27] and a lack of clarity on how it interacts with other medications.[28,29]

A clinically relevant finding from our previous Grounded Theory study of people with CNP was that participants considered their cannabis use to be "medical", if they were using it to alleviate pain, even if they were using it illegally and without a recommendation from HCP. Regardless of how it was obtained, most MC use was selectively disclosed to HCPs.[30] Key reasons for selective disclosure of MC use included: 1) fear of potential negative consequences, 2) HCPs lack of knowledge about MC, and 3) seeking reliable information about MC from informal sources. [31] Consequently, patients sought information on MC without the guidance of HCPs, which we propose reduced the opportunity for shared decision-making and meaningful conversations about risks and benefits of MC.

Purpose and Study Aims

This manuscript provides an in-depth discussion of one theme - 'Selective Disclosure of MC Use to HCPs' - identified through the Grounded Theory study of patients who use MC to alleviate symptoms of CNP. The aims of the original study have been reported elsewhere.[32] The purpose of this paper is to specifically discuss selective disclosure of MC use by patients with CNP and the relevant clinical practice implications.

Main Manuscript

Methods

Study design and participants. Details of study design and sample have been previously reported.[33] Briefly, this was a qualitative Grounded Theory study of interview data collected between 2017-2018 from twenty adult participants (n=20) with CNP who self-reported using MC as one modality to alleviate pain. Participants were recruited through a neuroscience clinic and online support groups for CNP. Semi-structured interviews, which focused on the experience of living with CNP, decision-making about MC use, and involvement of HCPs were audio recorded and transcribed verbatim. Basic demographic data were also collected.

Data Analysis. Data were analyzed by coding interview transcripts using first initial and then focused coding to define actions occurring in the data (NVIVO 13.0). Codes were compared between interviews, and common themes were developed. [34] Each theme was explored for salience, reviewed with participants and additional researchers, and "selective disclosures" was identified as a central consequence of MC use. "Selective disclosures" was explored and expanded for clinical significance.

Results

A total of 25 interviews lasting 1-2 hours were completed (5 participants were interviewed twice). Participants were between the ages of 30-65 and 30% were male.[35] A central theme, "selective disclosure" of MC use to HCPs had three main factors. A summary of the theme and associated factors, along with exemplar quotes are summarized in Table 1.

Theme: Selective disclosure. Participants selectively disclosed their use of MC to clinicians based on their personal assessment of three major factors: 1) fear of potential of negative consequences related to disclosure, 2) HCPs seen as uneducated or uninformed about MC, and 3) seeking reliable information about MC from informal sources.

1) Fear of potential negative consequences. Participants selectively disclosed their use of MC to HCPs due to their perceived fears of being "kicked out" of pain management clinics or losing access to more traditional pain therapies, such as prescription opioid medications

(POMs). They described using both MC and POMs to treat refractory CNP and feared being dismissed from pain management if urine tested positive for cannabis byproducts. Participants living in states without MC laws described being fearful of how their HCP would react, being hesitant to sacrifice relationships they had built based on mutual trust. Others also ascertained that HCPs would be unwilling or unable to offer any guidance on MC because of state MC laws deeming it illegal. There was a general desire by participants to be honest with HCPs, but often fear of losing access to POMs prevented sharing and making decisions together.

2) HCPs seen as uneducated or uninformed about MC. HCPs are typically seen as experts in medical knowledge and technical skills, but were not the expert in MC as described by participants in states with and without MC laws. The assumption that HCPs lacked knowledge resulted in participants searching for MC information from informal sources. The assumption of HCP knowledge gap was perpetuated if MC use was dissuaded.

Participants described being on a quest to seek out non-traditional therapies for CNP. They described the role of HCPs being to provide traditional medications like POMs, gabapentin, pregabalin, duloxetine, but not MC. Ultimately, those HCPs who did write a recommendation for MC (from states where it was legal), were also bypassed on any further clinical decision making because the recommendation was taken to a dispensary (business or non-profit selling MC or cannabis products) and the HCP was no longer involved in decision making.

3) Seeking reliable information about MC from informal sources. Participants described seeking reliable information about MC online, through social media based support groups, friends/family, dispensary workers, and even MC websites advertising products. The role of HCP became unnecessary because information was obtained through these informal sources.

