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Original Article

Management of Pediatric Migraine in a Tertiary Care Versus Community Based Emergency Department: An Observational Pilot Study

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ABSTRACT

BACKGROUND: Because of a lack of guidelines for the management of pediatric migraine in the emergency department setting, marked variations in treatment protocols exist between institutions. We aimed to characterize differences in management strategies for pediatric migraine treatment between a community-based and a tertiary care emergency department. **METHODS:** A retrospective cohort study was performed to include pediatric patients presenting with headache fulfilling the International Classification of Headache Disorders-2 migraine criteria in a tertiary care (site 1) and a community based (site 2) emergency department. The two sites were compared with respect to patient demographics and approach to treatment. **RESULTS:** A total of 158 patients at site 1 (mean age 13.6 years, 70% female, 68% African-American) and 63 patients at site 2 (mean age 16.7 years, 71% female, 100% Caucasian) were analyzed. Opiate use (7.6% vs. 33%), imaging (6.3% vs. 20.6%), use of nonsteroidal anti-inflammatory drugs/serotonin agonists at discharge (72.7% vs. 22.2%), and admission rates to hospital (22% vs. 0%) were significantly different. Logistic regression analysis indicated that the main predictors of hospital admission were use of opiates and intravenous combination abortive therapy. **CONCLUSION:** Low rates of intravenous combination therapy, antidopaminergic agent, and serotonin agonist use were noted across both hospital settings. Community-based physicians used opiates and obtained neuro-imaging more than those in the academic setting. Standardization of care in the emergency setting coupled with reliable acute care plans that are based on evidenced-based guidelines can allow for better control of episodic migraine and reduce emergency department visits.

Keywords: migraine, standard combination therapy, emergency department, opiates, neuroimaging

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Introduction

Headache is the third most common reason for emergency department (ED) visits by children in the United States.[1] Migraine accounts for 8.5% to 18% of all such visits.[2,3] Episodic migraine that leads to frequent ED encounters imposes a significant economic burden on families and the health care system because of direct costs of treatment and indirect costs that result from lost productivity of caregivers. Migraine may also have a negative effect on a child's overall well-being and functional ability and has been associated with a predisposition to psychiatric illnesses, including depression and anxiety.[4] Studies have shown higher rates of learning disabilities and attention deficit hyperactivity disorder in children with migraine.[5] Timely and appropriate treatment of migraine may decrease the impact of the disease on the child and the family.

Various therapeutic modalities are available for management of episodic attacks of migraine. These include

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TABLE 1.
Comparison of patient characteristics and home medication use at the two sites

Variable	Site 1 (n = 158)	Site 2 (n = 63)	*P* Value
Age, yr			
Mean ± SD (range)	13.6 ± 2.9 (5-18)	16.7 ± 3.2 (6-21)	<0.001*
<13 yr, n (%)	52 (32.9)	6 (9.5)	
≥13 yr, n (%)	106 (67.1)	57 (90.5)	
Ethnicity			
African American, n (%)	107 (68)	0	<0.001†
Caucasian/others, n (%)	51 (32)	63 (100)	
Female gender, n (%)	110 (70)	45 (71)	0.871†
Duration of headache before presentation to the ED (hr)			
Mean ± SD	44.3 ± 44.1	52.9 ± 74.8	0.264*
Median (IQR)	24 (36)	23.5 (66.7)	
Self-reported history of migraine, n (%)	67 (42.4)	52 (82.5)	<0.001†
Severity of migraine			
Moderate	40 (25.3)	15 (23.8)	0.865†
Severe	118 (74.7)	48 (76.2)	
Rescue medication use before ED visit, n (%)	104 (65.8)	47 (74.6)	0.262†
Analgesics	96	31	
Triptans‡	5	7	
Triptans‡ + analgesics	3	9	

Abbreviations:
ED = Emergency department
IQR = Interquartile range
SD = Standard deviation
Site 1 is an ED affiliated with an academic institution; site 2 is a community-based ED.
* Mann-Whitney test.
† Fisher's exact test.
‡ Triptans refer to serotonin agonists used for management of acute migraine.

analgesics (acetaminophen, nonsteroidal anti-inflammatory drugs [NSAIDs]), dopamine antagonists, "triptans" (serotonin agonists), and various combinations thereof. One such migraine "cocktail" is referred to as the standard combination therapy, a term applied by Leung et al. that refers to the intravenous use of normal saline, an NSAID, an antidopaminergic agent, and diphenhydramine in combination for the acute treatment of migraine.[6]

Although guidelines exist for the treatment of acute migraine,[7] there are no practice parameters for the management of pediatric migraine in the emergency setting. The high rates at which children with migraine return after initial treatment in the ED[8] speaks to the fact that treatment strategies currently being used may not be optimal. In addition, significant variations exist with respect to pediatric migraine management practices across EDs.[9]

The aim of this study was to characterize patient demographics and evaluate differences in management strategies between a tertiary care and a community-based ED in the treatment of pediatric migraine.

Materials and Methods

Data source

A retrospective cohort study was performed by reviewing electronic medical records of children who were seen at two EDs in the Metro Detroit area between June 2011 and June 2012 for the chief complaint of "headache." A total of 2208 patient records were available for analysis from site 1 (Children's Hospital of Michigan) and 316 from site 2 (Huron Valley Sinai Hospital). Site 1 is a tertiary care pediatric ED; site 2 refers to the pediatric section of a suburban ED that serves a mixed adult and pediatric population. Individuals up to 21 years of age are triaged to the pediatric section of this ED. Site 1 is staffed by physicians with specialized training in pediatrics or pediatric emergency medicine, whereas site 2 employs physicians who are primarily trained in emergency medicine.

Inclusion and exclusion criteria

Patients at both sites whose ED documentation fulfilled the International Classification of Headache Disorders-2 (ICHD-2) criteria for "migraine with aura" and "migraine without aura" were selected. That children often have migraine that is bilateral and of shorter duration than in adults was recognized. Patients with comorbidities that might contribute to headache were excluded. Other patients that were excluded from the study presented with previous neurosurgery, history of neoplasms in the central nervous system, idiopathic intracranial hypertension, trauma or radiation to the head in the past 12 months, and underlying systemic diseases (eg, diabetes, systemic lupus erythematosus, sickle cell disease).

Data analysis

The study was approved by the Wayne State University School of Medicine Institutional Review Board. Data were analyzed by two independent reviewers (A.E., R.A.). Both reviewers were trained in identifying ICHD-2 criteria for diagnosis of migraine, and a standard abstraction form was used. Ten percent of all charts were randomly cross-checked by one of the investigators for conformity and adherence to previously discussed guidelines (L.S.). In cases in which there was lack of agreement, a diagnosis of migraine was based on iterative discussion among team members.

Statistical analysis

Demographic variables were summarized using descriptive statistics. Continuously scaled variables were reported using mean, standard deviations, medians, and interquartile ranges. Categorically scaled variables were reported using proportions and ratios. Comparison between the two sites for categorically scaled variables was done using a nonparametric Fisher's exact chi-square test. Comparison between sites on continuously scaled variables was done using a nonparametric Mann-Whitney U test.[10]

Statistically significant differences in proportions and means were considered achieved at a P value ≤ 0.05, two-tailed. A binary logistic regression analysis was performed to examine the potential predictors of admission to the hospital. The odds ratio as well as the 95% confidence intervals of the odds ratio were reported. All statistical procedures were