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MANAGING 7-HYDROXYMITRAGYNINE USE DISORDER WITH BUPRENORPHINE-NALOXONE

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Managing 7-Hydroxymitragynine Use Disorder with Buprenorphine-Naloxone

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Abstract

Kratom, a plant native to Southeast Asia, is legal in Hawai'i and is used for many purposes including pain relief and opioid withdrawal. Kratom contains many alkaloids with mitragynine being the most abundant. 7-hydroxymitragynine, one of the minor alkaloids in kratom, is approximately 46 times more potent than mitragynine. In recent years, 7-hydroxymitragynine has been available online and in Hawai'i vape shops where any individual can purchase it. In July 2026, due to its negative side effects, including substance use disorder development, the United States Drug Enforcement Administration announced its intent to temporarily placing 7-hydroxymitragynine under schedule I; kratom, which contains 7-hydroxymitragynine, remains uncontrolled. This case describes a patient with a history of getting off illicit opioids using kratom who developed tolerance and transitioned to 7-hydroxymitragynine. The patient believed 7-hydroxymitragynine, a "natural" plant product, was safe. She eventually also developed tolerance to 7-hydroxymitragynine, spending approximately \$150 per day. This financial burden affected her mental health and contributed to the development of suicidal ideation. In the hospital, her withdrawal symptoms from 7-hydroxymitragynine were similar to opioid withdrawal. She was managed with buprenorphine-naloxone, requiring 40mg-10mg per day to control her cravings. This case highlights the adverse effects of 7-hydroxymitragynine and demonstrates the successful treatment of 7-hydroxymitragynine withdrawal and substance use disorder (specifically 7-hydroxymitragynine) with high-dose buprenorphine-naloxone. Although the temporary scheduling of 7-hydroxymitragynine may limit its availability, other psychoactive botanical products may emerge as alternatives. Therefore, clinicians are recommended to routinely inquire about patients' use of botanical supplements in addition to illicit substances.

Introduction

Kratom, also known as *Mitragyna Speciosa*, is a legal botanic substance in most of the United States (US), including Hawai'i.^{1,2} Although used for centuries in Southeast Asia, kratom is classified under "drugs of concern" by the US Drug Enforcement Administration (DEA) because of its potential for negative effects such as overdose and dependence.^{3,4} Kratom acts on various opioid receptors and

has opioid-like properties, but at low doses, it acts as a stimulant.⁵ Some common uses of kratom include recreation, pain management, and opioid withdrawal.⁶ The most recent data from the 2021 National Survey on Drug Use and Health estimated 0.6% (1.7 million) of Americans 12 years and older have used kratom in the past year.⁷ Kratom sales are increasing and in 2024, kratom had \$441,408,984 in sales, increasing 21.9% since the previous year.⁸

Kratom contains many alkaloids, with mitragynine being the most abundant.^{6,9} According to Cinosi et al, kratom is estimated to be composed of 66% mitragynine.⁶ 7-hydroxymitragynine, a 2% minor alkaloid of kratom, is approximately 46 times and 13 times more potent than mitragynine and morphine, respectively (please see [Table 1](#) for currently known differences between kratom and 7-hydroxymitragynine products).^{6,10} In recent years, 7-hydroxymitragynine, also known as 7-OH, has been available in local vape shops in Hawai'i and any individual can purchase 7-hydroxymitragynine.² It is also available online and comes usually in the forms of tablets and shots.^{1,2,11} One serving according to the manufacturer is usually less than 10mg however in some cases, it is more. The recommended dose also varies depending on the company.¹¹ Since it is a "plant" product, people who use kratom or 7-hydroxymitragynine (or come across it in the store) may think that these substances are safe.

Literature searches show some case reports / series of patients taking kratom who develop kratom use disorder and are treated with buprenorphine-naloxone.¹² While these prior cases provided treatment insight into kratom use disorder, to our knowledge, as of 6/2025, there are no case reports on patients taking just 7-hydroxymitragynine.^{12,13} The authors report a case of a patient who initially used kratom but later switched to 7-hydroxymitragynine after developing tolerance to the effects of kratom. Using DSM-5 criteria, she was diagnosed with "other substance" use disorder, specifically 7-hydroxymitragynine, and was treated successfully with high doses of buprenorphine-naloxone.

Case Presentation

A houseless woman in her early 20's with a history of polysubstance use (illicit opioids, kratom, and 7-hydroxymitragynine) was admitted due to suicidal ideation. She reported using illicit opioids in the past; however, she was not forthcoming about the exact use or treatment she tried. Two years prior to admission, she was introduced to oral kratom by her friend as a means of discontinuing illicit opi-

oid use. This worked, but her kratom dose quickly increased until she was taking approximately 60g per day and sometimes more. One year prior to admission, the patient recognized that kratom was no longer effective and subsequently started to use oral 7-hydroxymitragynine. Initially, the patient was taking 75mg per day, but she developed tolerance quickly and consumed up to 600mg per day (spending approximately \$150 per day) a few weeks prior to admission to avoid withdrawal symptoms. Per the patient, most of her days leading up to admission were spent consuming 7-hydroxymitragynine to avoid withdrawal symptoms; each dose (15 mg tablet) provided only about 20 minutes of relief before withdrawal symptoms gradually returned. She purchased the 7-hydroxymitragynine tablets from a local vape shop. During this time, she was unable to work or do other activities. She reported that her use of 7-hydroxymitragynine led to financial burden, anxiety about the use, and ultimately culminated in hopelessness and suicidal ideation. Using DSM-5 criteria, the patient met the criteria for “other substance” use disorder, specifically, 7-hydroxymitragynine. The patient’s physical exams were within normal limits. She had no skin lesions or needle marks on her arms or legs. Her lab tests were all within normal limits. She was admitted to the psychiatric ward.