Participants credited social media support groups as promoting MC use for CNP. Social media allowed open discussions of products that worked to alleviate symptoms of CNP. In states with legal MC laws, participants would request an MC recommendation from their HCPs to take to a dispensary. Dispensary employees provided education on the differences in route and concentrations as well as giving guidance on appropriate strains (or different varieties of MC), dose, frequency, side effects, and diagnosis specific recommendations. Many felt this valuable information helped them choose how to proceed with MC use. Participants who did not live in states with legal MC use would order recommended MC products online or buy from illegal suppliers. They described the disadvantage of being unable to choose specific MC products, but only using whatever the supplier could give them.

Discussion

This study identifies factors associated with the selective disclosure of MC use to HCPs in states without MC legalization. Three factors contributed to selective disclosures: 1) fear of negative consequences related to disclosure, 2) HCPs seen as uneducated or uninformed about MC, and 3) seeking reliable information about MC from informal sources.

Our study verifies previous findings that there is selective disclosure of cannabis use to HCPs. [36] This is consistent with literature on selective disclosure of herbal/supplement disclosure,[37] and disclosure of other illicit substances. We also verify that clinical relationships between HCPs and chronic pain patients can be complex[38] and selective disclosures can be multifactorial,[39] but ultimately results in decreased opportunities for shared decision making.[40] Shared decision making between patient and provider should include choice, options, and decision talk,[41] but if patients chooses not to disclose MC use they are taking on treatment without the guidance of HCPs.

Factors that preclude disclosure

Schedule I status. The Schedule I status of cannabis complicates the HCP-patient relationship in both states with and without MC laws. Despite state laws, cannabis is still federally illegal, and many HCPs are unclear what that means in their practice and therefore do not routinely ask specifically about MC use. If cannabis designation was changed to Schedule II, as supported by the AMA and ANA, there would be more opportunity to perform trials that would help clinicians decide whether they recommend MC in some situations, screen patients differently for MC use, or at least eliminate punitive measures.

Urine drug screenings. Urine drug testing is routine in pain management practices with the rationale that it improves medical-legal compliance, reduces regulatory scrutiny, improves documentation, prevents inappropriate patient dismissal and treatment bias.[42] Selective disclosure of MC out of fear of negative consequences was closely related to the fear of being dismissed from pain management as a result of testing positive for cannabis. Chronic pain patients on POM do not always disclose their cannabis use,[43] but it is unclear how it affects care of MC users. Elimination of urine drug screenings for cannabis could be considered unless it impacts the care provided to the CNP patient.[44]

Factors that promote disclosure

HCP openness. Patient perception that HCPs were uneducated about MC was attributed to the lack of formal training on the endocannabinoid system, MC, and lack of clear guidance from medical, nursing, or practice related organizations on how to practice under federal prohibition and state approved laws.[45,46,47] The negative consequences of selective disclosure are that MC users are not receiving a detailed risk benefit analysis as they do from their HCPs about all other medications. Furthermore, if a patient discloses their use there are unclear guidelines on how HCPs should proceed.

Become the experts. Even when participants were given recommendations for MC by HCPs, they were changed by dispensary, which could be similar to the pharmacist changing a prescription. If HCPs were the experts in the pharmacokinetics and pharmacodynamics, known drug-drug interactions and contraindications of MC use then patients would receive accurate and evidenced-based recommendations and education on the available scientific data. There are continuing medical education (CME) options for information on MC. Please see Table 2 for resources for HCPs on state MC laws, resources for HCPs.

Routine screening. There are multiple cannabis screening and assessment tools, but none are universally adopted and they are primarily to assess or screen for cannabis use disorder,[48] not MC use. HCPs routinely questions about alcohol and drug use[49], but MC users consider their use to be medical, and much like herbal supplements perhaps HCPs need to ask specific questions about MC use in order to receive an accurate response and allow for open discussions.

Clinical Implications/ Recommendations

Shared decision making involves the patient making decisions in conjunction with the HCP.[50] Patient satisfaction improves, outcomes are better, and patients are more adherent when communication is open and decision-making is shared.[51,52,53] Selective disclosure about MC use precludes an opportunity for shared decision making, excluding HCPs, and eliminating a proper risk-benefit discussion about treatment options. Opportunities to improve selective disclosures and shared decision making include 1) utilizing urine drug screenings for cannabis only if it will change the clinical decision making, 2) advocating for the rescheduling of cannabis from Schedule I to Schedule II to promote research, increase communication, and decrease confusion, 3) screening for patient MC use, and 4) seeking out educational resources on the endocannabinoid system, pharmacokinetics of cannabis, and prescribing of MC.

