Improving access to care for patients with migraine in a remote Pacific population

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Abstract

Objective

To evaluate the efficacy of increasing access to care for patients with migraines in a rural setting. Outcomes include decreased resource utilization, decreased hospitalizations, polypharmacy reduction, and decreased disability in a remote Pacific population.

Methods

Data were collected on all patients presenting to a single neurologist in a deployed military setting for migraines. Access to care was supplemented through health fairs, radio shows, telemedicine, and education of primary care providers.

Results

Over the course of 1 year, 300 providers were educated through public health fairs and telemedicine counseling. This strategy helped reduce consults by 50% and decrease clinic wait times from 2 months to 7 days. Two hundred twenty-one patients with chronic migraine or episodic migraine were seen in the neurology clinic over the course of 1 year. Of these patients, polypharmacy reduction was achieved in 71% of patients with chronic migraines and in 44% of patients with episodic migraines. Over the course of 1 year, only 13% of patients with chronic migraines and 11% of patients with episodic migraines were treated in an acute care setting. Less than 2% of patients had limitations in their work duties because of migraines.

Conclusion

Increased access to care provided benefits in reduction of specialist overutilization, reduction in hospitalizations, and reduction in disability. Patients with chronic migraine did not have increased use of medical resources or decreased productivity in this cohort.

Migraines and chronic migraines remain a major source of disability and resource utilization in the United States, affecting 1 in every 6 Americans.¹ Migraine is a condition that can exhaust a substantial amount of resources and medical care. Emergency department visits and acute care appointments lead to multiple tests, invasive procedures, and overprescribing.²⁻⁴ Chronic migraine is an even greater economic cost because these patients tend to visit primary care providers, specialists, and emergency departments more often than patients with episodic migraine.⁵ Total direct and indirect medical costs are 4.4 times greater for chronic migraine than for episodic migraine.⁶ There are also direct costs due to loss of productivity. Patients are less likely to be employed and have substantially more missed work or school time.⁷⁻⁹ Both economically and socially, it is recognized that chronic migraine is associated with substantial disability and poor quality of life.^{10,11}

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At each appointment, education of patients was encouraged with 15 minutes of formal didactics in lifestyle modifications for migraine management. Polypharmacy reduction was encouraged through a guided weaning process.

However, through education, providers can help prevent polypharmacy and unnecessary diagnostics. We hypothesized that increased access to care, public awareness, and provider education would improve outcomes for patients with chronic migraines. We present an active duty and dependent population in the remote Pacific who benefited from improved access to care, counseling on lifestyle modification, and polypharmacy reduction. A single neurologist implemented this approach to engage non-neurologists in the treatment of migraines, with a focus on improving safety, reducing polypharmacy, and decreasing hospitalizations.

Methods

Our quality improvement project was initiated to improve patient access to care in a setting with limited resources. The study was approved through the NAVMED West, US Naval Hospital Okinawa institutional review board and complied with all ethical guidelines. Our selected population consisted of all patients older than 18 years of age presenting to the neurology clinic at US Naval Hospital Okinawa between September 2014 and December 2015 for episodic migraine or chronic migraine. Patients were excluded if there was a history of secondary headache disorder, severe traumatic brain injury, or intracranial complication. Diagnoses were made by a single neurologist at the US Naval Hospital Okinawa. Chart review was performed on 221 patients who were seen in the Neurology Clinic over this timeframe. All patients had persistence of headaches for >4–6 weeks after initial treatment by a primary care provider or traumatic brain injury specialist.

Access to care was achieved by education of the public, health care providers, and patients through multiple modalities, all of which were approved by the public affairs office at the US Naval Hospital Okinawa. Public health fairs catered to the 65,000 Americans living on Okinawa. Radio shows were broadcasted quarterly across the island through a weekly public health channel and armed forces radio to spread awareness and manage expectations for patients with migraines. Continuing medical education courses were provided for over 300 providers and primary

care physicians of the United States Military, which emphasized lifestyle modifications. Finally, access to care was enhanced through telemedicine (Pacific Asynchronous TeleHealth) between the neurology provider and general medical providers in the Pacific. This allowed the physician to provide real-time encrypted and electronic medical record review, in addition to direct medical advice for providers who were without access to a neurologist. These strategies were used to improve access to care while minimizing resource utilization.

