

# Medical cannabis: What nurses need to know


Nurses can help patients make smart decisions by educating themselves.

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**CANNABIS** has a long history as a medicine, in spiritual use, and for recreational use. Currently, 33 states, the District of Columbia, Guam, and Puerto Rico allow medical cannabis use under specific qualifying conditions, and 11 states (and the District of Columbia) allow adult recreational use.

Nurses frequently care for patients who use or are considering using medical cannabis. In 2018, the National Council of State Boards of Nursing (NCSBN) released guidelines for nurses who care for patients who use medical cannabis, stating, “Nurses need practical information to care for the increasing number of patients who utilize cannabis...who self-administer cannabis as a treatment for various symptomatology or for recreational purposes. Individuals are using cannabis and nurses will care for these patients.” (See *Cannabis: 6 essential principles*.)

Because cannabis science isn't taught in most nursing schools (except in the context of misuse), nurses must find information about cannabis on their own. And because health-care professionals typically possess little knowledge about cannabis therapeutics, patients frequently seek information from other patients, cannabis industry workers, and the internet. However, a recent article by Boatwright and Sperry found that 90% of the information on the top 10 cannabis websites was based on low-quality studies and only one website used a medical professional to write



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**LEARNING OBJECTIVES**

1. Describe effects of cannabinoids.
2. Compare cannabis preparations.
3. Discuss cannabis administration.

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about cannabis health claims. Finding and validating information can be challenging—proper and timely research, however, can inform clinical practice for nurses.

## The endocannabinoid system

The main function of the endocannabinoid system (ECS) is to maintain homeostasis, which makes it a unique target for medical applications. This molecular signaling system consists of cannabinoid receptors (CB<sub>1</sub> and CB<sub>2</sub> are the most common and well studied), ligands, and enzymes that regulate sleep, pain perception, memory, mood, and appetite. The receptors can be stimulated by our own endogenous cannabinoids, by plant-derived cannabinoids (phytocannabinoids), and

by synthetic cannabinoids. Ligands act as chemical messengers to get cannabinoids to interact at the receptor site, while enzymes break down cannabinoids after they've completed their function.

## Cannabinoid receptors

CB<sub>1</sub> and CB<sub>2</sub> are G-protein-coupled receptors. CB<sub>1</sub> receptors are predominantly found in the central and peripheral nervous systems, in the heart, lungs, adrenal glands, kidneys, pancreas, testes, ovaries, liver, colon, and prostate. When activated, CB<sub>1</sub> receptors can help mitigate anxiety and stress, pain and inflammation, depression, post-traumatic stress, symptoms related to multiple sclerosis, and neurodegenerative disorders. Very few CB<sub>1</sub> receptors are found in the brainstem or the cardiorespiratory centers, making a lethal dose of cannabis impossible.

CB<sub>2</sub> receptors also are found in the brain and peripheral nervous systems, but they're concentrated in the peripheral immune cells. In addition, CB<sub>2</sub> receptors are located in the lungs, uterus, brainstem neurons, and microglia. When activated, they mitigate inflammation, mental health disorders (including depression, bipolar, schizophrenia, and eating disorders), and neurologic diseases such as Alzheimer's, Parkinson's, Huntington's, and multiple sclerosis.

## Cannabinoids

Cannabinoids are chemical compounds that can influence the can-

## Cannabis: 6 essential principles

nabinoid receptors and promote the release of neurotransmitters. They include phytocannabinoids, endocannabinoids, and synthetic cannabinoids.

*Phytocannabinoids* produced by cannabis plants can activate receptors and are responsible for the medicinal and therapeutic effects of cannabis. Cannabis plants contain 100+ cannabinoids, but the most abundant and well studied are delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD). Researchers hypothesize that phytocannabinoids work better together than in isolated forms of cannabinoids. For example, CBD can enhance the medicinal benefits of THC while also reducing THC's unwanted adverse effects. (See *THC vs. CBD*.)

*Endocannabinoids* (endogenous cannabinoids) are molecules produced naturally and on demand by our own bodies. The two most researched and understood are anandamide and 2-arachidonoylglycerol.

*Synthetic cannabinoids* are created in the laboratory and are single, isolated molecules that contain no other components of the cannabis plant.