On the day of admission, her Clinical Opiate Withdrawal Scale (COWS) was 5 (mild opioid withdrawal), however her COWS quickly worsened by the second hospital day ranging from 12-16 (moderate opioid withdrawal).¹⁴ She was diagnosed with withdrawal from 7-hydroxymitragynine and was treated with buprenorphine-naloxone by the addiction medicine team. She was initially given buprenorphine-naloxone 2mg-0.5mg (for 2mg buprenorphine – 0.5 mg naloxone) every 2 hours as needed for withdrawal, up to 12 doses (24mg-6mg per day). Her COWS came down to 2 after taking total of 4mg-1mg; however, she was encouraged to take as much as she needed to control her cravings. The patient informed the team that she wanted to limit her buprenorphine-naloxone use because she wanted to stop taking all substances, including buprenorphine-naloxone, as soon as possible. Counseling and education, including duration of treatment for buprenorphine-naloxone, were given. On the 2nd hospital day, she took total of buprenorphine-naloxone 10mg-2.5mg. The patient’s buprenorphine-naloxone doses increased steadily throughout the hospitalization despite the low COWS. She understood the importance of controlling her craving to avoid relapse, especially leading to illicit opioid use. By the 6th hospital day, her dose stabilized at buprenorphine-naloxone 40mg-10mg per day with no craving and was discharged on the 8th hospital day to a community substance treatment program and was continued on buprenorphine-naloxone as outpatient. See [Table 2](#) for buprenorphine-naloxone doses taken by the patient.

Supportive medications were provided as needed to manage withdrawal symptoms. The patient was offered various medications, including ondansetron 4-8mg every 8 hours as needed for nausea and vomiting, ibuprofen 600mg every 6 hours as needed for muscle aches / pain, and loperamide 2mg every 2 hours as needed for diarrhea (maxi-

mum 16mg per day). The use of these medications was minimal.

Discussion

This case supports using higher doses of buprenorphine-naloxone to manage 7-hydroxymitragynine use disorder / withdrawal. Per history, the patient used kratom to discontinue illicit opioid use. A year later, due to ineffectiveness of kratom, she transitioned to 7-hydroxymitragynine and quickly developed tolerance spending \$150 per day, leading to financial stress which affected her mental health and contributed to the development of suicidal ideation.

The clinical presentation of this patient was characterized by classic opioid withdrawal symptoms such as an increase in heart rate, upset stomach, tremor, restlessness, irritability, bone pain, joint aches and piloerection, which supported similarities in withdrawal between kratom alkaloids and traditional opioids. Interestingly, this patient did not exhibit rhinorrhea, yawning, or mydriasis, which are symptoms seen in opioid withdrawal. Although there are still many unknowns about kratom / 7-hydroxymitragynine, Smith et al, surveyed those who use kratom and found common kratom withdrawal symptoms included anxiety, irritability and low energy while other typical symptoms seen in opioid withdrawal, such as rhinorrhea and tearing were not as common.¹⁵ Her withdrawal was relieved with buprenorphine-naloxone, which demonstrates promise in treating patients with withdrawal symptoms from 7-hydroxymitragynine. When compared to other kratom use disorder patients, this patient needed a higher dose of maintenance buprenorphine, 40mg-10mg per day, to control cravings.^{12,13} This difference may be partly explained by the pharmacology of 7-hydroxymitragynine being more potent than mitragynine as well as her year-long daily use of 7-hydroxymitragynine. Being a “natural” plant product like kratom, 7-hydroxymitragynine may lead to the perception that it is a “safe” substance. This was evident in this patient, who believed 7-hydroxymitragynine was safe and was not aware of the negative effects, including the risk of developing dependence. This case also highlights an issue with a patient’s self-directed transition from illicit opioids to kratom, and then to 7-hydroxymitragynine as a harm-reduction attempt, which led her to developing a new substance use disorder.

On July 15, 2025, the Food and Drug Administration (FDA) issued warning letters to firms marketing products containing 7-hydroxymitragynine, claiming 7-hydroxymitragynine cannot be lawfully added to conventional foods.¹⁶ Approximately one year later, the DEA announced its intent to temporarily place 7-hydroxymitragynine in Schedule I, effective August 5th, 2026, making it an illegal controlled substance.¹⁷ However, kratom, which naturally contains 7-hydroxymitragynine, remains uncontrolled.⁴ Although the temporary scheduling of 7-hydroxymitragynine may limit its availability, other psychoactive botanical products may emerge as alternatives. Therefore, the authors recommend clinicians to routinely inquire about pa-

Table 1. Currently Known Differences Between Kratom and 7-Hydroxymitragynine Products^{6,9,10,17}

Characteristic	Kratom	7-hydroxymitragynine
Number of alkaloids	Over 50 alkaloids	Usually only 7-hydroxymitragynine
Prominent alkaloid	Mitragynine (66% of kratom plants)	7-hydroxymitragynine
% of 7-hydroxymitragynine	≤ 2%	Usually only 7-hydroxymitragynine
Natural vs synthetic	Usually natural	Mostly synthetic
Effect on Mu opioid receptors	Partial agonist	Data suggests it acts as a full agonist
Respiratory Depression	Appears to have minimal responsibility toward respiratory depression	More than 3-fold greater potency than morphine.
Potency compared to morphine	Since 7-hydroxymitragynine is 46 more time stronger than mitragynine, kratom may be approximately 0.3 times the potency of morphine from simple calculation (13/46 = 0.28)	13 times stronger than morphine
Legality in Hawai'i	Legal	It will be illegal starting August 5 th 2026
Reversed by naloxone	Yes	Yes
Symptoms of Withdrawal	Similar to opioid withdrawal	Similar to opioid withdrawal
Current Treatment for Withdrawal / Use Disorder	Buprenorphine-naloxone	Buprenorphine-naloxone
Treatment Dosages of Buprenorphine-naloxone	Doses recommended by Weiss et al: range of 4-1mg to 16-4 mg depending on the daily dose of kratom.	In this case report, at 4-1 mg, COWS came down to 2, however required 40-10 mg to control craving.