At the time of presentation to the neurology clinic, patients were assessed for continued ability to serve in an active duty, deployed status, and working at full capacity. The frequency of clinic visits, emergency department visits, and hospitalizations was monitored at each appointment. The presence of polypharmacy was documented. Polypharmacy was defined as greater than or equal to 3 medications prescribed for headaches or migraines. Use of both abortive and preventative migraine medications was documented at each clinic visit.

At each appointment, education of patients was encouraged with 15 minutes of formal didactics in lifestyle modifications for migraine management. Polypharmacy reduction was encouraged through a guided weaning process. This was performed by decreasing the dose or frequency of abortive and preventative medications. Patients were continued or started on preventative or abortive therapies based on the side effect profile, previous medication trials, and availability of these medications at the Naval Hospital Okinawa. Some service members were not trialed on level A medications because of military duties which restricted the use of these medications. Because of the complex nature of military operations, some medications will deem patients “nondeployable” and may alter military careers. This made our approach unique and necessitated the use of alternate medication strategies and a multimodal approach to care. In this deployed setting, neuromodulation devices and calcitonin gene-related peptide inhibitors were not available. Patients with chronic migraines or post-traumatic headaches were offered botulinum toxin chemodenervation as an adjunctive treatment during polypharmacy reduction. This treatment was FDA approved for chronic migraine. Botulinum toxin was supported for use in post-traumatic headache disorders based on expert opinion and supportive retrospective data. Defense and Veterans Brain Injury Center guidelines provide treatment recommendations for management of post-traumatic headaches in deployed settings.¹² In post-traumatic headaches, consideration of botulinum toxin chemodenervation was recommended if oral prophylaxis had been ineffective, not tolerated, or was contraindicated.^{13–17} Botulinum toxin injections were dosed at 155 units, and dosing was not changed. The interval for treatment frequency was extended from 3 months, as tolerated by the patient. If a patient remained headache free, he or she would extend the time interval between treatments with botulinum toxin by 1 or more months.

Standard protocol approvals, registrations, and patient consents

Approval from an ethical standards committee to conduct this study was received. No human or vertebrate experiments were performed, and all patient information has been deidentified.

Data availability

Individual deidentified participant data have been shared with the journal and reviewers but cannot be made available to the general public given Department of Defense regulations.

Results

From 2014 to 2015, all patients seen in the neurology clinic for episodic or chronic migraine had been previously treated by a provider who attended the continuing medical education series provided by a local neurologist. In total, 300 providers had attended the educational series, and many others were educated through public fairs or telemedicine counseling. Patients were managed remotely in rural areas and other areas of Southeast Asia such as South Korea, Guam, and mainland Japan. The methodology and strategies for outreach outlined above proved successful in spreading awareness and increasing access to care. A single neurologist was successfully able to manage a cohort of 65,000 patients with evidence of decreased hospital burden and improved patient outcomes. Consults from primary care providers for migraine management were reduced from an average of 30 per week to 15 per week. This estimate was based on provider experience and referral management system chart review. This allowed the department to decrease wait times for an initial appointment within the neurology clinic. Average waiting times were reduced from 2 months to 7 days for all patients presenting to the neurology clinic after 1 year of program initiation.

For direct patient care, data collection included 221 patients who were treated by a neurologist over 806 appointments. Of these, 6 were excluded because of a secondary cause of headache. Fifty-six percent of patients were active duty and 44% were family members or active duty dependents. Of the patients who met inclusion and exclusion criteria, 135 were diagnosed with episodic migraines and 80 were diagnosed with chronic migraines. Patients with episodic and chronic migraines did not differ regarding their duty status, sex, or comorbidities.