### Cannabis options

Cannabis products sold through state-licensed dispensaries can't be prescribed in the United States. Despite widespread use around the world, cannabis was effectively taxed into prohibition by the Marihuana Tax Act of 1937 and was prohibited under federal law in 1970, when it was placed in the Controlled Substances Act Schedule I category, the most restrictive of five categories. By definition, all Schedule I drugs have no medicinal value and are highly addictive. All cannabinoids found in THC-rich cannabis plants remain in Schedule I. However, the Food and Drug Administration (FDA) has approved three *synthetic* cannabinoids. (See *FDA-approved synthetic cannabinoid pharmaceuticals*.) Despite

The National Council of State Boards of Nursing has identified six principles of essential knowledge about cannabis for nurses, advance practice nurses, and nursing students.

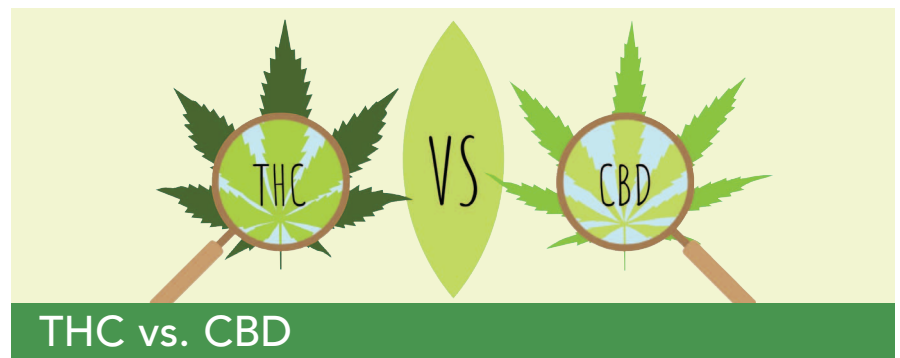
- 1 The nurse shall have a working knowledge of the current state of legalization of medical and recreational cannabis use.
- 2 The nurse shall have a working knowledge of the jurisdiction's medical marijuana program.
- 3 The nurse shall have an understanding of the endocannabinoid system, cannabinoid receptors, cannabinoids, and the interactions between them.
- 4 The nurse shall have an understanding of cannabis pharmacology and the research associated with the medical use of cannabis.
- 5 The nurse shall be able to identify the safety considerations for patient use of cannabis.
- 6 The nurse shall approach the patient without judgment regarding the patient's choice of treatment or preferences in managing pain and other distressing symptoms.

being available by prescription for decades, synthetic cannabinoid preparations have not led to any black market or addiction treatment issues.

### Epidiolex

In 2018, the FDA approved Epidi-

olex, an oral solution of plant-derived CBD. It's approved for treating seizures in Lennox-Gastaut and Dravet syndromes in patients 2 years old and older. Dosages start at 2.5 mg/kg twice daily and can be titrated up to 20 mg/kg/day.



The most commonly studied phytocannabinoids are delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD). The two have important differences and similarities.

*THC* is the most abundant cannabinoid in the cannabis plant and produces euphoric, psychoactive effects that influence mood, consciousness, and behavior. Research shows that THC is effective for treating conditions that cause pain, nausea, appetite loss, insomnia, inflammation, and post-traumatic stress. Side effects are dose dependent and can include hypotension, hallucinations, tachycardia, central nervous system depression, euphoria, dizziness, drowsiness, somnolence, confusion, new or worsening nausea and vomiting, and seizures. THC also can lead to substance use disorder.

*CBD* is the second-most abundant cannabinoid found in the cannabis plant. Both THC and CBD are mood-altering substances, which makes them psychoactive, but THC's psychoactivity is more likely to cause impairment. CBD has been shown to improve mood by decreasing anxiety and depression and is effective for treating nausea and vomiting; seizure, inflammatory, and neurodegenerative disorders; and pain. CBD also has been shown to cause apoptosis in various cancer cell lines. Side effects associated with CBD are dose dependent and can include dizziness, anxiety, diarrhea, jitteriness, decreased appetite, hepatocellular injury, somnolence and sedation, and suicidal ideation.

## FDA-approved synthetic cannabinoid pharmaceuticals

The U.S. Food and Drug Administration (FDA) has approved the following synthetic delta-9-tetrahydrocannabinol (THC) formulations for medical use.