Table 2. Patient Buprenorphine-naloxone Regimen, Amount Used, and Clinical Opiate Withdrawal Scale (COWS) Score by Day

Day	Regimen	Total buprenorphine-naloxone dose required	COWS score
Day 1	Admitted to the psychiatric ward. No buprenorphine-naloxone given	None	5
Day 2	Buprenorphine-naloxone 2mg-0.5mg q2h PRN for withdrawal, maximum 24mg-6mg per day	10 mg - 2.5mg	12-16 (prior to initiation) 2 (after 4mg-1mg)
Day 3	Buprenorphine-naloxone 8mg-2mg daily + 2mg-0.5 mg q2h PRN for subjective withdrawal, maximum 32mg-8mg per day	22 mg - 5.5mg	COWS score not done - patient was treated for subjective withdrawal, including craving
Day 4-5	Buprenorphine-naloxone 8mg-2mg TID + 2mg-0.5mg q4h PRN for subjective withdrawal, maximum 36mg-9mg per day	36 mg - 9mg	COWS score not done - patient was treated for subjective withdrawal, including craving
Day 6-8	Buprenorphine-naloxone 16mg-4mg QAM + 8mg-2mg at lunch + 16mg-4mg QHS	40 mg - 10mg	2-4 (Day 6)

PRN = *Pro re nata* (as needed), QAM = *quaque die ante meridiem* (every morning), QHS = *quaque hora somni* (every night at bed time), TID = *Ter in die* (three times a day)

tients' use of botanical supplements in addition to illicit substances.

Limitations

The limitations for this study are that this is a case report of a single patient with 7-hydroxymitragynine use disorder who responded well to this treatment protocol, which restricts the generalizability of the findings. Outcomes may differ across different patterns of 7-hydroxymitragynine use or withdrawal severity. Additionally, there is no standardized treatment protocol for kratom or 7-hydroxymitragynine use disorder, leaving clinicians to extrapolate from the limited data available. Furthermore, the unregulated nature of kratom products means that potency and purity can vary widely, which makes clinical responses to pharmacotherapy less predictable. Finally, while the patient reported symptomatic relief and underwent successful buprenorphine-naloxone induction, longer-term outcomes were not assessed. Further research is warranted to establish evidence-based protocols and long-term outcomes.

Patient consent

Our institutional board review had determined that this was a non-human research project. Information in this report has been de-identified to protect anonymity.

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Survey of the Availability of Neurology Services on Hawai'i Island

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Abstract

Patients in rural communities face significant health disparities including disparities in many subspecialties of medicine. Hawai'i Island is a largely rural island and is the second most populous island in the state of Hawai'i. Of the identified physician shortages across the state, neurology ranks among the highest on Hawai'i Island. Given this shortage, this study sought to assess Hawai'i Island primary care physicians' perceptions and experiences with accessing and delivering neurological care. Physicians practicing on Hawai'i Island were sent an anonymous online survey between April 2025 and September 2025 assessing need for neurology care. To ensure that only primary care physician responses were recorded, eligibility for the survey was determined by whether respondents indicated they were a currently practicing primary care physician on Hawai'i Island in the first question. Of the 28 eligible respondents, 19 (68%) reported that 10-50% of their patients have neurological complaints or diagnoses. Twenty respondents (71%) reported that they may decline to refer to a neurologist due to difficulties accessing neurological care. Respondents varied in their comfort with managing neurological conditions, preferring to refer to a neurologist for neuromuscular and movement disorders, epilepsy/seizures, and multiple sclerosis, while preferring to self-manage back pain, headaches/migraines, and dizziness/vertigo. Neurological patients comprise a large percentage of the patients that Hawai'i Island primary care physicians see and, because of shortages, patients may not be receiving necessary neurological care. Long-term efforts should be focused on increasing accessibility to neurological care on Hawai'i Island.

Abbreviation List

ALS = amyotrophic lateral sclerosis

EEG = electroencephalogram

EMG = electromyogram

PCP = primary care physician

SD = standard deviation

BACKGROUND

Rural communities face significant health disparities, often experiencing higher rates of chronic diseases and mortality.^{1,2} Disparities in various measures are found in rural populations compared to their urban counterparts, even across specialties of medicine, including cancer care and

outcomes,^{3,4} cardiovascular health,⁵ obstetric/maternal health,⁶ mental health,^{7,8} and surgical care.⁹ These disparities have been studied across different rural settings in the continental United States.

However, the geography of the state of Hawai'i, the only fully island state in the United States, poses unique challenges for its rural communities in accessing specialized care. Specialty care is often received in Honolulu County, on the island of O'ahu, which requires air travel or access to telemedicine if the resident resides on a neighbor island. Hawai'i County, which encompasses the entire Island of Hawai'i, is the largest county by total land area, the second most populous county in the state, and the most physically distant county from Honolulu County. State data characterizes most of the county as rural: about 99% of the county's total area is considered rural and nearly 60% of its residents live in rural areas.¹⁰

An annual report to the state legislature identifies physician shortages across the state of Hawai'i. Among those listed under "Other Specialties", neurology ranks highest in terms of shortage on Hawai'i Island. Specifically, there exists a high need for adult and pediatric neurologists on Hawai'i Island with an estimated shortage of 83% and 100%, respectively.¹¹ With the exception of a recent study comparing rural and urban prescription patterns for Parkinson's Disease patients in Hawai'i,¹² the delivery of neurological care in the state's rural communities remains largely unclear. This prompted the study team to conduct a survey to assess Hawai'i Island physicians' current perceptions of access to, quality of, and challenges regarding neurological care on the island.