At the first visit, 22.5% of patients with a diagnosis of chronic migraines and 14% of patients with episodic migraines had been taking 3 or more medications for acute pain management or headache prevention. After meeting with the neurologist at the US Naval Hospital Okinawa, 37.8% of patients with episodic migraines and 41.1% of patients with chronic migraines were removed from these medications. Before the Neurology appointment, 20% of patients had been prescribed medications with level A evidence for migraine

prevention. Afterward, 39% of patients were prescribed migraine preventative medications with level A evidence.¹⁸ Preventative medications with level B, C, and U evidence were reduced, and all narcotics were discontinued. The lists of preventative and abortive therapies used to treat migraine before and after neurology evaluation are included in tables 1 and 2. Botulinum toxin was used in 45% of patients with chronic migraine and in 11.85% of patients with episodic migraine. Weaning from botulinum toxin by increasing the treatment interval from standard 3 months was achieved in 89% of patients with chronic migraines and in 68.75% of patients with episodic migraines. The maximum extended interval between treatments with botulinum toxin was 12 months. Overall polypharmacy reduction or botulinum toxin treatment reduction was achieved in 71.25% of patients with chronic migraines and in 43.7% of patients with episodic migraines.

Utilization of health care resources was tracked by documenting the number of emergency department visits or

Table 1 Preventative therapies used to treat migraine before and after neurology evaluation

Preventative medications	Pre-Neurology	Post-Neurology
Level A	Divalproex sodium	Divalproex sodium
	Topiramate	Topiramate
	Propranolol	Propranolol
		OnabotulinumtoxinA
Level B	Amitriptyline	Amitriptyline
	Atenolol	
Level C	Lisinopril	Lisinopril
	Clonidine	
Level U	Acetazolamide	Acetazolamide
	Gabapentin	Gabapentin
	Verapamil	Verapamil
	Magnesium oxide	Magnesium oxide
	Indomethacin	Indomethacin
	Trazodone	Trazodone
	Sertraline	Sertraline
Other	Lamotrigine	Citalopram
	Pregabalin	Duloxetine
	Citalopram	Cyclobenzaprine
	Duloxetine	Nortriptyline
	Cyclobenzaprine	
	Nortriptyline	
	Methocarbamol	

Table 2 Abortive therapies used to treat migraine before and after neurology evaluation

Abortive medications	Pre-Neurology	Post-Neurology
Level A	Rizatriptan	Rizatriptan
	Frovatriptan	Sumatriptan
	Sumatriptan	Naratriptan
	Naratriptan	Aspirin
	Aspirin	Ibuprofen
	Ibuprofen	Naproxen
	Naproxen	Acetaminophen
	Acetaminophen	
Level B	Ketorolac	Promethazine
	Hydrocodone	Prochlorperazine
	Promethazine	Butalbital/acetaminophen/ caffeine
	Prochlorperazine	
	Butalbital/acetaminophen/ caffeine	
Other	Ondansetron	Ondansetron
	Prednisone	
	Oxycodone	

hospitalizations for migraine. Over the 1-year course of treatment, 12.6% of patients with episodic migraines and 11.25% of patients with chronic migraines had been seen in an emergency department or inpatient setting for migraines. Patients were also assessed for their ability to remain active duty, performing at full capacity as required for deployed military settings. Two patients (2.5%) with chronic migraines and 2 patients with episodic migraines (1.48%) were unable to maintain full duty capacity and had recommendations to return to the mainland United States for more specialized treatment. This meant that an average of 98% of patients maintained an ability to work at a full performance capacity without limitation in a deployed setting.

Discussion

This approach focused on resource utilization to spread awareness and access to care for patients with migraine. Our implementation strategy included the following steps to increase access to care, decrease polypharmacy, and decrease the burden of headache-related disability:

1. Create an action plan to increase access to care. This should enhance public awareness, primary care provider education, and direct teaching during clinic visits.