	Indications	Dosage	Side effects
<b>Dronabinol</b> (Schedule III)	<ul style="list-style-type: none"> <li>• Anorexia in patients with AIDS</li> <li>• Nausea and vomiting associated with chemotherapy in patients for whom conventional treatment has failed</li> </ul>	2.5 mg to 10 mg, three to four times daily	<ul style="list-style-type: none"> <li>• Hypotension</li> <li>• Tachycardia</li> <li>• Central nervous system depression</li> <li>• Euphoria</li> <li>• Dizziness</li> <li>• Drowsiness</li> <li>• Somnolence</li> <li>• Confusion</li> <li>• New or worsening nausea and vomiting</li> <li>• Seizures and seizurelike activity</li> <li>• Substance misuse</li> </ul>
<b>Dronabinol oral solution</b> (Schedule II)	<ul style="list-style-type: none"> <li>• Same as dronabinol</li> </ul>	2.1 mg to 4.2 mg, four to six times daily	Same as for above dronabinol
<b>Nabilone</b> (Schedule II)	<ul style="list-style-type: none"> <li>• Nausea and vomiting associated with chemotherapy in patients for whom conventional treatment has failed</li> </ul>	1 mg to 2 mg, two to three times daily (no more than 6 mg per day)	<ul style="list-style-type: none"> <li>• Tachycardia</li> <li>• Orthostatic hypotension</li> <li>• Dizziness</li> <li>• Drowsiness</li> <li>• Hallucinations</li> <li>• Ataxia</li> <li>• Substance misuse</li> </ul>

Epidiolex is approved as a Schedule V drug (the least restricted of the five categories and includes drugs with low potential for misuse). Side effects include hepatocellular injury, somnolence, sedation, and suicidal ideation.

### Nabiximols

Nabiximols, a cannabis plant-derived oral mucosal spray, is a delta-9-THC and CBD 1:1 formulation (each spray is 2.7 mg THC and 2.5 mg CBD). Nabiximols isn't available in the United States, but it's been approved in 25 countries for multiple sclerosis spasticity. Dosages range from two sprays up to 12 sprays daily. Side effects include tachycardia; transient alterations in blood pressure; dizziness; mood, memory, and coordination changes; and it has the potential for misuse.

### Hemp

In December 2018, the Agricultural Improvement Act ("Farm Bill") legalized hemp and defined it as any part of the *Cannabis sativa* L. plant, including cannabinoids. These changes

removed hemp from restrictions under the Controlled Substances Act.

Many hemp-derived CBD products are available for purchase on the internet; in health food stores, pet food stores, and gas stations; and at many other retail locations. Conflicting federal laws have led to debate about the legality of these products; however, hemp-derived products in the United States remain unregulated. Without oversight, the products may contain toxins or be mislabeled. The *Journal of the American Medical Association* released a study by Bonn-Miller in 2017 that found 70% of CBD products were mislabeled. The study included vaporizer cartridges and tinctures and found that 42% contained more CBD than advertised and 26% contained less than advertised. Consumers should purchase only products with a certificate of analysis from a third-party testing facility. (See *Buyer beware.*)

The U.S. Department of Agriculture doesn't anticipate providing the regulations that oversee the Farm Bill until 2020, leaving patients and consumers with little pro-

tection and allowing product manufacturers complete autonomy when marketing their products. Consumer health and safety are at risk until these products are subject to a compliance pathway.

### Cannabis administration

Cannabis products can be administered via various routes, including topical, transdermal, inhalation, sublingual, and ingestion. Understanding the onset and duration of action can help patients determine which route will effectively treat their symptoms. Unfortunately, the products available to patients depend on their state's cannabis laws, and many state cannabis programs severely limit the product and formulation options.

### Topical

Topical administration can provide quick, localized relief with little to no side effects. Unless the skin is broken, topicals typically don't reach the bloodstream. When activated, CB<sub>1</sub> receptors on the skin can help reduce redness and inflammation as-



## Buyer beware

Cannabis plants (including hemp) are bioaccumulators that absorb contaminants and pollutants from the soil and environment. Heavy metals, pesticides, and other toxins may be present in the plant and when extracted or concentrated can be detected in the final product. Cannabis product testing requirements vary from state to state, so check with your state's cannabis regulatory agency to understand specific testing requirements.

### Patient education

Explain to patients that because the hemp industry isn't regulated, they should review the certificate of analysis (COA) for any over-the-counter cannabidiol products they purchase. The COA must include testing for:

- potency
- pesticides
- molds
- residual solvents
- heavy metals
- mycotoxins.

Also explain that any vape products they use should be free of flavoring agents or other petroleum-derived additives (such as propylene glycol). These additives haven't been studied for inhalation. Remind patients that more research is needed to better understand vaping as a delivery method because there have been multiple reports associated with lung injury. Check the Centers for Disease Control and Prevention website for updated information.

sociated with conditions like atopic and contact dermatitis and psoriasis. Topical cannabis also has been shown to reduce pain and inflammation associated with arthritis. A study by Stinchcomb and colleagues reported that CBD can penetrate the skin 10 times more effectively than THC because it's slightly more water soluble.

