2020
HAWAII PACIFIC NEUROSCIENCE

SUMMER RESEARCH INTERNSHIP PROGRAM ABSTRACTS

HAWAII PACIFIC NEUROSCIENCE

Honolulu, Hawaii

An Assessment of the Shift in Neurological Care Toward Telemedicine During the COVID- 19 Pandemic

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INTRODUCTION

The novel coronavirus of 2019 (COVID-19) pandemic and the establishment of social distancing measures nationwide called for a substantial change in the delivery of healthcare. Many healthcare organizations, including Hawaii Pacific Neuroscience (HPN), began to implement telehealth services in response. The use of telemedicine has previously been proven successful in remote locations where there is a lack of medical personnel, and its validity has been tested in headaches, multiple sclerosis, Parkinson's, and acute stroke.

OBJECTIVES

This study aims to assess the use and satisfaction of telemedicine during the COVID-19 pandemic in neurological patients seen at HPN.

METHODS

A telephone survey was conducted with HPN patients who were seen between 04/22/2020 - 05/18/2020 that addressed four areas related to their outpatient experience: delivery of care, general well-being, experience with telemedicine, and disease-specific questions. A retrospective chart review was conducted to collect patients' diagnoses and demographics. Patient zip codes and US Census data were used to obtain average education level, socioeconomic status, and density of confirmed COVID-19 cases in patients' geographical region. Patients' characteristics were summarized using descriptive statistics and bivariate associations with the status of telemedicine usage were examined using Mann-Whitney U test or Fisher's exact test. A multivariable logistic regression model was developed for the status of telemedicine usage. With the subset of patients who used the telemedicine, bivariate associations were further explored between the location where they utilized telemedicine and their satisfaction with the telemedicine experience. Statistical analyses were conducted using R and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Data was collected for the 367 patients who responded to the survey questions; 182 patients participated in telemedicine while 185 patients did not. The logistic regression results suggest that for each one mile increase in distance from the nearest HPN location, the odds of using telemedicine increased by 3% (OR=1.03; 95% CI=1.01-1.05) after adjusting for other confounding variables. In addition, as the median household income of a patient increases by $10,000, the odds of the patient participating in telemedicine increased by 16% (OR=1.16; 95% CI=1.02-1.32). It was also found that patients with chronic pain syndrome are 3.39 times more likely to use telemedicine compared to patients without chronic pain syndrome (OR=3.39; 95% CI=1.04-11.04). Of the 182 patients who participated in telemedicine, 93 of them participated in telemedicine at HPN, while the other 89 patients participated in telemedicine at a different facility. HPN telemedicine patients were more likely to find telemedicine appointments easy to participate in (94% vs. 81%; p = 0.013) and as valuable as face-to-face appointments (83% vs. 53%; p < 0.001), compared to telemedicine patients at other facilities. Furthermore, telemedicine patients at other facilities were more likely than HPN telemedicine patients to find that their telemedicine appointment lacked something compared to a regular face-to-face appointment (71% vs. 39%; p < 0.001).

CONCLUSION

Overall, patients were satisfied with their telemedicine experiences during the COVID-19 pandemic. Telemedicine was deemed useful for patients that are farther away from HPN locations and patients diagnosed with chronic pain syndrome, suggesting that telemedicine is a fair healthcare delivery alternative to mitigate any travel inconveniences. Less costly telehealth modalities (emailing, text messaging, phone calls, etc.) may help HPN reach patients in lower income brackets.

Association of Parkinson's Disease Progression and Gastrointestinal Dysfunction in the Hawai'i Population

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INTRODUCTION

Parkinson's Disease (PD) is a progressive disorder of dopaminergic neurons in the brain, resulting in symptoms such as tremor, muscle rigidity, bradykinesia, mood changes, and cognitive impairment. Clinical indicators of PD progression include changes in motor function (using the Unified Parkinson's Disease Rating Scale, UPDRS), drug dosage (Levodopa Equivalent Daily Dose, LEDD) and impairment of daily living activities (dementia, falling). Recent studies on PD show evidence of early onset and/or increasing gastrointestinal (GI) dysfunction in association with PD progression.

OBJECTIVES

To evaluate the relationship between PD and GI dysfunction in the Hawai'i population.