METHODS

An online survey was conducted from April 2025 to September 2025. Eligibility for the survey was based on whether the respondent was a current practicing primary care provider (PCP) on Hawai'i Island. This was determined by the respondent's answer to the first item of the survey, which asked if they were a current practicing PCP on Hawai'i Island. Respondents who answered "No" were automatically sent to the end of the survey and were excluded from further participation. Only respondents who answered "Yes" to current PCP status were allowed to progress to the rest of the survey for completion. Hawai'i Island physicians were sent the survey link via email communication. Email invitations containing the survey link were distributed by a third party using a regular email newsletter sent to physicians throughout the state. Study investigators did not have

access to the newsletter distribution list and were therefore unable to determine the total number of physicians who received the survey link. There was a total of 12 survey questions for eligible participants to complete after the first item.

The survey included 11 multiple choice questions regarding practice and 1 open-response question. The survey questions were developed by the study investigators based on the objectives of the study. It did not undergo formal validation prior to distribution. Multiple choice questions were summarized. Open-ended responses were analyzed thematically, grouped, and tabulated by the authors. Both authors reviewed the open-ended responses, identified recurring concepts, and grouped responses with similar ideas into preliminary themes. Responses were only included if they contained interpretable text that described a potential change in practice. Responses that were blank or non-specific (eg, “Yes”, “No”, N/A”) were excluded from thematic categorization. The remaining responses were categorized into 4 themes: Improved Access to Care, Improved Quality of Care, Reduced PCP Clinical Burden, and Reduced Patient Burden. Because respondents could discuss multiple ideas in their answers, individual responses may have been assigned more than 1 theme. Responses were presented verbatim except for minor edits to correct for spelling, punctuation, or grammatical errors. Clarifying words were added in brackets where necessary to preserve meaning; ellipses denote omitted words. Responses, edits to quotations as described above, and their assigned thematic categories were reviewed and agreed upon by both investigators to ensure accuracy. The study was reviewed and approved by the University of Hawai‘i Institutional Review Board and determined to be exempt from federal regulations pertaining to the protection of human research participants (Protocol number: 2025-00010).

RESULTS

Patient Population Characteristics

A total of 32 Hawai‘i Island physicians responded to the survey. Four respondents were excluded because they were not practicing PCPs on Hawai‘i Island. The remaining 28 respondents were practicing PCPs on the island and completed the survey. Based on the estimated supply of PCPs on Hawai‘i Island,¹¹ the response rate for this survey was approximately 22%.

Respondents were asked to indicate the proportion of the patients they see who have neurological complaints/diagnoses. The most common response to percent of patients with neurological complaints/diagnoses was 10-25%. This was made by nearly half (46%) of participants. Furthermore, to assess accessibility to neurological care, respondents were asked to indicate the average wait time for a neurologist appointment. The majority reported an average wait time of 2 months (21%) or 3 months (36%). Responses to these survey questions are presented in [Table 1](#).

Table 1. Hawai‘i Island Primary Care Physician (PCP)-Reported Neurologic Patient Volume and Wait Times (n=28)

Survey Question and Response	Number of Respondents	% ^a
What percentage of the patients that you see have some kind of neurological complaint or a neurological diagnosis?		
Fewer than 10%	7	25
10-25%	13	46
26-50%	6	21
51-75%	1	4
76-90%	1	4
More than 90%	0	0
In your experience, what is the approximate average wait time to get an appointment for a patient with a neurologist?		
Less than 1 month	1	4
1 month	5	18
2 months	6	21
3 months	10	36
4 months	1	4
5 months	1	4
6 months	3	11
7 months	0	0
8 months	0	0
9 months	0	0
10 months	0	0
11 months	0	0
12 months or more	1	4

^aThe sum of percentages may not sum to 100% because values were rounded to the nearest whole number

Primary Care Physician Practices

All respondents except one (96%) indicated that they have referred out to neurologists on other islands. About two-thirds (64%) have sent their patients to another island to receive neurological procedures. A similar percentage of respondents reported that they sometimes (54%) or usually (14%) decide not to refer to a neurologist due to difficulties in accessing neurological care; over half of respondents (57%) also reported sometimes deciding not to order a neurological procedure due to difficulties in accessing procedures ([Table 2](#)).

However, 64% of respondents said they feel comfortable managing neurological conditions themselves. Respondents were also asked to assess which categories of neurological conditions they preferred managing themselves or conditions for which they would rather refer to a neurologist. PCPs generally indicated a preference to manage commonly encountered neurological conditions, such as back pain, dizziness/vertigo, headache/migraine, and syncope/loss of consciousness. In contrast, all respondents indicated a preference to refer patients for epilepsy/seizure and multiple sclerosis, and nearly all respondents preferred to re-

Table 2. Hawai'i Island Primary Care Physician Referral Patterns and Management Decisions (n=28)

Survey Question and Response	Number of Respondents	% ^a
Have you ever referred a patient to a neurologist who practices on another island?		
Yes	27	96
No	1	4
Have you ever sent a patient to another island in order to get a neurological procedure, such as an EMG or EEG?		
Yes	18	64
No	10	36
When you have a patient with a neurological problem, do you ever decide to not refer a patient to a neurologist because of difficulties in accessing neurological care?		
Never	8	29
Sometimes	15	54
Usually	4	14
Always	1	4
When you have a patient with a neurological problem, do you ever decide to not order a neurological procedure because of difficulties in accessing neurological procedures?		
Never	11	39
Sometimes	16	57
Usually	0	0
Always	1	4
Do you feel comfortable managing neurological problems yourself?		
Yes	18	64
No	10	36

EEG = electroencephalogram; EMG = electromyogram

^aThe sum of percentages may not sum to 100% because values were rounded to the nearest whole number

fer patients with neuromuscular (96%) and movement disorders (93%). [Figure 1](#) summarizes PCP preferred practices when managing different neurological conditions.