Patients have reported pain relief from topicals for muscle spasms and tightness, joint pain, burns, itching, and peripheral neuropathy. Onset of action generally occurs within 10 minutes and can last 2 to 3 hours. Topical cannabis products are ideal for patients who need lo-

calized relief; they might be less beneficial to patients who have more generalized conditions.

### Transdermal

Transdermal cannabis products (typically patches) take effect within 1 hour and can provide between 8 and 12 hours of relief while avoiding first-pass metabolism. In patients where drug interactions or medication adherence is a concern, transdermal products can be the best administration route.

### Inhalation

Inhalation provides rapid relief, reaching the bloodstream within

minutes. Patients suffering from conditions that vary in intensity can benefit from this route because it provides nearly immediate relief, is the most predictable of administrations, and is the easiest to control. It also is preferable for patients who can't ingest other forms of medications.

You must assess the patient to determine if the risks of inhalation outweigh the benefits, but an extensive review of the medical literature by the National Academies of Sciences, Engineering, and Medicine determined that smoking cannabis doesn't lead to increases in lung, head, or neck cancers.

### Sublingual

Sublingual applications can be an option for patients who can't inhale. They take effect within 15 minutes and last 2 to 3 hours. However, many sublingual products are oil-based and might not absorb quickly into the mucosa, thereby following the pattern of ingestion and delaying onset by 1 to 2 hours. With oil-based sublingual products, patients should be advised to wait a full 2 hours before repeating the dose to avoid any potential adverse effects that can occur with over-ingesting cannabis.

### Ingestion

Ingesting cannabis can provide longer-lasting relief than other administration methods and is ideal for patients who suffer from chronic pain, inflammation, nausea, and insomnia. A major disadvantage to ingestion is the variability in onset of action. Depending on the patient's metabolism, genetics, gender, and food intake, the onset of action can range from 30 minutes to 2 hours (and sometimes longer). The effects, however, can last for 5 hours or more. Because of this unpredictability, patients can more easily overconsume and experience adverse effects, such as tachycardia, paranoia, hypotension, vomiting, and even hallucinations. To avoid overconsumption, patients should

## Resources for nurses

Use these resources to learn more about medical cannabis and patient care:

- **American Cannabis Nurses Association** uses advocacy, collaboration, education, research, and policy development to support cannabis nursing practice. [cannabisnurses.org](http://cannabisnurses.org)
- **Americans for Safe Access** is dedicated to ensuring safe and legal access to cannabis for therapeutic use and research. [safeaccessnow.org](http://safeaccessnow.org)
- **Healer** is an online support community for patients using medical cannabis. [healer.com](http://healer.com)
- **Project CBD** is a nonprofit in California dedicated to promoting and publicizing research into medical cannabidiol use. [projectcbd.org](http://projectcbd.org)
- **Society of Cannabis Clinicians** provides continuing education, facilitates best practices, and conducts research related to medical cannabis. [cannabisclinicians.org](http://cannabisclinicians.org)

For more resources, visit [americannursetoday.com/?p=58596](http://americannursetoday.com/?p=58596).

be advised to “start low and go slow,” waiting at least 2 hours before repeating a dose. Also, patients must know how to read the labels and understand serving sizes of the products they ingest.

### Drug interactions

Although drug interactions with cannabis are rarely dangerous, review the patient’s medication and supplement list to ensure no contraindications exist before beginning cannabis therapy. Most interactions occur with ingested cannabinoids.

When taken orally, cannabinoids are metabolized by the CYP family of enzymes. THC is commonly metabolized by the CYP2C9, CYP2C19, and CYP3A4 enzymes, which convert THC into 11-hydroxy-THC (11-OH-THC). CBD is commonly metabolized by the CYP2C19 and CYP3A4 enzymes, which convert CBD into 7-hydroxy-cannabidiol (7-OH-CBD). Because most medications are metabolized by the CYP3A4 enzyme, CBD and THC can inhibit or induce other medications metabolized through that same enzyme. Also, some medications, such as warfarin, can inhibit or induce THC and CBD, increasing or decreasing cannabinoid plasma levels.

Because cannabis can produce sedative effects, it should be used with caution with other central nervous system depressants, including alcohol. Monitor patients throughout cannabis therapy to ensure safety and treatment adherence and to reduce potential interactions.