METHODS

A retrospective medical chart review of 149 patients diagnosed with Parkinson's Disease at Hawaii Pacific Neuroscience between June 2010 and July 2020 was conducted. Variables collected include: patient demographics, first and last recorded UPDRS scores, PD medication dosage, presence of falls, dementia diagnosis, GI dysfunction (medication, ICD diagnoses, and frequency of symptoms reported during clinic visits). A PD progression/severity score was calculated by adding the following: (1) change in UPDRS scores (normalized, 0-1pts), (2) change in LEDD (normalized, 0-1 pts), (3) dementia diagnosis (1pt), and (4) presence of falls (1pt). A GI severity score was calculated by adding the following: (1) percentage of appointments a patient reported a GI-related symptom (0-1pts) and (2) GI-related ICDs assigned prior to the last UPDRS score (1pt each).

RESULTS

101 of the 149 patients reported GI-related issues during at least 1 clinic visit and 23 were assigned at least 1 GI-related ICD code prior to their last recorded UPDRS score. 94 patients required an increase in LEDD, 49 showed worsening motor symptoms, 39 reported falls during the last appointment, and 16 were diagnosed with dementia. There was positive correlation observed between PD score and GI score for all 149 patients (r = 0.21, p = 0.01). Women appeared to have a stronger positive correlation (r = 0.30, p = 0.01). Positive correlation between speech/facial expression and diarrhea, hand movement and diarrhea, and leg movement and diarrhea (p = 0.05, 0.0001, 0.0004) were also observed. Of patients with worsening motor symptoms, there appeared to be additional positive correlations between tremor and diarrhea, gait/balance and diarrhea, and gait/balance and swallowing (p = 0.056, 0.007, 0.012).

CONCLUSION

Results show that as PD symptoms progress, GI-related issues tend to be more frequent and/or severe. These findings on the Hawai'i population support current literature correlating progression of gastrointestinal symptom severity and Parkinson's disease severity in the continental US. Further, correlations between diarrhea and individual motor symptoms appeared to be particularly strong and should be considered in future studies.

A Comparative Analysis of Alzheimer's Disease Presentation in Hawai'i's Asian, Caucasian, and Native Hawaiian Populations

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INTRODUCTION

Alzheimer's Disease (AD) has not been studied in the context of Asians and Native Hawaiians as extensively as other racial groups.

OBJECTIVES

The purpose of this study is to investigate how the disease presents differently, in terms of patient characteristics at diagnosis, severity of cognitive impairment, and intensity of behavioral disturbance, across the Asian, Caucasian, and Native Hawaiian populations on Oahu, Hawai'i.

METHODS

Data was extracted from Hawai'i Pacific Neuroscience's (HPN) late onset AD patient records compiled over the past decade. Racial affiliation, age and body mass index (BMI) at diagnosis, Mini Mental State Examination (MMSE) score, Geriatric Depression Scale (GDS) reportation, and usage of antidepressants, antipsychotics, or anxiolytics was noted. Only patients with an MMSE score of 15 or higher were included in GDS analysis to ensure the validity of the reports.

RESULTS

Average diagnosis age in all groups fell within a year of each other, with the youngest group being Native Hawaiians, at 79.8 years. Native Hawaiians were the only group that averaged a diagnosis BMI in the overweight range, with 25.93. Asians posted the lowest BMI at 23.54. A significant difference ($p < 0.05$) in average MMSE score was identified, with Caucasians at 22.4, Asians at 21.1, and Native Hawaiians at 18.2. The proportion of patients on behavioral medication within each race was observed to be highest in Native Hawaiians, at 47% (n = 17), and lowest in Asians, at 27% (n = 38). Antidepressant use was the most common. GDS analysis suggested no significant difference in depressive severity, but was severely limited due to MMSE cutoffs.

CONCLUSION

These findings suggest that Native Hawaiians present with greater cognitive impairment severity and behavioral disturbance intensity than Asians or Caucasians diagnosed around the same age. BMI and socioeconomic status could factor into the observed disparity. Outreach should be directed to the Native Hawaiian population to push for earlier diagnosis and implementation of practices to slow disease progression. There is also a need for a more appropriate depression screening method at HPN, as the GDS has major limitations when used with patients who display cognitive impairment.

The Efficacy of Anti-CGRP Monoclonal Antibody Monotherapy in Comparison to Anti-CGRP and Botox Dual Therapy For Migraine Patients at Hawaii Pacific Neuroscience

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INTRODUCTION

The difference in anti-CGRP mAbs monotherapy treatment versus Botox and anti-CGRP mAbs dual therapy for migraines is largely understudied.

OBJECTIVES

Our study clinically examines the nuances in the effectiveness of the different migraine treatment plans.