2. Obtain institutional support and permission for the project.
3. Attend community events to promote health and provide information in simple language.
4. Participate in community health fairs with a dedication toward lifestyle management, sleep hygiene, stress reduction, and trigger avoidance in the treatment of migraines.
5. Collaborate with other providers who provide treatment for migraines to provide remote care to rural areas and initiate proper migraine management early. This will allow treatment initiation and implementation of lifestyle techniques before a specialist appointment.
6. Use radio broadcasting as a way to spread awareness and conservative treatment strategies for patients with migraines.
7. Use every specialist visit as a time to discuss polypharmacy reduction.
8. Obtain patient feedback verbally during each visit.

We hope that through implementation of this technique, appropriate treatment and prevention of migraines would begin before an appointment with the neurologist. Decreased referrals and shorter time to initial visit were considered evidence of success. Through spreading awareness and increasing access to care, the patients assessed required less acute care appointments, emergency department treatments, or specialty referrals. However, it remains possible that the population's migraine burden or referral base could have changed for other reasons, including the lack of perceived efficacy. In addition, detailed outcome measures and data regarding polypharmacy or resource utilization for the greater population of Okinawa were limited.

This cohort demonstrated that early time to evaluation, education, and access to care had a favorable effect on the chronic migraine population. Our chronic migraine population did not suffer regarding their ability to maintain a full employment status. Furthermore, patients with a history of chronic migraine did not have more emergency department visits or acute care appointments. Thus, these patients did not use increased economic resources as compared to patients with episodic migraine. Future studies may include other markers for a detailed comparison of the productivity between patients with chronic migraine and episodic migraine. We would recommend assessing resource utilization by patients with chronic migraines vs episodic migraines before and after improvements in access to care are made.

Polypharmacy reduction was achieved for both patients with episodic and chronic migraine. Interestingly, polypharmacy reduction and decreased resource utilization proved as effective or more effective in patients who had been diagnosed with chronic migraines vs those with episodic migraines. This finding was likely subject to multiple confounders, including the higher prevalence of polypharmacy before presentation

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in patients with chronic migraine or increased utilization of botulinum toxin treatments in these patients. The results were not adjusted for these variations between groups. Study limitations include a lack of documentation regarding migraine severity, frequency, or duration before or after intervention.

Our study assessed the unique challenge of a single neurologist serving in a remote setting using multiple modalities to reach a relatively large population of patients with migraines. Population-based education using media and community resources to treat a disease process is not a new concept.^{19,20} This approach is not frequently used in the treatment of migraines but is clearly beneficial for this highly prevalent condition. Our focus was improving patient safety by reducing polypharmacy and hospitalizations while maintaining productivity in one of the hottest islands in the Pacific.

Using our combined approach of public education, provider education, and direct counseling, we reduced polypharmacy by nearly 40 percent, decreased neurology referrals by half, and limited emergency department visits among our large clinic population. Full-capacity employment was maintained by 98% of the population. Despite the study limitations including a lack of preintervention data, more extensive outcome measures, and a relatively small sample size, our intervention demonstrated positive results for both patients with episodic and chronic migraine in this population. The methods outlined above can serve as a basis for treatment in rural areas or areas with limited access to neurologists. It appears that these benefits were greater in patients with chronic migraine as compared to episodic migraine. Further studies are recommended to assess these conclusions in a more controlled and long-standing fashion.

Disclaimer

The views expressed in this chapter are those of the author and do not reflect the official policy of the Department of Army/Navy/Air Force, Department of Defense, or U.S. Government. This research does not reflect the views or opinions of the United States Military or Government.

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Appendix Authors

Name	Location	Contribution
Nawaz Hack, MD	Walter Reed National Military Medical Center	Major role in the acquisition of data and revised the manuscript
Virginia Baker, MD	Walter Reed National Military Medical Center	Analyzed the data, drafted the manuscript, and submitted the publication

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