

# Neurologist Attitudes on Practicing in Hawai‘i

Selin Kutlu MA; William B. Harris BA; Christina E. Tse BA; Nicole E. Anzai BS; Heather Miura BA; Bryce Kalei Chang BA; and J. Douglas Miles MD, PhD

## Abstract

*There is a shortage of neurologists nationwide, and the demand for neurologists is expected to increase in the upcoming years while the pool of practicing neurologists dwindles. Per Hawai‘i Neurological Society, there were 44 practicing neurologists in the state of Hawai‘i in 2019, representing a shortage of approximately 28 neurologists. Considering that Hawai‘i is geographically, demographically, and culturally distinct compared to other states, a concern is that practicing neurology in Hawai‘i poses unique challenges that may contribute to the low numbers of neurologists. An anonymous online survey was sent via email to all members of the Hawai‘i Neurological Society from February 2019 to June 2019, inquiring about aspects of their practice they considered unique to Hawai‘i. Twenty-three neurologists completed the survey, representing 52% of Hawai‘i’s neurology workforce. One neurologist completed a portion of the survey. Twenty-five percent of participants were born and raised or completed their medical education in Hawai‘i. Self-reported reasons for practicing in Hawai‘i included family, lifestyle, and patient population despite financial challenges and limited resources and opportunities. Participants suggested introducing a mandatory neurology rotation for Hawai‘i medical students and creating an in-state neurology residency program to combat the growing neurologist shortfall in Hawai‘i. This survey identified local strengths and challenges in the field of neurology, potential ways to improve the practice environment in Hawai‘i, and neurologists’ perspectives on ways to address the neurology shortage.*

## Keywords

neurologists, physicians, Hawai‘i, shortage, burnout

## Abbreviations and Acronyms

HNS = Hawai‘i Neurological Society  
JABSOM = John A. Burns School of Medicine  
MD = Doctor of Medicine  
US = United States

## Introduction

The first neurological specialists to practice in the state of Hawai‘i were Fredrick Reichert MD, a neurosurgeon from Stanford University who practiced part-time in Hawai‘i, shortly followed by Ralph B. Cloward MD, a neurosurgeon who practiced full-time in Hawai‘i starting in 1938.<sup>1</sup> Since then, the field of neurology in Hawai‘i has evolved. As of 2019, the Hawai‘i Neurological Society reported 44 neurologists in Hawai‘i who served a population of 1 420 491.<sup>2</sup> A national physician shortage in the United States (US) has been well-documented.<sup>3,4</sup> In the US, there is expected to be a greater shortfall of neurologists than many other specialties.<sup>3,5</sup> The national supply of neurolo-

gists is predicted to increase from 16 366 in 2012 to 18 060 in 2025, but with an increased shortfall from 11% to 19% with the growing population.<sup>4</sup> In addition to the marked shortfall of neurologists in Hawai‘i, the islands’ unique geography isolates particular populations from neurological care.<sup>6</sup> There is a need for approximately 3 neurologists in Kaua‘i County, 9 in Hawai‘i County, 4 in Maui County, and 10 in Honolulu County, with an overall statewide need of approximately 26 neurologists.<sup>6</sup>

In response to the national and state-level physician shortages, many studies have analyzed mechanisms that might explain the demand and shortage.<sup>3,7,8</sup> One factor thought to contribute significantly to the shortage is physician burnout. Neurology is among the top 10 specialties with the highest rates of burnout and lowest rates of satisfaction with work-life balance.<sup>9</sup> In studies of US neurologists, over 60% reported at least 1 symptom of burnout and rates of burnout increased from 2011 to 2014.<sup>9–11</sup> Another important contributor to physician shortage might be location. Relative to urban areas, neurologists practicing in more rural areas report greater levels of dissatisfaction.<sup>12</sup> This may be due to decreased resources, funding, staff, and support. Conversely, teaching and research have been associated with higher physician career satisfaction, likely as a result of increased interactions, collaborations, and a more stimulating environment.<sup>12</sup>