METHODS:

A retrospective chart review of patients prescribed monotherapy with Aimovig, Ajovy, or Emgality, and patients prescribed dual therapy with Botox was conducted at Hawaii Pacific Neuroscience. Our monotherapy group included 20 patients and our dual therapy group included 21 patients. Variables recorded were age, gender, and comorbid illnesses such as depression, anxiety, and sleep disorders. Additionally, patient's initial headache days and severity ratings were recorded and compared to their final values taken 1-6 months after treatment. Paired-sample t-tests with alpha=0.5 were conducted for all monotherapy patients vs. all dual therapy patients, as well as for monotherapy vs. dual therapy patients in each age group and severity group.

RESULTS

There was no significant difference in the effectiveness of mono- versus dual therapy in the total patient population. However, monthly migraine days were significantly reduced more by monotherapy in comparison to dual therapy, by an average of 65.5 +- 25.9% for patients with a childhood onset (p=0.021). Monthly migraine severity was also significantly reduced more by monotherapy in comparison to dual therapy, for patients experiencing moderate migraines (p=.05), and those with a childhood onset (p=0.042).

CONCLUSION

These findings suggest that anti-CGRP monotherapy is more effective than botox and anti-CGRP dual therapy for migraine treatment for patients with an early onset of migraines or a moderate initial severity.

Abbreviations: CGRP calcitonin gene-related peptide, mAbs monoclonal antibodies

The Efficacy of Mono versus Dual Antiplatelet Therapy for Recurrent Ischemic Stroke Prevention in Hawaii

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INTRODUCTION

Stroke is the leading cause of disability in the United States and Hawai'i. After patients suffer an ischemic stroke, prescription of aspirin as a mono antiplatelet (MAPT) therapy is considered the gold standard to prevent a recurrent stroke. Recent studies have shown that dual antiplatelet therapy (DAPT), specifically clopidogrel and aspirin, can be more effective at reducing risk of a second stroke compared to aspirin alone. Yet, the efficacy of these two antiplatelet therapies for patients in Hawai'i has not been clearly addressed.

OBJECTIVES

Our study aims to elucidate if this effect will remain consistent with the patients treated at Hawaii Pacific Neuroscience.

METHODS

This study was a single-centered, retrospective medical chart review of stroke patients seen at Hawaii Pacific Neuroscience over a 10 year period from 2010 to 2020. Patients were screened using ICD Codes for ischemic stroke and stratified based on prescribed treatment of mono (aspirin) and dual (aspirin and clopidogrel) antiplatelet therapy. Variables were collected on demographics, comorbidities, date of first stroke, antiplatelet treatment start date, and dates for any subsequent strokes within 12 months following the first stroke event. Efficacy was estimated based on the frequency of recurrent stroke events in the timeframes (30, 90, 150 and 365 days). Statistical analysis was done using Fisher's exact test with an alpha of 0.05.

RESULTS

Data was collected for the 296 patients who fell within our inclusion criteria. Of these patients, 212 patients were prescribed aspirin as MAPT and 84 patients were prescribed clopidogrel and aspirin as DAPT. Our results show that within all time frames, DAPT had a lower relative risk (RR) of recurrent stroke compared to MAPT. Of note, statistical significance was seen in the time frames of 90, 120, 150, and 200 days ($P=0.012$, 0.012, 0.028, and 0.028 respectively). With a time frame of one year, the RR of a second stroke is .34, showing DAPT as more effective ($P=0.053$).

CONCLUSION

We believe statistical significance could be seen at shorter time frames due to the low frequency of recurrent strokes within short time frames and a small sample population. These two factors may have amplified the efficacy of DAPT. In longer time frames, the relative risk is consistent with established studies, which demonstrated a RR=.75, but were statistically insignificant due to a small sample size. The findings in this preliminary study aligns with the studies done in the continental United States and shows the patient population in Hawai'i could benefit from DAPT for secondary stroke prevention. Future studies should further explore this effect with a larger sample size and consider stratifying the efficacy of MAPT versus DAPT based on ethnicity, age, or other comorbidities.

Factors That Affect the Employability of Patients with Epilepsy in Hawaii: A Look at Race, Comorbidities, and Marital Status

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INTRODUCTION

Many studies have demonstrated that unemployment rates among patients with epilepsy are higher than the general public. However, no such study has been completed in Hawaii. Hawaii offers unique perspectives on this problem because of its diverse population and can identify whether epilepsy affects different races at a higher rate. This study focused on a patient population in Hawaii and looked at the rates of unemployment among patients with epilepsy compared to patients with other neurological diagnoses. Factors that affected employability of these patients and variation in employment rates between patients of different racial backgrounds was also explored.

OBJECTIVES

Establish the rate of unemployment among patients with epilepsy in Hawaii and identify key factors that affect employability.