Primary Care Physician Assessment of Resources

Respondents were asked to compare the quality of electroencephalogram / electromyogram (EEG/EMG) studies on Hawai'i Island and the island of O'ahu (which comprises all of Honolulu County). Most respondents (64%) were unsure if there were any differences in quality, while about a fifth of respondents (21%) felt quality was about equal in both places. All remaining respondents felt the quality of EEG/EMG studies on O'ahu was better than those on Hawai'i Island. Using a 5-point Likert Scale, with 1 indicating "Not at all" and 5 indicating "Helped a lot", respondents were also asked to rate how much telehealth services have improved access to neurologists. Eleven respondents (39%) rated the impact of telehealth services in accessing neurologists as 3. Responses to these questions are presented in [Table 3](#).

Open-Ended Responses

One open-response question was included in this survey. Respondents were asked "If there were more neurologists, how would your practice change?" Of the 28 open-ended responses, 4 were excluded (n=24) due to blank or non-specific answers. Four major themes were identified from analysis of the open-ended responses. First, improved access to care emerged as the most common theme (71%), which included greater ability to refer patients for diagnosis and management of complex neurological conditions. Second, responses described ideas of improved quality of care, such as access to more advanced diagnostics and treatments, which was discussed by 25% of responses. Third, reduced PCP burden was identified as another common theme (38%), including increased capacity to focus on patients' other medical problems. Finally, responses reflected reduced patient burden, with interisland travel identified as a barrier to accessing neurological care. This theme emerged in 25% of responses. [Table 4](#) provides example quotes from individual responses for each thematic category.

DISCUSSION

The purpose of this survey was to characterize Hawai'i Island PCP perspectives in delivering and accessing neurological care. On a largely rural island with an identified shortage of neurologists, understanding current practices and perspectives may in turn help identify areas toward which efforts can be made. Lin et al estimated that neurological complaints comprise 10.5% of PCP visits.¹³ Hawai'i Island PCPs may have a larger proportion of their patient population who have neurological complaints. In this study, over half of respondents indicated that 10-50% of their patients have some neurological complaint, but simultaneously this survey showed that about one-third of respondents are not comfortable managing neurological problems. Importantly, however, they may still be choosing to manage neurological conditions themselves. When asked to specify which classes of neurological conditions they felt comfortable managing and ones for which they would send a referral, PCPs almost unanimously indicated that they would refer patients with neuromuscular conditions, seizures/epilepsy problems, multiple sclerosis, and movement disorders. These findings were directionally consistent with prior results describing the division of neurologic care between PCPs and neurologists, which found that PCPs provided the greatest share of care for dizziness/vertigo, headache/migraine, and dementia, while neurologists were the dominant providers for Parkinson's Disease, epilepsy, and multiple sclerosis.¹³ Additionally, a high proportion of PCPs in this survey reported that they often decide against neurology referrals or ordering neurological procedures due to challenges in accessing neurological care. This is consistent with prior studies demonstrating that PCPs practicing in rural and smaller towns are less likely to refer to specialists as compared to their non-rural counterparts, and these differences in referral rates may even be widening.¹⁴

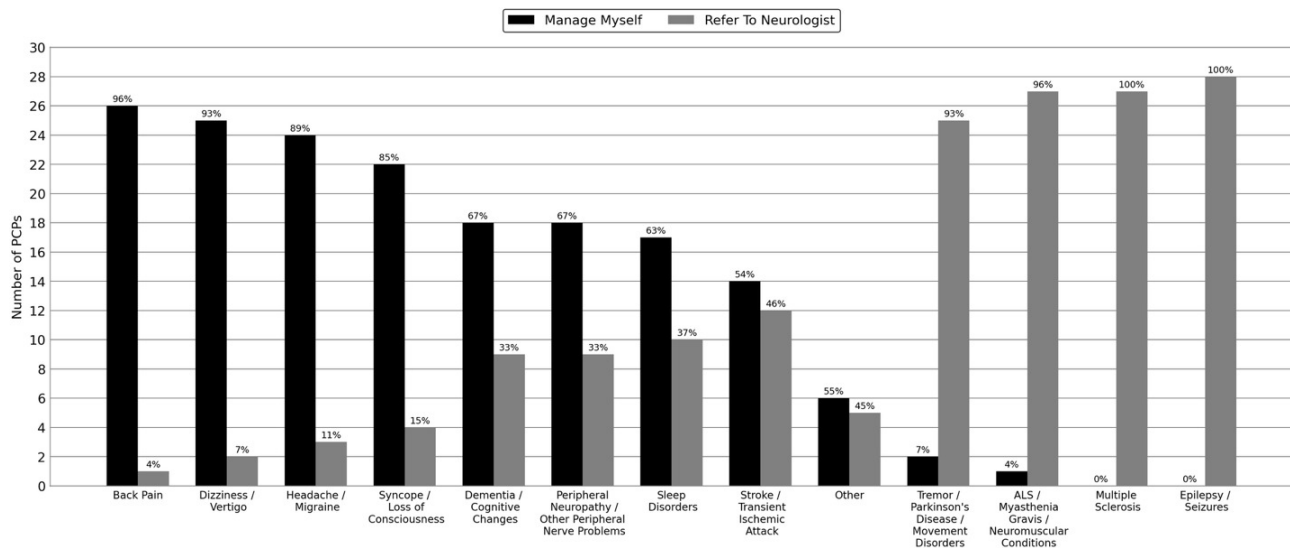


Figure 1. Hawai'i Island Primary Care Physician Preferred Practices in the Management of Different Neurological Conditions^a