One factor perpetuating the neurologist shortage worldwide is an absence of medical students who want to pursue a career in neurology.<sup>3</sup> Medical schools may be trying to increase recruitment through their curriculum. In the 2018–2019 academic year, 86% of medical schools reported having a mandatory neurology clerkship.<sup>13</sup> However, as the only 4-year allopathic medical school in Hawai‘i, the John A. Burns School of Medicine (JABSOM) does not have a third-year neurology clerkship rotation nor a neurology residency program.<sup>14</sup>

Neurologists currently practicing in Hawai‘i were surveyed to understand the present and future directions of neurology in the state. To the authors’ knowledge, this cohort of neurologists has never been surveyed previously about the climate of their work environments. By examining the strengths, challenges, and disparities within the field, this small pilot study seeks to understand the benefits and barriers of practicing neurology in Hawai‘i to improve recruitment, retention, and perspective on the neurology shortage in Hawai‘i.

## Methods

### Recruitment and Consent

Neurologists in Hawai'i were emailed the link to an anonymous online survey about their attitudes regarding practicing neurology in Hawai'i. Email addresses were obtained from the Hawai'i Neurological Society (HNS), the state neurological association. HNS attempts to maintain an accurate list of all the neurologists in the state, regardless of whether they are active members of the organization and reported 44 practicing neurologists at the time of data collection. Approval for the study was obtained from the HNS board of directors and the University of Hawai'i Institutional Review Board (2018-00855) before the survey. The authors of this paper also made brief in-person announcements at HNS meetings to encourage participation. Participation took place from February 2019 through June 2019 and was voluntary.

A waiver of informed consent was obtained from all participants on the first page of the online survey and was sent as an attachment in the email inviting participation. There was no payment or other compensation incentive for participation.

### Measures

The 26-question online survey was administered using RED-Cap, a Health Insurance Portability and Accountability Act-compliant electronic survey database. Measures of physician attitudes were adapted from measures used in The Queens Medical Center physician satisfaction survey with permission from The Queens Medical Center. The survey included questions regarding practice characteristics and physician training background and attitudes regarding practicing in Hawai'i. Due to concerns expressed by HNS board members about the possibility of participant demographics identifying survey respondents, demographics were not included in the survey. Finally, the survey included questions to ascertain neurologists' thoughts on how their practice and the neurology shortage in Hawai'i might be improved.

### Data Analysis

Microsoft Excel 2011 version 14.0.0 (Microsoft Corporation: Redmond, WA) was used to report descriptive statistics. Due to the nature of the questions, inferential statistics were not applied.

## Results

Twenty-three neurologists completed the survey ( $n=23$ , 96%). An additional neurologist only completed a portion of the survey ( $n=1$ , 4%). On average, participants spent 14 years practicing in Hawai'i, ranging from 1.2 to 32 years. Most participants ( $n=18$ , 75%) were neither born nor raised in Hawai'i and did not complete any part of their collegiate or medical education in Hawai'i.

Family ties were most commonly indicated as a primary motivation for practicing in Hawai'i for 38% ( $n=9$ ) of respondents (Figure 1). Other frequently indicated primary or secondary motivations included location ( $n=14$ , 58%), lifestyle ( $n=12$ , 50%), and patient population ( $n=9$ , 38%). Of note, for secondary motivations, respondents could choose more than 1 answer. Concerning patient population, respondents noted Hawai'i's diverse and underserved patient population, including patients of Native Hawaiians, Guamanians, Chinese, Japanese, Koreans, and Other Pacific Islanders. One unique motivation for practicing in Hawai'i was that Hawai'i represented the only place that offered "the opportunity to build a neurology program."

Twenty respondents (87%) reported subspecializing, with the majority being stroke, neuromuscular, neurodegenerative/dementia, movement disorders, and concussion/traumatic brain injury (Figure 2). Of those reporting a subspecialty ( $n=23$ ), 16 (70%) self-reported being board certified in their subspecialty. Sixteen respondents (70%) also indicated difficulties in finding neurology consults in certain subspecialties, particularly for multiple sclerosis ( $n=1$ , 6%), neurodegenerative/dementia ( $n=1$ , 6%), and movement disorders ( $n=1$ , 6%). It should be noted that there are fellowships, but no board certification for these subspecialties.

