



# **ABSTRACTS**

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Summer Research  
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Brain Research, Innovation &  
Translation Labs (BRITL)



**HAWAII PACIFIC  
NEUROSCIENCE**

HONOLULU, HAWAII

# Investigating the Etiologies of Seizures in Patients Undergoing Video-EEG at Hawaii Comprehensive Epilepsy Center

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## Introduction

Video-EEG (vEEG) monitoring is classically used to confirm, diagnose, and classify epilepsy. Collecting data from Hawai'i Comprehensive Epilepsy Center will help to identify risk factors and guide diagnoses in under-represented populations.

## Objective

To identify the percentage of patients with vEEG abnormalities, whether they experienced an epileptic or non-epileptic event, and to evaluate patient comorbidities.

## Methods

This retrospective chart review analyzed patient data from Hawai'i Comprehensive Epilepsy Center between 2015-2022. 247 individuals  $\geq 18$  years old at the time of vEEG were included, totalling 294 vEEG reports. Data consisted of the presence of a vEEG abnormality, type of abnormality, the number of anti-epileptic drugs (AEDs) used, epilepsy risk factors, psychiatric comorbidities, and MRI structural abnormalities.

## Results

Of the 294 vEEG reports, 209 (84.6%) were abnormal. Subjects with an abnormal vEEG were significantly more likely to have epilepsy ( $p < 0.001$ ) and be taking an AED ( $p < 0.001$ ). The 123 (58.9%) epileptic events were subcategorized into focal onset (69.1%), generalized onset (4.1%), and non-diagnostic (26.8%). These individuals were significantly more likely to have epilepsy ( $p < 0.001$ ) and be taking an AED ( $p = 0.002$ ). The 86 (41.1%) non-epileptic seizures were subclassified as psychogenic (7.0%), physiologic (13.0%), unspecified non-epileptic (68.6%), and non-diagnostic (12.7%). They were significantly more likely to be Asian ( $p = 0.046$ ) or Other ( $p = 0.031$ ) race, have depression ( $p = 0.003$ ), and have anxiety ( $p = 0.035$ ).

## Conclusions

These findings identified the breakdown of vEEG results in an epilepsy center. Additional findings included an atypical distribution of age at epilepsy diagnosis and an increased likelihood of depression and anxiety in patients with non-epileptic seizures.

# **Barriers & Methods to Improve Alzheimer's Disease Clinical Trial Participation Among Asian American and Native Hawaiian Populations**

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## **Objective**

Understanding barriers to Alzheimer's Disease (AD) clinical trial participation in Asian and Native Hawaiian (NH) patients diagnosed with AD or mild cognitive impairment (MCI) at a single institution.

## **Methods**

This retrospective study included 187 (134 AD, 53 MCI) patients with a Mini-Mental State (MMSE) score  $\geq 14$  between 01/2022-06/2022. A 15-question telephone survey was conducted assessing demographics, barriers to participation, and improvement methods. Descriptive statistics were performed using Wilcoxon rank-sum test for continuous variables and Fisher's exact test for categorical variables. Incomplete surveys were included for analysis.

## **Results**

49 patients responded (29 AD, 20 MCI) with 47 surveys incomplete having one or more questions unanswered. The mean patient age was 77 years with 51% being male and the mean MMSE score being 23.2. Surveys identified that the decision to participate in trials to help others differed by race (91% White, 80% NH, 29% Asian;  $p=0.023$ ). Additionally, 5.6% Asian, 22% NH, and 32% of White patients surveyed were in an active AD clinical trial. 30% of Asian and 80% of NH patients reported the main barrier to participation was a lack of information about clinical trials. Accordingly, additional trial information given to family members (64% Asian, 88% NH) and patients (64% Asian, 88% NH) were listed as the most popular trial improvement methods.

## **Conclusions**

A deficiency in information about AD clinical trials is the primary barrier to participation amongst Asian and NH patients. Increased outreach and education in these communities should be pursued to improve rates of trial participation.