There are risk evaluation and mitigation strategies in place for traditional medications through the Food and Drug Administration (FDA) that could be applied to MC. This would involve strategies such as 1) having a registry of MC users, 2) close and consistent monitoring of MC users, 3) dispensing MC only at specified locations, 4) specialty certification for HCPs, or specialty training of HCPs who prescribe.[54]

MC can be confusing for HCPs because each state has different qualifying conditions for use, requirements for prescribing, routine for approval, and places for patients to buy MC. State laws can vary and while in Hawaii a patient with severe pain qualifies to grow their own MC with the approval of an HCP[55], but in Minnesota the qualifying condition 'intractable pain' must be diagnosed by a specialist in pain medicine or the system of the perceived source of pain[56], and MC can only be purchased at eight "Cannabis Patient Centers" in that state. This is just an example of the confusion that persists about MC, but there are resources to help. Please see Table 2 for a list of MC resources for HCPs. Many states have registries, but each state has different requirements making it confusing for HCPs. For example, Hawaii requires HCPs to submit the MC application, whereas Illinois requires HCPs to give patients a qualifying diagnosis certification to submit to the state. There are no standardized data collected on MC users, contributing to challenges of long-term data collection. There are also no standardized quality controls on dispensaries (across state lines), so the MC product may be inconsistent. Regardless of the different laws, there are specialty certifications for nurses, and other HCPs interested in learning more about MC. HCPs can obtain CME credits for MC education.

One strategy to increase shared decision making would be to utilize urine drug testing only when it changes clinical decision making, in accordance with the CDC recommendations. Routinely checking for cannabis constituents in urine may not be beneficial to patients with CNP, as it causes fear of losing access to POMs or threatens dismissal from pain management for disclosing MC use.

Advocating for rescheduling of MC from Schedule I to Schedule II would allow for the research required by HCPs to change practice. Many participants believed MC improves QoL, HCPs would be remiss not to dedicate time, research, and understanding to the indications, efficacy, risks, and route options of MC in order to make an educated recommendation to patients, even if that recommendation is that the risks outweigh the benefits.

Regular screening for MC use would involve adopting an existing screening and assessment tool for cannabis use disorder. To start, specifically asking patients about their use of MC may prompt them to consider MC as something the HCP is willing and able to discuss, and would open dialogue about their frequency, route, and a risk-benefit conversation. However, HCPs need to be prepared to discuss MC if patients disclose their use. Opportunities for CME can be found on Table 2.

Limitations. Our sample was homogenous as it included primarily White (n=19; 95%), females (n=14; 70%), and recruitment was predominately through online support groups for CNP (n=14; 70%), and there was selection bias with those who were willing to respond, as they were not concerned about legal ramifications. Participants self reported their medical information, which resulted in the inability to validate medical information. This analysis did not take into consideration differences between people living in states with MC laws versus those without.

Conclusions

MC use is selectively disclosed to HCPs resulting in a loss opportunity for shared decision making. Nurses and other HCPs need to take the lead in creating opportunities for increasing disclosure by eliminating the fear of dismissal from pain management for testing positive for MC, supporting and participating in continuing education for HCPs on MC, and advocate for policy change to reschedule cannabis from Schedule I to Schedule II in order to support research efforts.

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Table 1. Exemplar Quotes for Selective Disclosures

Reasons for Selective Disclosure	Participant quote
Fear of potential negative consequences	“The problem with…I don’t know if it’s everywhere, but in Maryland you have to sign a pain contract, an opioid contract, and you have random urine analysis tests and if you come back positive for cannabis you’re out.” 112 “I’m not out to lie to any doctors...I don’t want to have to feel like I’m committing a crime just to get myself functional, but I came off of 90% of my all of my medications [with MC]. I feel the more honest with them the better off you’ll be--better relationship--but it’s almost like when they hear you using medical cannabis even though it works 95% of the time, if you’re in the middle of a crisis and you need to take something via pharmaceutical pill form you cannot have both. You have to make the decision one or the other down here anyway. You can’t have both.”
HCPs seen as uneducated or uninformed about MC	“It’s a little bit weird to have to go in and explain, you know, how the marijuana works for me to a doctor because I feel like he should already know that. But when it was such a no-no for so many years I kind of understand why none of the doctors around here really knew anything about it.” “because my doctor had never done any research about the good uses for marijuana so he had absolutely no idea what direction to send me. And I just looked right at him and I said “okay, well I know a place that can help me figure all of this out and I’m headed there as soon as you give me my card.” And he said “okay” and since I was the first medical card that he had ever given out…since me and my progress he’s given out four more.”
Reliable information found through other sources	” Now if you belong to a cannabis group [online, social media based]. …. You ask a question and there’s some very knowledgeable people in that group that will come back and answer your question.