Participants were asked to compare key aspects of practice and lifestyle in Hawai'i versus the contiguous US (Figure 3). Neurologists in Hawai'i agreed or strongly agreed that compared to the continental US, there were "sufficient numbers of patients to have a successful practice" ( $n=21$ , 91%), "a patient population with unique medical and intellectual challenges" ( $n=17$ , 74%), and "opportunities to provide direct patient care" ( $n=18$ , 78%). Additionally, neurologists in Hawai'i disagreed or strongly disagreed that Hawai'i, compared to the continental US, offers "increased academic employment opportunities" ( $n=17$ , 74%), "opportunities to do both patient care and research" ( $n=15$ , 65%), and "opportunities to participate in drug studies" ( $n=11$ , 48%).

When asked about adding neurologists to their practice, 19% ( $n=4$ ) felt that 4 or more neurologists could be added, 43% ( $n=9$ ) of participants felt that they could add 1 or 2 neurologists, and 38% ( $n=8$ ) of participants felt that no additional neurologists could be added to their practice ( $n=21$ ).

Participants selected from a list of ways JABSOM could improve Hawai'i's physician shortage in neurology ( $n=23$ , 96%). Note that the participants could have selected more than one answer. From these options, "neurology rotation for 3rd year medical students" was indicated by 74% ( $n=17$ ) of participants, "neurology residency program" by 74% ( $n=17$ ), "more opportunities to interact with practicing neurologists" by 61% ( $n=14$ ), "scholarship for medical students committed to neurology" by 30% ( $n=7$ ), and "more research opportunities in neurology" by 17% ( $n=4$ ).

Participants were asked to indicate up to three of the most important challenges of working in Hawai‘i when they first started compared to their practice now (Figure 4). Over one-third of respondents cited cost of living ( $n = 11$ , 48%), bureaucracy ( $n = 9$ , 39%), lack of sufficiently skilled specialists ( $n = 9$ , 39%), and reimbursement rates/salaries ( $n = 9$ , 39%) as major challenges when starting their practice in Hawai‘i. The current major challenges for neurologists in Hawai‘i are bureaucracy, lack of sufficiently skilled specialists, physician shortage, and reimbursement rates/salaries. Note that respondents were able to choose their top 3 challenges.

Neurologists were asked about their perceptions of practicing in Hawai‘i ( $n = 23$ , 96%). The vast majority of respondents rated the overall practice environment in Hawai‘i ( $n = 19$ , 83%) and quality of neurology care ( $n = 21$ , 91%) as excellent, good, or satisfactory. Furthermore, 83% ( $n = 19$ ) of respondents stated that they would recommend a neurologist from Hawai‘i to their friends and relatives. The majority of respondents ( $n = 14$ , 61%) agreed that there is open and honest communication among neurologists in Hawai‘i.