# **Implementation of the Modified Oswestry Disability Index (MODI) in Outcome Assessments for Chronic Back Pain Patients Undergoing Conservative Treatment: A Quality Improvement Project**

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## **Introduction**

The numeric rating scale (NRS) is commonly used to assess pain intensity but only depicts a single dimension of a patient's pain experience.

## **Objective**

The purpose of this study was to evaluate the clinical utility of supplementing the traditional NRS pain scale with the Modified Oswestry Disability Index (MODI) in understanding a patient's chronic back pain experience.

## **Methods**

This study was conducted at a single-center outpatient clinic on patients with chronic back pain from radiculopathy or lumbago with sciatica. 32 patients were administered two surveys before and after completing 6 weeks of conservative pain treatment, including NRS to evaluate pain intensity and MODI to measure functional capacity. Percent change in NRS and MODI scores were calculated and compared using partial correlation analysis. Patients were excluded from the final analysis if they were lost to follow up or had a history of physical therapy for their back pain.

## **Results**

11 of 32 participants were analyzed with a mean age of 54±14. 36% were female, 36% were unemployed, and 90% had public insurance. 2 participants showed a positive correlation between changes in NRS and MODI, while 9 participants showed a negative correlation or no correlation. After adjustment for age, sex, ethnicity, and BMI, there was no significant correlation between changes in NRS and MODI scores (p=.24) in chronic back pain patients.

## **Conclusions**

This study emphasizes that chronic pain is a multidimensional phenomenon, encouraging providers to look beyond isolated assessment such as pain intensity and focus on outcomes most important to patients.

# Psychiatric Disorders Associated with Comorbid Autoimmune Diseases in Multiple Sclerosis

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## Introduction

Multiple Sclerosis (MS) is an autoimmune disease of the CNS that has a high prevalence of autoimmune and psychiatric comorbidities. Previous studies have not addressed how these comorbidities relate to each other.

## Objective

To assess the relationship between comorbid autoimmune diseases and psychiatric disorders in MS, and to elucidate possible environmental factors or health disparities within this relationship.

## Methods

A retrospective case-control study was conducted using patient records at the Hawaii Pacific Neuroscience in Honolulu, Hawaii. Sociodemographic variables, clinical characteristics, and medical comorbidities were collected. Variables between the autoimmune disease status groups were compared using the Wilcoxon rank sum test for continuous variables and Pearson's Chi-squared test or Fisher's exact test for categorical variables. A p-value less than 0.05 was considered statistically significant.

## Results

Of the 109 patients analyzed, 30 (27.5%) patients with MS were found with comorbid autoimmune diseases (ADs). They had a significantly higher prevalence of depression (50% vs. 25%;  $p = 0.0075$ ) and, although not significant, anxiety (30.0% vs. 21.5%;  $p=0.35$ ). Comorbid ADs in MS did not seem to be associated with sociodemographic factors, but did appear to be associated with a significantly higher prevalence of health disparities, such as asthma (26.7% vs. 10.1%;  $p=0.038$ ) and coronary artery diseases (13.3% vs. 2.5%;  $p=0.048$ ).

## Conclusions

Our findings suggest that comorbid ADs in MS are associated with increased risks of depression and other debilitating health disparities. This result can influence treatment options and inter-specialty care management to improve the outcomes in MS patients with comorbid ADs.

# Different Experiences in Chronic Migraine Etiology, Treatment and Comorbidities of Hawaii's Ethnic Groups

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## Introduction

Chronic migraine (CM) is a debilitating condition that disturbs patients' lives, impairing socioeconomic functioning. Under-diagnosis and treatment of chronic migraines is prevalent in minority populations, and it is crucial to identify treatment and comorbidity characteristics of CM patients in Hawaii.

## Objective

To determine racial differences in CM treatment and comorbidities.