METHODS

An IRB approved retrospective chart review of 500 patients with epilepsy (PWE) at Hawaii Pacific Neuroscience (HPN) was performed. Patients were identified using ICD-10 codes and were included in the study if they were seen at HPN in the last year, reported employment status, and were at least 18 years of age. 510 controls were randomly selected from the patients at HPN and were included if they reported employment status, were at least 18, and were not diagnosed with epilepsy. Both groups were comparable in age, sex, and race. Statistical analyses were performed using the χ^2 test, Tukey's HSD multiple comparison test (ANOVA), and independent sample T-tests. For all tests, an alpha of .05 was used to indicate significance and were performed using SPSS.

RESULTS

Of the 500 patients with epilepsy, 45.2% reported to be unemployed or disabled while only 28.2% were employed. This differed significantly from the reference group wherein only 20.9% were unemployed or disabled and 49.4% were employed ($p < 0.001$). In regards to marital status, of the PWE, 46.8% were single and only 35.0% were married, whereas in the reference group only 33.0% were single and 47.0% were married ($p < 0.001$). A positive correlation between marital status and employment was found; patients were more likely to be employed if they were married ($p < 0.001$). PWE were not only more likely to have multiple comorbidities ($p < 0.001$), but it was demonstrated that PWE were also more likely to be unemployed when compared to reference patients with the same number of comorbidities. Furthermore, PWE were more likely to be depressed (OR=1.32; 95% CI 1.00-1.74; $p < 0.001$) compared to the reference group.

CONCLUSION

Not only was there a significant increase in unemployment rates in PWE at HPN, but PWE were also more likely to be single, more likely to have multiple comorbidities, and more likely to be depressed. These findings highlight the need for increased support in helping PWE connect with employment opportunities and appropriate mental healthcare. Future work can be done to analyze which factors have the most significant effect on employability and to assess support systems and quality of life in PWE.

A Retrospective Analysis of the Association Between Economic Status and Severity of Disease in Multiple Sclerosis Patients in Hawaii

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INTRODUCTION

Multiple sclerosis (MS) is a chronic, immune-mediated disease that affects the central nervous system through demyelination. The exact causes of MS remain unknown. Disparities in socioeconomic status have been known to increase the progression and severity of certain diseases, negatively affecting quality of life. In Hawaii, high costs of living and particularly high taxes on low-income households contribute to the state's growing income inequality. This study will focus on the effect of economic status on the severity of MS in patients in Hawaii. Based on the current literature, we predicted an association between economic status and severity of MS.

OBJECTIVES

Determine if there is an association between severity of disease and economic status in MS patients seen at Hawaii Pacific Neuroscience (HPN).

METHODS

A standardized retrospective analysis was conducted using the eClinicalWorks data of 74 MS patients treated at HPN between 2010 and 2020. Severity of MS was measured in three ways: the proportion of patients with the presence of severe pain (self-reported pain scores >5) within the last physician visit, the presence of clinical worsening (relapses, exacerbations, attacks, and flare-ups) within the past year of treatment, and the presence of abnormal ambulation using the Disease Steps (DS) scale criteria (scores >1). Patients were categorized by either private or public insurance level (high and low economic status respectively). Further statistical analysis was conducted using chi-square tests. Patients with limited data, out-of-state residence, and absence of the G-35 ICD-10 code for MS were excluded from the study.

RESULTS

A greater proportion of public insurance patients reported severe pain when compared to private insurance patients (public insurance = 37.5% versus private insurance = 5.6%). This finding was statistically significant, X2 (1, N=74)=6.654, p=.01. No significant differences were seen between insurance level and presence of clinical worsening. No significant differences were seen between insurance level and the presence of an abnormal ambulatory status.

CONCLUSION

MS patients within a lower economic status are more likely to display severe pain when compared to patients of a higher economic status. However, changes in ambulation and clinical worsening were not linked to differences in economic status. Thus, it cannot be strongly concluded that the severity of MS is affected by economic status.This is mainly an exploratory study. Future studies with a larger sample size, standardized patient records, and inclusion of social factors (education, occupation, ethnicity, language spoken at home) should be conducted to obtain more representative results.

2020 Hawaii Pacific Neuroscience Research Internship Program Students

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Patient Advocate: Rena

My name is Rena & I've had epilepsy for 20 years. I've been involved with clinical research for 3- 5 years. Research is important because it finds medications that can help and save peoples lives. For me, it's very important because I need medication that can help control my seizures. At this very moment, the phrase "clinical trial" is being heard around the world. Due to the pandemic caused by COVID-19, clinical research is a top priority. The current situation should definitely encourage people to be involved with clinical research, including students, doctors and patients. I've learned that Clinical Research is responsible for having medications approved. We need hardworking people to help make it work. Aloha!