ALS = amyotrophic lateral sclerosis

^aThe sums of each category may not equal to 28 due to unanswered/missing responses

Table 3. Hawai'i Island Primary Care Physician Perception of Neurological Services and Telehealth (n=28)

Survey Question and Response	Number of Respondents	% ^a
What is your experience of the quality of EEGs or EMGs performed on Hawaii Island compared to those performed on O'ahu?		
The studies on Hawaii Island are of better quality	0	0
The studies on Oahu are of better quality	4	14
The studies are about the same in quality	6	21
Not sure	18	64
How much has telehealth helped with accessing neurologists?		
1 (Not at all)	6	21
2	3	11
3	11	39
4	6	21
5 (Helped a lot)	2	7

EEG = electroencephalogram; EMG = electromyogram;

^aThe sum of percentages may not sum to 100% because values were rounded to the nearest whole number

¹⁵ Consequently, patients who have more complex neurological problems may not be receiving comprehensive neurological management if their PCPs choose to forgo referrals and procedures but receive care from their PCPs, some of whom do not feel comfortable managing these conditions. This willingness to provide patients with essential clinical care that is outside a physician's preferred scope of practice, especially in rural or resource-limited settings----

a phenomenon termed "clinical courage"---has been explored to a limited extent in the medical literature.¹⁶ Ultimately, this suggests that barriers to access may influence clinical decision-making, potentially leading to situations in which PCPs manage conditions outside of their preferred comfort level due to lack of nearby specialist support.

PCPs who do refer to neurologists may encounter prolonged wait times for appointments, further delaying neurological care. A plurality of PCPs (36%) in this survey reported a neurologist appointment wait time of 3 months, with another 43% reporting a wait time of 2 months or less and 21% reporting 4 months or greater. Although no study currently provides estimates for neurology wait times in Hawai'i, a recent claims-based study of Medicare patients reported median neurology appointment wait time of 34 days.¹⁷ While this measure is not directly comparable to the 3 month PCP-reported appointment wait time in this study due to differences in study design, it may suggest access to neurologic care on Hawai'i Island may be more limited. This, at least in part, may be explained by the unique geography of Hawai'i. Prior studies have shown that patients who live in areas with a lower density of neurologists were more likely to travel longer distances for care.¹⁸ However, this is measured using driving distance in the contiguous 48 states. That is, the physical connectedness of different locations on the continental United States still allows driving to be an option for patients. In contrast, those who live on neighbor islands who need care on O'ahu are required to fly to appointments that are scheduled on O'ahu; this physical constraint also applies to any patient seeking care on another island of which they are not a resident. This geographic limitation often restricts patients to only neurologists immediately available on their island because inter-island travel may present financial and logistical barriers for some patients, particularly if transportation benefits are

Theme	Count (%)	Example Quotes
Improved Access to Care	17 (71)	"Patients would have better access to care" "More referrals for chronic neurologic problems like Parkinson's and MS" "...The inability to get an EEG easily has hampered definitive diagnosis of a few patients..."
Improved Quality of Care	6 (25)	"Better care for our patients" "I would be able to rule out epileptic etiologies for complicated neurological syndromes" "Patients with severe migraines would be able to see Neurology for advanced treatments and I could spend more time addressing their other chronic issues..."
Reduced PCP Clinical Burden	9 (38)	"As a PCP, could refer [patients] and not have to watch them as closely" "...Able to diversify my focus/attention on other areas knowing neuro was covered" "We would have way less work to do to make referrals, and we would have way less stress"
Reduced Patient Burden	6 (25)	"Would have better access for EEG on island instead of sending patients to Oahu" "Shorter wait times for patients..." "A lot of new neuro issues need in-person care. It's a rare insurance which would pay for flight over and most don't have the finances to fly over..."

Table 4. Summary of Hawai'i Island Primary Care Physician (PCP) Responses Regarding Impact of Increased Neurologist Availability on Hawai'i Island (n=24)

EEG = electroencephalogram; MS = multiple sclerosis;

unavailable or if travel requires time away from work, family, or other responsibilities. In the context of this survey, patients on Hawai'i Island may be constrained to local neurologists, concentrating clinical demand on a limited number of providers. This reliance on local neurologists may exacerbate the prolonged wait times.

Telehealth services have helped alleviate accessibility issues and shortages, especially during and after the COVID-19 pandemic. According to this survey, telehealth services have made a moderate impact in improving access to neurologists. This is consistent with other studies that have demonstrated success in the implementation of telemedicine services and delivery of neurological care.^{19, 20} Telehealth services have also seen some success among seizure patients in rural Hawai'i, with patients reporting high satisfaction.²¹ However, PCPs reported only a moderate impact on accessibility, which suggests that other factors still may be limiting accessibility to neurologists. Although telehealth services can expand the pool of available neurologists beyond local areas, they do not solve the underlying statewide shortage.¹¹ In other words, telehealth services allow patients to transfer care to an area with less of a shortage. However, the entire state of Hawai'i has a shortage of adult and pediatric neurology of 17% and 36%,¹¹ respectively, which may explain the perceived mod-

erate impact of telehealth services. Furthermore, patients may feel that certain aspects of the appointment are better in an in-person appointment format, such as the physical exam, and may also prefer in-person appointments altogether.^{21,22} Thus, while telehealth services may help improve accessibility to neurological care and are well-regarded for their quality, in-person care is still highly valued among patients.