## Methods

We performed a retrospective chart review on patients diagnosed with CM at a headache and facial pain center in Honolulu, Hawai'i. 743 patients with a clinic visit from January 27, 2022 to April 27, 2022 were retrieved from eClinicalWorks. Patients without sufficient data or ethnicity were excluded, yielding 298 patients. Socioeconomic demographic variables were collected including race, age, obesity, number of medications and public/private health insurance. The following patient treatment modalities were recorded: Botox, pharmacologic treatment, monoclonal antibodies, and physical therapy.

## Results

Native Hawaiian/Pacific Islander patients had the highest prevalence of obesity (60.9%) at >30% compared to other race groups ( $p < 0.001$ ). History of diabetes was low across all race groups (7.7%). However, NHPI patients had a significantly higher history of diabetes (14.5%) ( $p = 0.004$ ), hypertension (37.7%), >13% higher than other race groups ( $p = 0.01$ ). Significantly more white patients received Botox as therapy (73.9%), >25% compared to other race groups ( $p = 0.02$ ). Public insurance was significantly more common in NHPI patients (59.4%) followed by other minorities (57.1%), with a 9-11% difference compared to other race groups. ( $p = 0.02$ )

## Conclusions

Our findings suggest possible barriers to CM Botox treatment in minority patients. Chronic migraine comorbidities in NHPI patients might also differ from other ethnic groups, which may change CM management in this group.

# Investigating the Neuropathic Electromyography Findings in COVID-19 Patients

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## Introduction

Previous studies have found evidence of myopathic electromyography (EMG) changes in critically ill COVID-19 patients. However, there is limited research on the neuropathic EMG changes involved in COVID-19 patients. This study aims to evaluate the neuropathic EMG findings in COVID-19 patients in Hawai'i.

## Methods

A single-centered, retrospective chart review was performed using the eClinicalWorks electronic medical record data of patients treated at Hawaii Pacific Neuroscience between 2019-2022. Information on patient demographics, chief complaint, EMG findings, past medical history, and neurological review of systems was collected.

## Results

Among 61 patients diagnosed with COVID-19, 7 (11.5%) had an EMG conducted following COVID-19 diagnosis. 5 (71.4%) were males and 2 (28.6%) were females. 4 (57.1%) patients identified as Caucasian, 2 (28.6) as Native Hawaiian/Pacific Islanders, and 1 (14.3%) as Hispanic. EMG findings showed 6 (71.4%) patients presented with radiculopathy, 2 (28.6%) with polyneuropathy, 0 (0%) with myopathy, 0 (0%) with plexopathy, 4 (57.1%) with entrapment neuropathies, and 1 (14.2%) with Guillain-Barre syndrome (GBS).

## Conclusions

Radiculopathy, polyneuropathy, and entrapment neuropathy were the most common EMG findings observed. One patient with a severe case of COVID-19 displayed several EMG findings including multilevel bilateral lumbar motor polyradiculopathy, acute motor and sensory axonal neuropathy, and GBS. Other studies have shown EMG findings of GBS in COVID-19 patients. Thus, GBS may be a potential EMG finding that may be linked to severe cases of COVID-19. However, further research is needed to determine the strength of this correlation.

# Utilization of a Risk Acuity Scorecard for Comparison of Stroke, Pre and Post Therapeutic Lifestyle Intervention

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## Introduction

Stroke is the leading cause of long-term adult disability and fifth leading cause of death in the United States. Modifiable risk factors for stroke, such as hypertension and diabetes mellitus, plague many Americans. Lifestyle medicine was developed to treat lifestyle-related contributors to noncommunicable diseases, like stroke.

## Objective

To determine if HPN stroke patients who have had  $\geq 2$  lifestyle visits will have an improved LMA score. Also, to investigate whether changes in LMA scores are correlated with changes in incidence of high-risk factors for stroke.

## Methods

The Lifestyle Medicine Assessment (LMA) is a clinical tool that is used to assess a patient's overall health risk factors. The stroke risk scorecard is a clinical tool that determines a patient's stroke risk. Pre survey data was collected from 8 patients in HPN's database who met the following criteria: had a previous stroke and had  $\geq 2$  lifestyle visits with Dr. Smith between October 2021-July 2022. These patients were given LMA and PHQ-2 assessments on their first and last visits. Using the stroke risk scorecard, patients were also categorized into high, caution, and low stroke risk groups.