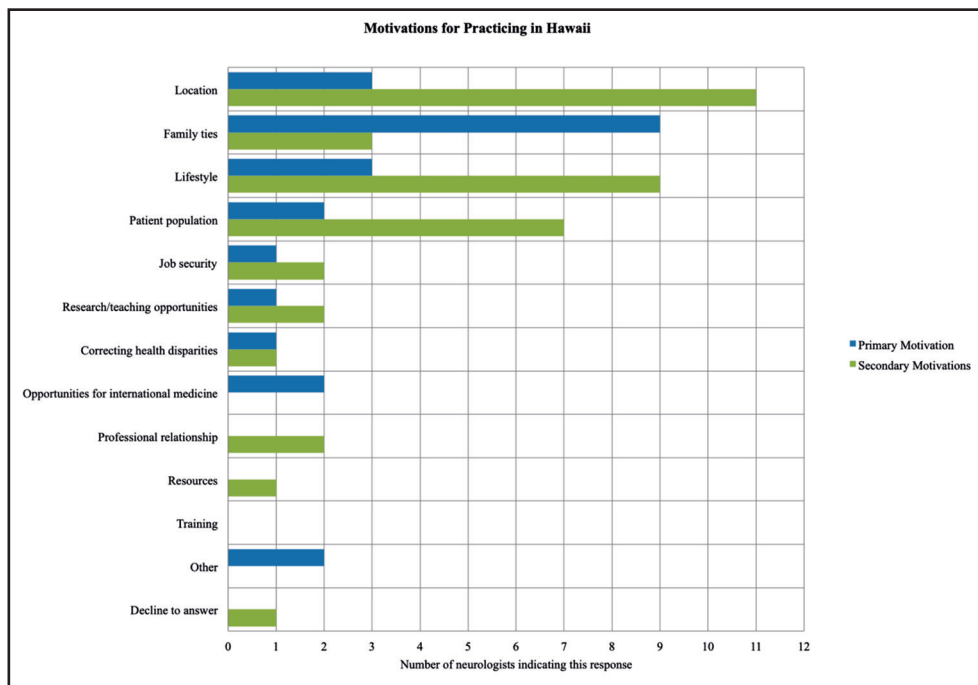


Figure 1. Participant motivations for practicing in Hawai‘i listed in descending order. Blue indicates primary motivations ( $n = 24$ ). Green indicates secondary motivations, of which respondents could choose more than 1 answer. Twenty-three neurologists completed the survey; 1 neurologist completed a portion of the survey.

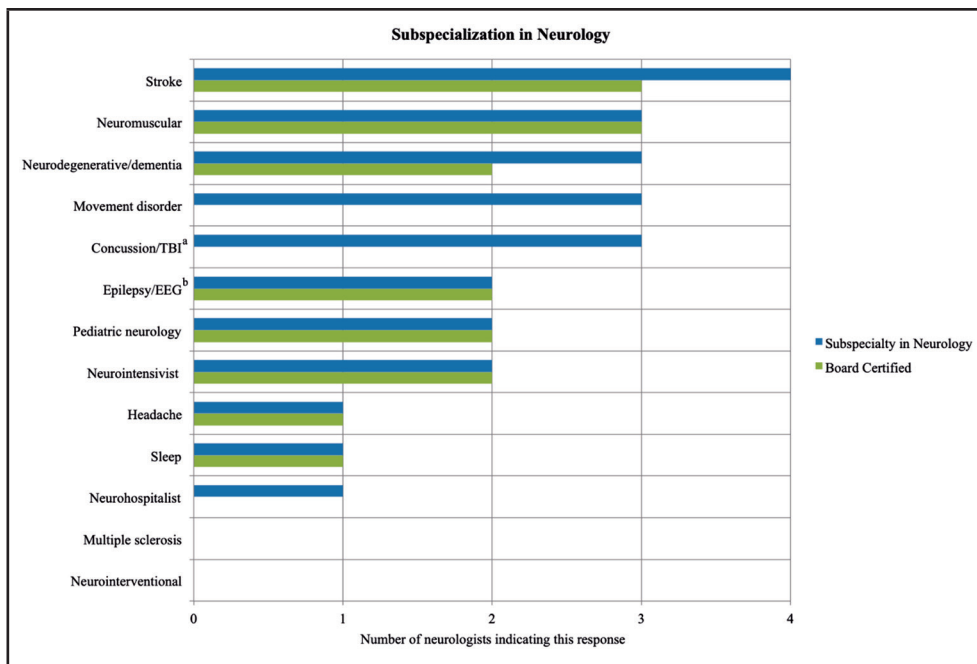


Figure 2. Self-reported neurology subspecialty. Blue indicates the participants' subspecialty ( $n = 20$ ). Green indicates participants' board certification ( $n = 16$ ).