### Assessment and dosing

For patients using medical cannabis, perform a systems assessment and thorough health history that includes a review of past treatments, comorbidities, previous cannabis experience, medication and supplement reconciliation, food and medication allergies, physical assessment, and risk for substance use disorder and psychiatric disorders.

Work collaboratively with the patient to determine his or her goals and encourage initially focusing on a single condition (which can decrease variables and improve adherence). Your nursing care plan should facilitate the patient’s goals while decreasing potential adverse effects and maximizing outcomes. Teaching patients how to read and understand product labels will help them better understand dosages and enable them to independently self-titrate their medicine. The more information the patient records (such as the route, dosage, time of administration, length of action, and effect), the more you can help him or her improve outcomes.

A typical cannabinoid serving size can range from 5 mg to 10 mg (10 mg might be too high for a cannabis-naïve patient), but the general cannabis protocol of “start low and go slow” is widely accepted. No established national dosage protocols exist for specific conditions. And because of federal cannabis laws, don’t recommend specific dosages to patients.

Cannabis dosing remains a challenge, but some providers have developed best practices. For example, Dustin Sulak, DO, of Healer.com provides patient education materials on tincture and inhalation dosages

to guide patients on where to start. Everyone is different, so responses to cannabinoid dosages will vary from person to person, medicine. The more information the patient records (such as the route, dosage, time of administration, length of action, and effect), the more you can help him or her improve outcomes. Also, cannabis has biphasic properties, producing one effect at a low dose and an opposite effect at a higher dose. Adverse effects from cannabis frequently depend on dose, and larger doses can exacerbate symptoms like anxiety, insomnia, and pain.

### Learn more

As cannabis legalization continues to gain momentum, more patients will want to explore it as a medicine. Nurses must learn about the ECS, cannabinoids, routes of administration, potential drug interactions, and clinical implications to better serve patients. ★

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**Please mark the correct answer online.**

**1. Which of the following are chemical messengers that cause cannabinoids to interact at a receptor site of the endocannabinoid system?**

- a. Ligands
- b. Enzymes
- c. Proteins
- d. Microglia

**2. Which of the following break down cannabinoids after they've completed their function?**

- a. Ligands
- b. Enzymes
- c. Proteins
- d. Microglia

**3. CB<sub>2</sub> receptors are**

- a. found in the liver, colon, and prostate.
- b. most prevalent in the brainstem.
- c. not found in the peripheral nervous system.
- d. concentrated in the peripheral immune cells.

**4. Which statement about types of cannabinoids is correct?**

- a. Synthetic cannabinoids are created in the laboratory and are made up of clusters of four molecules.
- b. Phytocannabinoids are molecules produced naturally and on demand by our own bodies.
- c. The most common phytocannabinoids are delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD).
- d. The most researched synthetic cannabinoids are anandamide and 2-arachidonoylglycerol.

**5. Which statement about the classification of cannabis in the United States is correct?**

- a. Cannabis products sold through state-licensed dispensaries can be prescribed.
- b. The Food and Drug Administration (FDA) has not approved any form of cannabinoids.
- c. All cannabinoids found in cannabis plants are classified in the Schedule I category.
- d. Prescription of plant-based cannabis has been prohibited since 1910.

**6. Which has been approved by the FDA for treating seizures in Lennox-Gastaut and Dravet syndromes in patients 2 years old and older?**

- a. Nabiximols
- b. Epidiolex
- c. Hemp
- d. THC

**7. The maximum dose of nabilone is no more than**

- a. 2 mg per day.
- b. 4 mg per day.
- c. 6 mg per day.
- d. 8 mg per day.

**8. The FDA has approved which synthetic delta-9-THC as a Schedule III agent?**

- a. Epidiolex
- b. Nabilone
- c. Nabiximols
- d. Dronabinol

**9. Which statement about hemp products in the United States is correct?**

- a. Hemp-derived products are unregulated.
- b. Hemp-derived products are well regulated.
- c. Only a small percentage of hemp products are mislabeled.
- d. Selling of hemp-derived products is illegal.

**10. The cannabis plant-derived oral mucosal spray that has been approved in other countries (but not the United States) for multiple sclerosis spasticity is**

- a. dronabinol.
- b. nabilone.
- c. Nabiximols.
- d. Epidiolex.

**11. Transdermal cannabis products typically take effect within**

- a. 30 minutes.
- b. 1 hour.
- c. 90 minutes.
- d. 2 hours.

**12. Sublingual cannabis products usually last**

- a. 30 to 45 minutes.
- b. 2 to 3 hours.
- c. 6 to 8 hours.
- d. 8 to 10 hours.