	I'll give you an example I get an edible version of caramel popcorn. In the caramel popcorn comes 55 grams of popcorn. Each kernel…on the side it'll say take 1-3 kernels as needed and it was approximately 150 milligrams of CBD and about 10 milligrams of THC and on the bottle it said that that was only supposed to last…you know how on the prescription bottle it says "should be done by" or whatever and it says this is a 12 day supply. "…the doctor prescribed a combination of THC to CBD and the dispensary changed it and gave me something different. They thought it would be better for me…They offered, let's say, nine different flavors and three different methods of administration: vaping, sub-lingual and by mouth. I chose by mouth based on the description of how the administration would work."

Table 2. Resources for Healthcare Providers on Medical Cannabis

Resource		Value	Website
National Council of State Legislators	State laws	Medical uses of cannabis State vs federal perspective State Medical Laws Limited Access Laws Deep Dive on cannabis	http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx http://www.ncsl.org/bookstore/state-legislatures-magazine/marijuana-deep-dive.aspx
Governing	State and National laws	State Cannabis Laws Up to date news on cannabis related to legal status	http://www.governing.com/gov-data/state-marijuana-laws-map-medical-recreational.html
The Medical Cannabis Institute	Course on medical cannabis	Medical Cannabis curriculum for nurses	https://themedicalcannabisinstitute.org/product/medical-cannabis-curriculum-for-nurses/
American Cannabis Nursing Association	Nurse involvement in cannabis	Local chapter meetings, discount on courses, cannabis certification	https://cannabisnurses.org
New York State Healthcare Provider Education	Medical use of marijuana	Endocannabinoids, pharmacology of cannabis, delivery and dosage of cannabis, disease specific	https://themedicalcannabisinstitute.org/scc-nys-landing-page/ or http://www.theanswerpage.com/new-york-state-practitioner-education-medical-use-marijuana.
NASEM	Health Effects of Cannabis	Free download, Current state of evidence and recommendations	http://nationalacademies.org/hmd/Reports/2017/health-effects-of-cannabis-and-cannabinoids.aspx

Chapter Six: Discussion and Conclusion

This chapter provides a summation of the dissertation's key findings and contributions to the state of the science, implications for nursing practice, policy, limitations/lessons learned, and future research. The initial phase of the dissertation research was a pilot study to explore the phenomenon of people with chronic neuropathic pain (CNP) using cannabis for pain relief, as this phenomenon had not been well described in the literature. The unpublished findings from the pilot study were used to conduct a constructivist grounded theory analysis of 20 participants with chronic neuropathic pain (CNP) who were using medical cannabis (MC), as they defined it, for pain relief.

Three manuscripts resulted from the primary research. The first manuscript (Chapter 3) was a literature review examining MC use, laws, policies, and their potential association with prescription opioid medication (POM) use and related harms. The second manuscript (Chapter 4) explored the patient experience in using MC to alleviate CNP, identify conditions that contribute to use without the oversight of healthcare providers (HCPs), and describe patient explanatory models for how MC impacts pain, quality of life (QoL), and POM use using primary data from interviews. The third manuscript (Chapter 5) specifically discussed one theme from the findings: 'selective disclosures of MC use by patients with CNP' and the relevant clinical practice implication. To integrate concepts from three manuscripts, this chapter will highlight key findings and contributions to the state of the science on MC for CNP, nursing and policy implications, limitations and lessons learned, and future research.

Key Findings & Contribution to Science

MC use allows power over pain. The conclusion developed out of this grounded theory study was that MC use was attributed to 'negotiating power over pain to gain control.' Negotiating power described the compromise that was reached by finding ways to control pain, often by stepping outside of traditional HCP pain management recommendations, and seeking out MC as an alternative treatment. The context of being dependent on POMs in the midst of an opioid crisis contributed to a sense of lost power, lost control, and dehumanization. Perceived control was obtained through decreased reliance on HCPs to provide medications. Instead MC purchased legally from a dispensary (in states with legal MC laws), or illegally in states without laws, for pain control.