By far the most frequently mentioned impact an increase in neurologists would have on PCP practices was improved accessibility of care. This comports with the identified neurologist shortage¹¹ and PCP practices of forgoing referrals in light of these shortages. By increasing the number of practicing neurologists on Hawai'i Island, it follows that PCPs and patients alike can more easily access neurological care and procedures. Importantly, because of the shortage of neurologists, PCPs also often split their time between managing their patients' neurological conditions and having to address other chronic, non-neurological problems. This emphasizes another important theme in this survey's responses: improvement of care quality. Two potential mechanisms may help explain this recurring theme from respondents. First, greater neurologist availability allows patients with neurological conditions to receive specialized care that may extend beyond the comfort and scope of pri-

mary care. Lack of PCP comfort treating such conditions was, in fact, a point made about various conditions in this survey. Secondly, shifting specialized care to neurologists decreases the clinical burden of PCPs, which allows them to focus on managing other chronic and comorbid conditions (eg, hypertension, diabetes, obesity, etc.). Prior evidence suggests that patients may perceive the care received by PCPs with high clinical loads as being of lower quality.²³ Therefore, increasing the number of practicing neurologists on Hawai'i Island not only would enhance accessibility to specialized care but also reduce PCP clinical loads, thereby helping address patients' broader primary care needs and helping patients receive the full spectrum of care.

Limitations

Because this survey was administered in an online format, PCPs in areas where internet access may be more limited may have been missed. In addition, results from this survey may be subject to selection bias. Because the survey was distributed via a third-party newsletter and study investigators did not have access to the distribution list, a precise response rate could not be calculated. Lastly, survey questions were developed by study investigators and did not undergo pilot testing or validation. Consequently, there may be variation in individual respondents' interpretation of questions, which can influence responses.

CONCLUSION

These findings indicate that a significant number of patients on Hawai'i Island may not be receiving necessary neurological care. Future research should examine subspecialties in neurology most in need and specific types of neurological problems most encountered by PCPs. The recently accredited Hawai'i Neurology Residency Program is expected to provide a steady supply of new neurologists who, having trained in Hawai'i, will be more likely to stay and practice in the state. The planned curriculum for this residency program also includes selective rotations on Hawai'i Island, which will help expose residents to the unique health needs of local communities and may encourage graduates to remain and practice on Hawai'i Island. Other long-term efforts should be focused on increasing access to neurological care on Hawai'i Island, such as acceptance and accessibility of high-quality telehealth services for neurological treatment, periodic visiting general and subspecialty neurology clinics, and rural practice incentives.

CONFLICTS OF INTEREST

None of the authors identify a conflict of interest.

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Stories that Sustain: Talk-Story and Portraiture Across Generations of Women in Medicine in Hawai'i

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The Medical School Hotline column of the University of Hawai'i John A. Burns School of Medicine (JABSOM) was founded in 1993, by Satoru Izutu PhD (former vice-dean of JABSOM). It is edited by HJH&SW Contributing Editor, Kathleen Kihmm Connolly PhD, Office of the Associate Dean for Academic Affairs, JABSOM.

Burnout in medicine continues to rise, with women physicians carrying a disproportionate share of its burden.¹ Although women now make up more than half of many medical school classes, they remain underrepresented in leadership and often face a combination of workplace inequities, increasing clinical and administrative demands, and heavier caregiving responsibilities outside of work. In Hawai'i, the picture reflects both progress and persistent gaps. Women comprise two-thirds of the 2025 class at the University of Hawai'i John A. Burns School of Medicine (JABSOM). Within the Department of Medicine (DOM), women comprise just over one-third of internal medicine residents and compensated faculty, and only 15% of DOM faculty at the professor rank. Although these figures represent different cohorts and career stages, they illustrate persistent differences in representation across the medical education and academic career continuum. These differences suggest the need for approaches that move beyond documenting disparity to strengthen belonging, visibility, and durable support across career stages and generations.

The Creative Pedagogy Award project, now being implemented through the *Mana Kauka Wahine* (collective strength, generational wisdom of women physicians) initiative, was developed in response to that need. The project centers on 2 complementary strategies: first, the visual representation of distinguished past and present women faculty physicians through portraiture²; and second, the creation of dedicated space for intergenerational support, mentorship, and community-building through talk-story gatherings. The initiative began with an inaugural gathering in September 2025 and is intended to continue through future talk-story sessions and a portrait gallery in the DOM offices. This work builds on the legacy of Dr. Elizabeth "Liz" Keali'ikua'aina Tam, the first woman JABSOM Chair of Medicine, whose leadership continues to shape the DOM's sense of *pilina* (connection) and shared purpose. It is grounded in Hawaiian relational concepts of *kaikua'ana* (older sibling of the same sex) and *kaikaina* (younger sibling of the same sex), reflecting a relational order shaped by knowledge, experience, and responsibility, in which roles of

teaching and learning may shift across time and context. The project also draws on *mo'olelo* (storytelling) as a methodology, celebrating Indigenous oral tradition and the power of narrative to transmit knowledge, values, and resilience.