<sup>a</sup>EEG = Electroencephalogram; <sup>b</sup>TBI = Traumatic Brain Injury

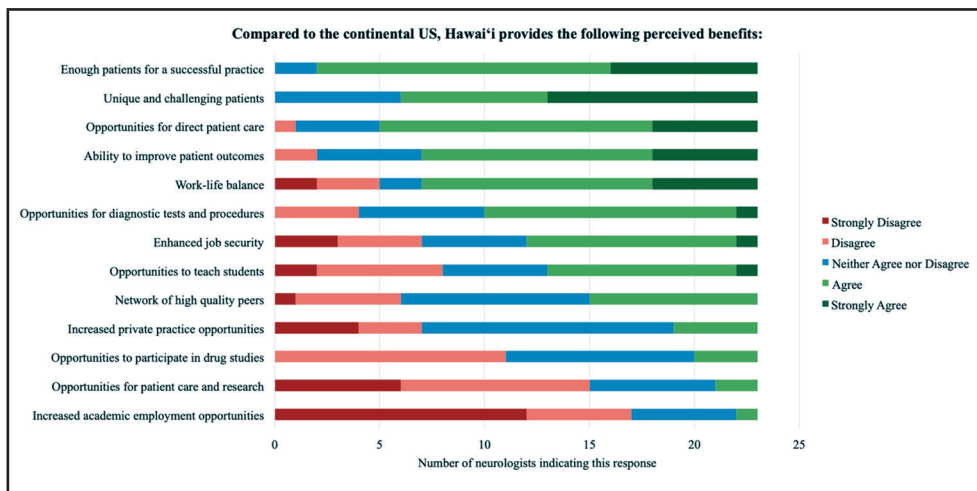
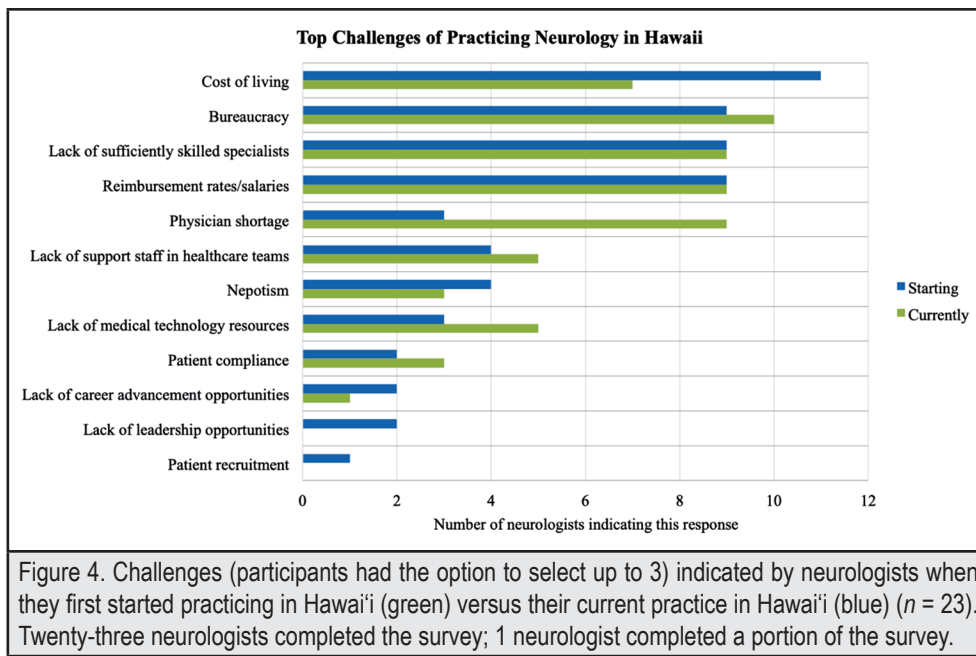


Figure 3. Perceived benefits of practicing neurology in Hawai'i compared with the rest of the US, listed in descending order ( $n = 23$ ). Twenty-three neurologists completed the survey; 1 neurologist completed a portion of the survey.



## Discussion

In this study, several motivations and challenges unique to practicing neurology in Hawai'i were identified. Among the most commonly indicated motivations were location, family ties, and lifestyle. The most commonly indicated challenges of practicing in Hawai'i compared with the continental US included cost of living, bureaucracy, lack of sufficiently skilled specialists, reimbursement, and physician shortage. While factors such as cost of living and nepotism reportedly decreased from when neurologists first began working, factors such as lack of adequate support staff and physician shortage became an increasing hindrance.