MC use created a perception of control over pain, which in turn could result in a reduction in pain intensity (Vallerand, Crawley, Pieper, & Templin, 2016), and greater overall mental health (Raichle, Hanley, Jensen, & Cardenas, 2008). Control could contribute to a placebo effect (Colloca, Klinger, Flor, & Bingel, 2013), or MC could alleviate CNP because of mechanisms of the endocannabinoid system on central and peripheral nerves (Russo, 2008; Wilsey et al., 2008; Maldonado, Baños, & Canañero, 2016). MC was being used for severe pain (CBHSQ, 2016), but the phenomenon of specifically using MC to gain power over CNP had not been explained in the literature.

MC use without oversight. HCPs were unnecessary and uninvolved with participant MC use. In states where MC was legal it could be obtained from a dispensary with a “recommendation” or “certification” from a HCP. HCPs do not “prescribe” MC and were not involved in its use past the point of recommending. The recommendations, in this sample, were taken to a dispensary, where a dispensary employee selected route, dose, frequency, and discussed appropriate strains for the disease process (Haug, et al., 2016).

There are negative effects of MC such as psychosis, loss of motor coordination, and cognitive performance deficits (Volkow et al., 2014), as there are negative effects of POMs (Schiltenwolf et al., 2014; Chou et al., 2015; Krashin et al., 2016), and medications such as gabapentin, commonly used in CNP (Quintero, 2017). The comparative difference is that HCPs have the opportunity for a risk benefit discussion on the harms, side effects, alternatives, and dose manipulation in prescribed medication, but not with MC because they are essentially bypassed in these decisions. Furthermore, there was unanimous lack of or selective disclosure of MC use to HCPs by participants living in states without MC laws. Selective disclosure of MC use is documented (Chang et al., 2015), but there were three main reasons for selective disclosure in this study: 1) fear of potential negative consequences related to disclosure, 2) HCPs seen as uneducated or uninformed about MC, and 3) seeking reliable information about MC from informal sources. Factors that precluded disclosure in this sample were federal and state legal status, and the use of routine urine drug screenings by HCPs (Atluri & Sudarshan, 2003). Factors that promoted disclosure of MC use were perceptions of HCP openness, education about MC, and screening for MC use (Brooks et al., 2017). Ultimately, selective disclosure resulted in lost shared decision-making and highlighted opportunities for HCP education on MC.

MC as harm reduction strategy. MC was used as a POM reduction technique, meaning participants perceived a reduction in their POM use when they used MC. The etiology for this behavior could be because of similarities between the opioid receptor system and the cannabinoid receptor system (Bushlin, Rozenfield, & Devi, 2010), which could potentially explain why participants were able to substitute MC for pain relief and described reducing their POM dose after initiating MC. Participants in this sample generally felt POMs were unsafe, and the risk of addiction or dependence was high, and there were undesirable side effects. POM harms have been well documented, and abuse has been associated with progression to heroin. There has been a 200% increase in opioid related mortality in the U. S., and opioids were involved in over 15,000 deaths in 2015 (Rudd, Seth, David, & Scholl, 2016). The high rates of addiction and dependence in POMs could be attributable to the POM action on the reward centers in the brain that can contribute to dependence and addiction of POMs (Volkow & Morales, 2015).

There is evidence that MC is being used as a substitute for POMs (Sexton et al., 2016; Corroon et al., 2017), that there is a decrease their use of POMs while using MC (Boenke, Litinas, & Clauw, 2016; Reiman, Welty, & Solomon, 2017), decreased harms (Bachuber, Saloner, Cunningham, & Barry, 2014; Kim et al., 2016; Powell, Pacula, & Jacobson, 2015;) and decreased hospital admissions (Shi, 2017). Ultimately, MC should be considered as a harm reduction strategy (Vyas, LeBaron, & Gilson, 2018).

Nursing Implications for Practice and Education

This dissertation and its findings have important implications for nursing, and highlights ways nurses can implement change by incorporating the findings into practice.