At that inaugural gathering, the project team brought together approximately 30 participants from within and beyond the Department of Medicine. Residents and both current and retired faculty members came together to honor Drs. Sharon Vitousek and Helen Petrovitch, pioneers whose distinct careers in the Department of Medicine have shaped medicine in Hawai'i ([Figure 1](#)). More than a formal panel, the gathering took the form of "talk-story": a locally rooted practice of reciprocal conversation and storytelling in which people share not only what they know but also how they came to know it. In this setting, talk-story strengthened relationships and created space to reflect on shared history and responsibility to one another across generations. In that spirit, this column carries forward the sustaining wisdom that emerged from the honorees' *mo'olelo* (stories and lived histories). It reflects what became visible when a community made time not only to honor accomplishment but also to listen closely to the experiences, relationships, and sources of support that helped the honorees remain and thrive in medicine over the course of their careers.

Drawing on Dr. Petrovitch's early years at Queen Emma Clinic in the 1980s, during a time when gender gaps in medicine were wider than they are today, she reflected on how caring for patients who struggled with financial strain, physical labor, and limited flexibility changed the way she understood her own profession. Medicine was hard, she acknowledged, but it was also meaningful, intellectually engaging, and comparatively privileged. "Medicine is not just a job. I see it as a privilege. I really do," she shared. At the same time, she spoke candidly about the emotional weight of clinical responsibility. She recalled the stress and worry of advising a patient to seek emergency care, only to have the patient decline, and the long evening that followed as she wrestled with uncertainty, concern, and self-doubt. Through these experiences, she learned that she could provide guidance and recommendations but ultimately could not control outcomes. What emerged from that story was not detachment, but a more sustainable understanding of responsibility, one that allows physicians to remain committed without being consumed.



Figure 1. Dr. Sharon Vitousek (left) and Dr. Helen Petrovitch (right), honorees of the inaugural *Mana Kauka Wahine* gathering, September 2025. Portrait by Yola Monakhov Stockton, Assistant Professor of Photography at the Department of Art and Art History, University of Hawai'i at Mānoa, to be featured as a part of a portrait gallery of women physicians at the Department of Medicine offices.

Dr. Vitousek's *mo'olelo* centered on the intersection of professional demands with pregnancy and early parenthood. In her words, "It became a challenge for me once I started having kids." What was striking in her account was that she did not frame medical school or residency itself as the main barrier. Instead, the turning point came later, when the structure of training no longer fit the realities and demands of family life. She described becoming pregnant during her chief resident year, at a time when maternity leave was far shorter than what she felt she needed. Her response was practical and relational: she asked for help, calling her friend and colleague, Dr. Petrovitch, to step in and enable a longer leave. That story carried more than nostalgia. It surfaced a form of wisdom that is often absent from formal curricula: ask for help early, lean on trusted relationships for support, and do not view unsustainable strain as a test of character or aptitude. Dr. Vitousek's advice was clear: "Get help. Get as much help as you can afford, and if it's still not working, get more help." She also reframed balance as threefold: career, family, and self. In this reframing, rest is not an indulgence. As she put it, "It's helping you do your job better."

Beyond individual stories, the gathering itself revealed a broader truth: community is not separate from the work of

medicine, but part of the human infrastructure that makes it sustainable. This became clear not through formal declarations, but through the testimony of colleagues of Dr. Vitousek and Dr. Petrovitch, who described years of shared writing, editing, research, and mutual support. Their reflections did not portray the honorees as superhuman figures who succeeded by force of will alone. Instead, they pointed to the quieter reality that difficult work becomes more bearable, and often more fulfilling, when those who do it are supported by trusted colleagues over time.

The same was true of the evening itself. The small scale of the gathering, the laughter woven through serious reflection, and the space for trainees alongside faculty to listen together all underscored that such events are not merely social indulgences. They build *pilina* and sow the seeds for trusting relationships that make it easier to ask for help, to offer it, and to see oneself as part of something larger than an individual career. *Mo'olelo* functioned not simply as storytelling, but as a way of making a departmental *mo'okū'auhau* (genealogy) visible. It showed who had come before, how they had navigated similar tensions, and how certain forms of practical wisdom are carried into the future.

Taken together, this work suggests that, for many women, sustaining a life in medicine is not achieved through individual endurance alone, but through meaning, relationship, and shared responsibility across generations. Here, portraiture refers to creating and displaying photographic portraits of women physicians to recognize their contributions and make their presence visible within the medical community. *Mo'olelo* reveals how those who came before navigated challenge, adapted with intention, and made space for others along the way. In this way, the project is not only about honoring the past, but about shaping the future. Future *Mana Kauka Wahine* gatherings and portraiture displays will continue this work by pairing visible recognition with intergenerational reflection, mentorship, and community-building. By strengthening *pilina* and carrying these stories forward, *Mana Kauka Wahine* honors the women who came before and reminds those who follow that they need not navigate a life in medicine alone.

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Hawai'i Journal of Health & Social Welfare (HJH&SW)

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- Instructions for Manuscript Preparation and Submission of Research Articles
- Instructions for Manuscript Preparation and Submission of Columns
- HJH&SW Statistical Guidelines
- HJH&SW Style Guide for Native Hawaiian Words and Phrases
- AMA Manual of Style

4. The sponsor will oversee the article selection, peer review, and editing process. We recommend that time be allowed for at least two rounds of reviews for each article.

Time frame: 6 months

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b. Obtain a Copyright Transfer Agreement signed by all authors for each article.

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5. The sponsor or their designee will conduct a final review of each article to ensure adherence to HJH&SW guidelines and AMA style.

Time frame: 2 weeks

8. For each article, the sponsor will submit the final Word document and Copyright Transfer Agreement to the HJH&SW via Scholastica. The journal Publications Specialist will send the articles to the copy editor for journal style review. Copy editing will be 8 hours per edition plus 1 hour per article for additional articles purchased. Any additional hours will be billed at \$100 per hour.

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