The lack of neurologists, subspecialists, and neurology support staff may increase the burden on neurologists in Hawai'i and translate to longer work hours, higher patient and call volume, poorer quality of care, and longer patient wait times. Stroke has been reported as one of the leading causes of death in Hawai'i between 2014 and 2017.<sup>15,16</sup> Despite stroke being the most commonly indicated subspecialty by Hawai'i neurologists, 1 participant indicated that the overwhelming demand resulted in neurologists from other subspecialties caring for stroke patients, which may uniquely contribute to decreased job satisfaction and burnout of neurologists in this state. A cohort of neurologists previously reported working longer hours than physicians in general, and the increased percentage of time worked was associated with decreased job satisfaction.<sup>10</sup> Greater number of hours worked, nights on call, and outpatient volume were also associated with higher burnout risk.<sup>17</sup>

Recruitment of more neurology-trained support staff and advanced practitioners, including neurology technicians, nurses, nurse practitioners, and physician assistants, may decrease the risk of physician burnout and further extend the limited supply of neurologists in Hawai'i. With its inaugural class for the 2020–2021 academic year, the establishment of the MEDEX Northwest Physician Assistant Program in Hawai'i aims to address this need.<sup>18</sup> Multidisciplinary training for neurologists, residents, and medical students may also be warranted to familiarize physicians with how best to incorporate advanced practitioners in a changing practice landscape.<sup>19</sup>

However, to directly improve the shortfall of neurologists in Hawai'i,<sup>6</sup> one of the identified factors most feasible to address is family ties. Family was the top primary motivation for practicing neurology in Hawai'i. This finding suggests that an effective strategy for increasing the number of neurologists practicing in Hawai'i may be to attract in-state medical students into the field of neurology. Furthermore, as indicated by 71% of respondents, a third-year neurology clerkship and residency program may be a solution to alleviate the neurologist shortage in the state through increased retention.

The literature suggests that positive experiences in neurology clerkship rotations are strongly predictive of student interest in neurology; conversely, the absence of a neurology clerkship rotation predicts significantly lower interest in neurology.<sup>20</sup> The addition of a mandatory neurology clerkship to Hawai'i's medical school curriculum may be a valuable strategy to stimulate local medical student interest. In-state training programs



would facilitate the professional support network that can encourage retention of Hawai'i-trained neurology residents to practice neurology in-state. Indeed, Hawai'i leads the nation in retaining physicians in-state, with 86.3% of physicians who complete undergraduate and graduate medical education in Hawai'i staying in the state to practice.<sup>2</sup> Moving beyond the undergraduate medical education, participants felt that a local neurology residency program would reduce the physician shortage within this specialty. Although there have not been studies pertaining to neurology to demonstrate this, there have been studies in other medical specialties that correlate site of training to location of practice. For example, in the continental US, over half of newly trained family physicians and dermatologists practice within 100 miles of their training sites.<sup>21,22</sup> Coupled with the finding that nearly two-thirds of those surveyed reported that additional neurologists could realistically be added to their practice, with 19% reporting room for 4 or more neurologists, an in-state residency has the potential to impact the neurologist shortage significantly. None of the 24 neurologists surveyed disputed the fact that Hawai'i has enough patients to sustain a neurology practice.