## Results

Overall, no significance was found in both the changes in total LMA scores when comparing high versus low stroke risk groups.

Overall LMA Score by Risk

	Low Risk		High Risk	
	Before, N = 4 <sup>1</sup>	After, N = 4 <sup>1</sup>	Before, N = 4 <sup>1</sup>	After, N = 4 <sup>1</sup>
Overall Score	32.8 (6.5)	39.5 (5.3)	31.2 (3.0)	31.0 (5.8)
P-value	0.125		1	

<sup>1</sup>Mean (SD)

## Conclusions

The low-risk group showed a slight increase in individual LMA domain scores and the mean scores of individual LMA domains in the high-risk group remained relatively unchanged after the initial visit. This study was limited by a small sample size. Further research is needed to determine the effectiveness of the LMA and stroke risk scorecard in reducing stroke recurrence risk.



# Impact of Return-to-Exercise on Traumatic Brain Injury Recovery in a Community Setting

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## Introduction

Recommendations on return-to-exercise post-traumatic brain injury (TBI) remain controversial. This study surveys Hawaii's diverse population to identify trends in exercise and recovery for TBI patients to shape recommendations on return-to-exercise. It also aims to identify health inequities and factors contributing to different outcomes, allowing inequities to be addressed.

## Objective

To investigate the relationship between exercise modalities, intensities, and patterns following TBI and recovery, and to identify health inequities and barriers to recovery that may negatively impact recovery.

## Methods

Retrospective review of patients at TBI Ctr at HPN between January 2020 and January 2022 was performed. Variables collected include demographics, etiologies, and symptoms at diagnosis. Self-generated phone surveys were completed to evaluate exercise patterns post-TBI and barriers to recovery. Statistical analysis was performed using RStudio.

## Results

Patients who recovered within two years displayed similar exercise patterns to patients who took longer. Exercise frequency, intensity, and duration did not differ significantly ( $p=0.75$ ,  $p=0.51$ ,  $p=0.80$ , respectively). Hiking/walking for exercise was more common in the long recovery group ( $p=0.018$ ), likely reflecting advanced age compared to the short recovery group (50 vs. 39 years,  $p=0.003$ ). Otherwise, exercise modalities did not differ significantly. Additionally, no correlation exists between exercise intensity and symptom change ( $p=0.920$ ), suggesting patients exhibit exercise patterns suitable for their specific situations. Finally, when comparing TBI recovery resources accessed and race or insurance type, Caucasian patients utilized the most resources compared to other races and private insurance utilized by far the most resources ( $p=0.032$ ).

## Conclusions

Return-to-exercise does not appear to be a predictor for TBI recovery. If encouraged to exercise post-TBI, patients will self-regulate a regimen not likely exacerbating their symptoms or recovery time, thus it may be suitable to recommend return-to-exercise as tolerated. The study also found worrying inequitable trends in TBI recovery resources accessed, and these disparities should be further investigated to rectify this issue.

# CPAP Adherence Among Obstructive Sleep Apnea Patients in Hawaii

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## Introduction

Obstructive sleep apnea (OSA) is the obstruction or collapse of the upper airway while still maintaining respiratory effort during sleep. Implementing continuous positive airway pressure (CPAP) therapy is commonly used to treat patients with OSA and improve respiration. This study evaluates the CPAP adherence of patients diagnosed with OSA in Hawaii in order to understand and improve current therapeutic approaches.

## Methods

A retrospective chart review was conducted on patients identified using the ICD 10 code for OSA (G47.33) in the (HPN) *eClinicalWorks* database. Data was collected from the most recent chart with a compliance rating by Dr. Sriharsha Vajjala between January 1, 2021 - December 31, 2021. Patients with coexisting diagnoses and ICD 10 codes for central sleep apnea (G47.37) and insomnia due to a medical condition (G47.01) were excluded. Compliance was determined by CPAP use for at least 4 hours a night for at least 70% of the time. Alpha = 0.05 determined statistical significance.