Consider MC as harm reduction strategy. The national opioid epidemic is a public health crisis associated with the harms of POM use. Nurses are involved in prescribing (APRNs), dispensing (bedside RNs) as well as taking care of those who have complications, such as overdose or addiction, from POMs. Nurses also witness the morbidity and mortality chronic pain can cause and need to advocate for patient- centered and integrative pain management approaches (Vyas et al., 2018). This includes safe prescribing of POMs, but also consideration of MC in states where it is legal to prescribe. Consideration for weaning from POMs with the addition of MC would be important to implement as future research guides proper uses of MC.

Recognize harms of MC. The potential harms of MC cannot be overlooked and deserve the attention of nurses. There are potential complications such as respiratory disease, substance use disorder, psychiatric complications, impaired cognitive functioning, pediatric overdose, and motor vehicle operation outcomes that continue to need attention and longitudinal study (National Academies of Science, Engineering and Medicine [NASEM], 2017). Nurses also need to temper the pro-MC perspective available on the Internet with a careful risk-benefit conversation with all patients prior to use.

Promote MC research standards. This dissertation demonstrates the perception of power MC gives in CNP populations, but there are still many unanswered research questions about MC. There is limited longitudinal data on MC (NASEM, 2017). There is substantial evidence for the benefit of MC for chronic pain (NASEM, 2017), but current studies have methodological shortcomings (Andreae et al., 2015; Whiting et al., 2015; Nugent et al., 2017).

The National Institute of Health (NIH) has agreed to fund a large scale, longitudinal study addressing the impact of MC on POM use (NIH, 2017; Williams 2017), but there are other benchmarks that would promote high quality MC research. Observational and clinical studies should have standard study design, methods, data collection, and reporting techniques (NASEM, 2017). In addition, the terms used for MC should be standardized. There is confusion about the term marijuana versus cannabis, what constitutes medical use versus recreational use, and how to differentiate between the two. Standardized terminology, such as using MC only in the setting of cannabis recommended by a HCP, would promote consistent outcome reporting.

Prescribing standards. The ANA advocates for the development of specific prescribing standards for MC (ANA ,2016). Although HCPs cannot write prescriptions for MC, recommendations for specific strain, dose, route, and counseling about side effect profiles and evidence based standards for use are within the realm of nursing. Nurses need to question the appropriateness of dosing decisions being made at the dispensary and not by HCPs.

HCPs and pharmacists go through rigorous training in order to diagnose, treat, care for, and provide medication to patients in compromised conditions. The phenomenon of dispensary workers practicing a type of health care service with very little training is unlike any other practice in the U. S. Survey data of dispensary workers indicates (by self report) that they of frequently make recommendations on MC strains, route of administration, side effects, benefits, and disease specific information, but have been found to make recommendations that could exacerbate, or are ineffective for the users condition (Haug et al., 2016). All of the participants obtaining their MC from a dispensary in this dissertation study were given advice about route, dose, strains, and benefits for their disease.

Dispensary workers recommending treatments for disease processes may provide an opportunity for collaboration between the nursing and medical communities with dispensaries operating in states with legal MC laws. The opportunities for standardization for both research and practice purposes could promote HCP involvement as laws change, develop, and MC practices form in additional states. Nurses in particular should be involved in all aspects of care, as the MC market is commercially and geographically growing (Spitz, 2017). Nursing oversight would help promote patient safety and shared decision making (Glass, 2012; George, 2013).

Education and specialty certification. The endocannabinoid system should be included in educational curriculum of nurses, physicians, physician assistants and other HCPs. It would expose students to the state of the science and give opportunity for expanded understanding of MC. Pharmacokinetics and pharmacodynamics, interactions, and safety of MC should also be included, as well as signs of cannabis use disorder.

Policy Implications

There are many areas in the study indicating the need for policy improvement and the use of MC. One illustrative example of the current research barriers and policy implications can be best understood by the following outline of the barriers to MC researchers in Colorado, a state with both medical and recreational use laws.

