

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

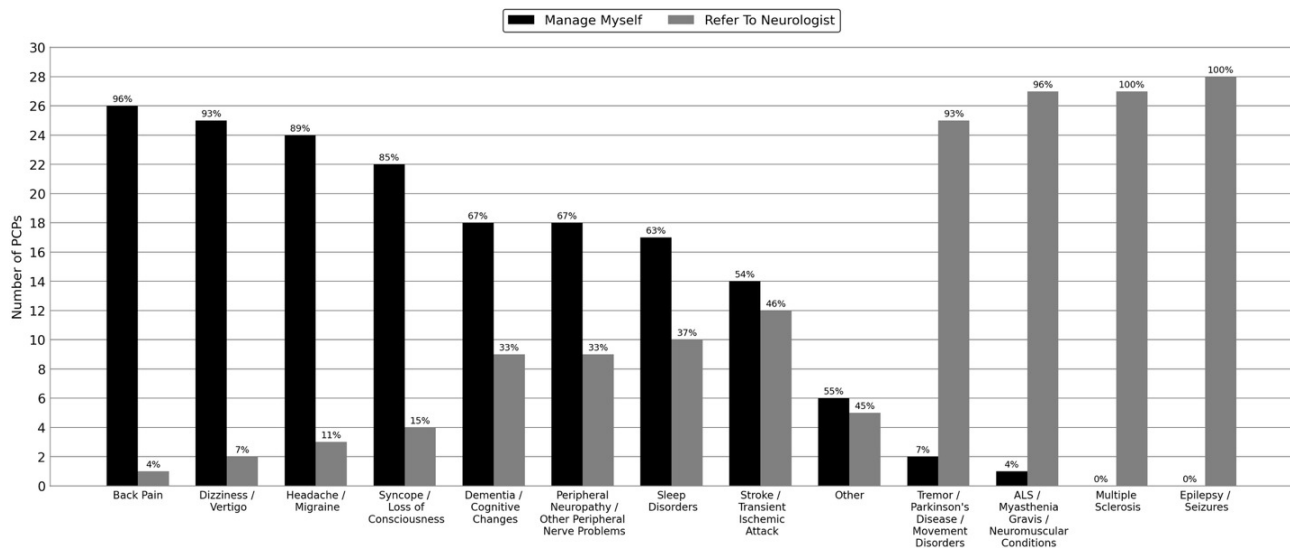


Figure 1. Hawai'i Island Primary Care Physician Preferred Practices in the Management of Different Neurological Conditions^a

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)	<i>"Patients would have better access to care"</i> <i>"More referrals for chronic neurologic problems like Parkinson's and MS"</i> <i>"...The inability to get an EEG easily has hampered definitive diagnosis of a few patients..."</i>
Improved Quality of Care	6 (25)	<i>"Better care for our patients"</i> <i>"I would be able to rule out epileptic etiologies for complicated neurological syndromes"</i> <i>"Patients with severe migraines would be able to see Neurology for advanced treatments and I could spend more time addressing their other chronic issues..."</i>
Reduced PCP Clinical Burden	9 (38)	<i>"As a PCP, could refer [patients] and not have to watch them as closely"</i> <i>"...Able to diversify my focus/attention on other areas knowing neuro was covered"</i> <i>"We would have way less work to do to make referrals, and we would have way less stress"</i>
Reduced Patient Burden	6 (25)	<i>"Would have better access for EEG on island instead of sending patients to Oahu"</i> <i>"Shorter wait times for patients..."</i> <i>"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..."</i>

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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