## Results

Of the 126 patients observed, 40.5% of patients showed excellent adherence to CPAP therapy. CPAP adherence was also significantly associated with OSA severity ( $p = 0.02$ ). 49% of patients with severe OSA were compliant while 85.7% of patients with mild/moderate OSA were not compliant to CPAP.

## Conclusions

Our main finding showed that OSA severity was directly associated with improved adherence to CPAP therapy. Likewise, previous studies have reported that having a higher frequency of observed interrupted breathing correlated with better adherence to CPAP therapy.

# Quality of Life in Patients with Refractory Epilepsy with Implanted Vagal Nerve Stimulation

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## Introduction

Neuromodulation-based therapies such as vagal nerve stimulation (VNS) are used for patients with refractory epilepsy. Many studies have shown that VNS reduces seizure frequency,<sup>1</sup> and the impact on quality of life (QOL) in patients implanted with VNS treatment in US cities.<sup>6-8</sup> However, the efficacy, utilization and QOL of life in VNS patients has not been looked at in Hawaii.

## Objective

To evaluate the efficacy, utilization, and QOL impacts of patients implanted with VNS at Hawaii Comprehensive Epilepsy Center.

## Methods

We retrospectively reviewed 37 patients who underwent VNS therapy within the past 10 years. Of these, twelve completed the interview. The mean age of participants was 45.25 years (range of 11-73 years) with the majority being female (83.3%). Patients with VNS identified at our institution completed the Quality of Life in Epilepsy-10 (QOLIE-10) via voluntary telephone survey.

## Results

Of these, the mean QOLIE-10 score was 29.33, with a minimum and maximum of 21 and 44 respectively. By choosing a QOLIE-10 total score of > 25 as an impaired QOL, eight (66.67%) of participants fulfilled this criterion. Majority of participants (83.33%) reported a reduction in seizures since implantation and all participants tolerated the device.

## Conclusions

Many studies reported favorable seizure outcomes to be significantly related to QOL. Here, majority (83.33 %) reported a seizure reduction. Despite the significant improvements in seizure reduction, only four (33.3%) reported a good QOL. Given the deleterious effects of recurrent seizures on the QOL in patients with refractory epilepsy, improved QOL metrics is an important treatment goal in this disorder.

# COVID-19 Impact on Depressive Symptomatology Among the Parkinson's Disease Population within Hawai'i

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## Introduction

In patients with Parkinson's disease (PD), depression is the most common psychiatric comorbidity and often under-diagnosed and under-recognized. Hawaii's diverse cultural landscape is unlike that of other locations which may yield different scientific findings and outcomes. Unfortunately, a study that identifies the correlation between depression and severity of PD has never been done here before.

## Objective

To identify the prevalence of depression in the PD population at Hawaii Pacific Neuroscience, to determine if positively correlated with PD severity, and to investigate the impact the COVID-19 pandemic.

## Methods

We retrospectively reviewed 86 consecutive patients with PD from Hawai'i with a diagnosis of PD from June, 18th 2017 to June 18th, 2022. Depression was defined as a recorded PHQ-2 score of 3 or more during or after the year 2020 or having a diagnosis of depression. Severity of PD was measured by medication dosage amount and frequency, and presence of Dementia. LEDs were calculated based on a previously published algorithm from a systematic review by Tomlinson et al (2010).

## Proposed Results

There was no significant difference in PHQ-2 scores from before COVID-19 (M = 0.93, SD = 1.79) to during COVID-19 (M = 0.84, SD = 1.92) via paired sample t-test. The mean decrease in PHQ-2 scores during COVID-19 was 0.09 (95 CI: -0.17-0.36).

## Conclusions

While our results suggested that there were no significant differences in PHQ-2 scores from before the pandemic to now, future researchers should continue to explore potential protective factors in this population here in Hawaii.

# 2022 Hawaii Pacific Neuroscience Summer Internship Program

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