> “As a concrete example of the impact of the divide between federal and state policy, cannabis concentrate sales doubled in Colorado from 2015 to 2016, reaching $60.5 million in the first quarter of the 2016 (Marijuana Business Daily Staff, 2016), and yet federal law prevents chemists from examining the composition of those products as it may relate to safety, neuroscientists from testing the effects of those products on the brain or physiology in animal models, and clinical scientists from conducting research on

> how these products may help or harm patients. And while between 498,170 and 721,599 units of medical and recreational cannabis edibles were sold per month in Colorado in 2015 (CDOR, 2016, p.12), federal law also prohibits scientists from testing those products for contaminants, understanding the effects of these products in animal models, or investigating the effects in patient populations."
>
> (NASEM, 2017, p.380)

Nurses should urge policy makers and funding entities to allow for investigation into MC as an adjunct and/or alternative pain management strategy. There are potential harm reduction implications for MC that requires exploration without the constraints of federal policy. The ANA and AMA have both voiced support of changing cannabis from a Schedule I to Schedule II controlled substance. Several synthetic MC- based medications have been approved in the U. S. (Badowski, 2017) and are Schedule II, but no medications have been approved for CNP. One such medication, nabiximols (Sativex) has been approved in 30 countries for spasticity and pain (in multiple sclerosis) and chronic cancer pain, but not the U. S. (GW Pharmaceuticals, 2018).

Safety of MC should be a major policy consideration. There are reports of adulteration of MC when uncontrolled by government with substances such as beads or sand (Delourme et al., 2009), microbial toxins (Taylor, 1982; McPartland, 1994), heavy metals, and pesticides, fungicides (Cohen & Ziskind, 2013) or substances intended to enhance the psychoactive effects (Russo & McPartland, 2002). There is evidence that the potency, as determined by the amount of THC, has doubled in the U.S. (McLaren, Swift, Dillon & Allsop, 2008), which can cause unwanted side effects of psychoactivity, psychosis (DiForti et al., 2009), and change brain morphology (Rigucci, Marques, DiForti, & Taylor, 2015).

Limitations and Lessons Learned

The purpose of this grounded theory study was to describe the phenomenon of MC use to alleviate CNP. The findings may not be applicable to those unwilling to disclose or discuss their MC use openly, and that population was unrepresented in this study. The sample included participants from states with and without laws allowing for the medical use of cannabis. However for all participants their use remained federally illegal, which put them at risk for disclosing their use.

The stigma and cultural context of the opioid crisis may have limited those willing to discuss their methods for pain control. Participants described the secrecy used for fear of being labeled an addict, and the sample was only made up of those willing to openly discuss their use.

The sample for this study was homogeneous, primarily Caucasian, female, and recruitment was skewed towards online support groups, which means the sample was inherently looking for support through the Internet platform. Recruitment barriers included limited access to a small number of institutional review board (IRB)-approved online support groups, inconsistent researcher presence at in-person clinic recruitment sites, IRB limitations with using the word “cannabis” during recruitment. For future studies, approval to recruit through active dispensaries, at in-person support groups, and increasing researcher presence at recruitment sites would likely increase enrollment.

This was not a review of whether or not MC was effective in alleviating CNP, but instead focused on participant perception and decision making in hopes that it was representative of a more general population. There were no controls for what types of MC participants were using, nor what type of CNP the participant reported. For example, one participant who stopped using MC because of psychogenic side effects was unable to report the ratio of THC: CBD because she purchased the substance illegally.

The accuracy of self- report for participant diagnosis was a limitation, but in some cases there was an inability to confirm accurate diagnosis. For example, during the interview if the participant said say “they tell me I may have….fibromyalgia”, there was no judgment of whether or not this was accurate. Requesting access to medical charts was not feasible for online recruitment, but more stringent and specific recruitment techniques to recruit participants from a more defined diagnosis group.

The intent was not to discuss MC misuse, substance use disorder, risks, or implications of MC use outside of participant perception. Participants reported their perception of risk, benefit, and their own ability to decrease POM use, but this was not quantitatively measured. Analysis of interview data included making assumptions about commonalities in participant’s experience, but not from a powered, or statistically significant perspective.

The participant’s experience was highly subjective and based on what they decided to divulge during the interviews. The researcher’s reflexive bias as a nurse practitioner could also contribute to making assumptions about participants based on their use of medications, MC, diagnosis, and health access. For example, a nurse practitioner might make assumptions if a participant says “I am pretty sure I have fibromyalgia, I looked up the symptoms online and I have all of them” as opposed to “I was diagnosed with fibromyalgia from my rheumatologist.”

Social media recruitment assumes a basic level of Internet access, and although routine access to the Internet is common (Ryan & Lewis, 2017), and can be a safe haven allowing people to discuss stigmatizing concepts (Rains, 2014; Keim-Malpass, Steeves, & Kennedy, 2014), there are challenges with online recruitment including younger demographic, lack of personalization (Markham & Bayn, 2009; Carmi & Zohar, 2014; Wise et al., 2016). For future studies, requesting IRB approval for multi-site recruiting would allow for more variation in the sample.