The creation of neurology clerkships and residency programs is not without major challenges. JABSOM does not have a university hospital but relies on community hospitals and clinics to provide clinical experience.<sup>23</sup> As a result, the institution of a clerkship or residency program would logistically require extensive discussion and agreement among the JABSOM faculty and staff and between the various healthcare systems, physician community, and national accreditation bodies. Another barrier to establishing a neurology clerkship and residency program is the greater demand for neurologists to serve as preceptors in addition to caring for their patients. With the recent increase in matriculating JABSOM class size, it will be challenging to meet the demand for preceptors given the modest number of community neurologists.<sup>6</sup>

Increasing medical student exposure without overwhelming the faculty neurologists might be a challenge. One viable option may be for JABSOM to offer a neurology elective to first- and second-year medical students. A neurology elective would allow students to explore neurology topics and gain clinical experience from the start of their medical education. In a survey of medical students pursuing a career in neurology, those who excelled in preclinical neuroscience curricula were significantly more likely to become neurologists.<sup>20</sup> Two-thirds of respondents cited increased opportunities to interact with practicing neurologists as an important way for students to gain exposure to neurology. Respondents also felt that providing opportunities in neuroscience research was a key factor in promoting student interest in neurology. Although an elective in neurology research is currently offered at JABSOM, students without prior exposure may be more interested in participating in a general neurology elective to gain knowledge and experience before feeling equipped to undertake research in the field.

The benefit of implementing more neurology into the curriculum may be bidirectional. The creation of a preclinical elective, third-year clerkship, or local residency program may concurrently address the lack of academic opportunities in Hawai'i compared with the continental US, reported as the most common relative deficit by participants. As indicated in the literature, neurologists involved in research and teaching report greater satisfaction with their specialty, as well as greater satisfaction in their relationships with colleagues and patients.<sup>12</sup> Neurologists who engaged in academic practice had lower burnout rates, higher rates of career satisfaction, and higher quality of life than neurologists solely in clinical practice.<sup>10</sup> Neurologist engagement with medical students and residents as preceptors, attendings, and principal investigators may help decrease the neurology shortage in Hawai'i by creating more opportunities for medical students to pursue neurology and increasing satisfaction and longevity among practicing neurologists by offering rewarding alternatives to pure clinical practice.

In summary, the results of this survey of practicing neurologists in Hawai'i support a recognized need for more neurologists in Hawai'i. Job security, maintaining family ties, and a highly satisfying practice environment may be incentives for future locally trained neurology residents to remain in Hawai'i. Creating more educational opportunities for students and increasing interaction with neurologists may help decrease the neurologist shortage in Hawai'i and increase satisfaction and longevity among practicing neurologists. Additionally, a neurology residency program could ameliorate the 2 largest deficits in practicing neurology according to participants, namely academic opportunities and research opportunities. Due to the small sample size and moderate response rate, definitive recommendations cannot be made. However, the results of this survey offer provocative ideas voiced by a majority of the state's practicing neurologists that may be useful in discussions about the future of neurology in Hawai'i.

### **Strengths, Limitations, and Future Directions**

This research study's strengths include endorsement by the HNS and the response from neurologists invested in medical education and the practice of neurology in Hawai'i. To the authors' knowledge, this is the first survey of its kind to assess the practice environment and satisfaction of neurologists practicing in Hawai'i.

The current research limitations include a lack of key demographic data such as neurologists' age, sex, ethnic background, practice size, and rural/urban practice. Demographic data give a better sense of the practice environment and can help gauge the longevity of the current body of practitioners and rates of progression of the physician shortage. In this small pilot study, the researchers chose not to obtain demographic data to avoid identifying participants in this small community.

Future studies may benefit from the inclusion of neurologists practicing in the continental US to directly compare with responses from neurologists in Hawai'i. Other factors to consider might include the number of hours devoted to clinical practice, rural versus urban practice environment, and questions that specifically focus on physician burnout. Despite achieving participation rates similar to other physician surveys,<sup>24,25</sup> considering the small sample size of neurologists in Hawai'i, future research would benefit from increased participation rates.

### Conflict of Interest

None of the authors reported any conflict of interest.

### Disclosure Statement

J. Douglas Miles is on faculty at the John A. Burns School of Medicine. He is also the President of the Hawai'i Neurological Society; this is a non-compensated position. None of the authors reported any financial disclosure.

#### Authors' Affiliation:

Department of Medicine, John A. Burns School of Medicine, University of Hawai'i, Honolulu, HI

#### Correspondence to:

Christina E. Tse BA; Email: tsec@hawaii.edu

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