Future Research

Medical cannabis use has been stigmatized and scrutinized since the early 20th century, but there is an opportunity to harness the patient experience to move the science forward without the limitations imposed by federal policy because state laws have legalized MC use.

This study has shown that people with pain are using MC with the belief that it helps their pain and quality of life. However, there is still a paucity of strong, randomized controlled trials demonstrating statistically significant improvements. By capturing the personal experience of 20 participants I have provided an explanatory model for their reason to use MC outside of traditional pain management, with many more research questions raised in the process.

Human behavioral study. Human behavioral studies with a Schedule I substance has many federal, procedural, and institutional challenges, but there are behavioral pharmacology departments within large research universities that have approval for human subjects testing of MC. Areas for future research include human behavioral studies examining the sex differences in MC effects on pain, QoL, sleep, and anxiety. Additional human subjects testing on those same outcomes with different concentrations and ratios (tetrahydrocannabinol (THC): cannabidiol (CBD)), and routes of MC (oral/edible, sublingual, inhaled, vaporized) using large sample sizes in randomized controlled trials for appropriately powered studies. One important factor in these studies would be use MC concentrations and routes that are consistent with what is being used/purchased from dispensaries in states with legal laws.

POM use decreases with MC. The scrutiny over POM requires that nurses and other HCPs investigate other modalities for pain control. This study suggests POM use decreases with MC use, but investigation with a large, prospective, controlled trial to answer the research question ‘does POM use change with MC use?’ would allow quantification of this finding.

Nursing interventions to improve disclosure. This study suggested that patients are not disclosing MC use to HCPs regularly and offered rationale for the phenomenon. The opportunity exists for a nursing intervention to improve disclosure of MC use and answer the research question ‘does nursing intervention improve disclosure of MC use?’

Quantification of QoL improvement with MC. Participants had the perception of improved QoL with MC use, but quantification of their improvement and whether or not it was significant would move the science of MC forward. There are multiple scales for QoL measurement but utilizing an instrument specific to CNP, such as the neuropathic pain quality of life index (Poole, Murphy, & Nurmikko, 2009) in a longitudinal outcome study would allow quantification improvements. Further controlling for specific disease processes, the type (route, dose, strain) of MC and frequency of use and undesirable side effects would be helpful for future interventions or prescribing information.

Utilize online community of MC users. A wealth of information was obtained through Internet recruitment of MC users. This study focused on people with CNP, but other chronic pain etiologies also have Internet blogs and support group sites that could offer recruitment opportunities for future studies. Future studies could investigate where MC users obtained information on MC, the most common Internet homes for MC users, and analyze the quality of the information they receive. Additionally, the advice given within support groups offers insight into new techniques for obtaining and therapeutic uses of MC.

Collaboration with other specialties. There are many overlapping fields in my research, and neuropathic pain is just one type of chronic pain. Chronic pain and palliative pain relief overlaps with fields such as cancer research, palliative care, diabetes (neuropathy), HIV (neuropathy), and substance use/addiction. There is an opportunity for collaboration with other nursing specialties for investigation the use of MC for palliation of these conditions.

Perception of MC in nursing. There are data sources for inquiry into nursing perception of MC. Universities, hospitals, and clinics offer a wealth of access to ask ‘what is nurses perception of MC use’ and evaluate individual level support for rescheduling MC from Schedule I to Schedule II controlled substance. Investigation into whether adding curricula about the endocannabinoid system and therapeutic use of MC would change the perception of nurses and other HCPs would further define barriers to disclosure, stigma, and implementation of MC into practices as an alternative to POMs.

Conclusions

MC use was associated with the perception of power over pain. MC was used as a harm reduction strategy in the context of the current opioid crisis and the stigmatization of being on POMs. MC was used without the oversight or input of HCPs, especially in states without state MC laws. MC use was also selectively disclosed to HCPs. Nurses and other HCPs should take the lead in considering MC as a harm reduction strategy by promoting prescribing standards, improving disclosure of MC use, and advocating for re-scheduling of MC from Schedule I to Schedule II controlled substance to promote further research. People in pain are using MC despite its federal status, confusing state laws, and historical stigma. Nurses are considered the most trusted profession in healthcare, and can help move the science forward to create a safe, open environment for further investigation into MC use to alleviate CNP.

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