

# Recurrence of Primary Headache Disorders After Emergency Department Discharge: Frequency and Predictors of Poor Pain and Functional Outcomes

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**Study objective:** We determine the frequency of moderate or severe headache during the first 24 hours after an emergency department (ED) visit for a primary headache disorder (such as migraine or tension-type headache), determine the burden of headache during the 3 months after the ED visit, and identify predictors of poor pain and functional outcomes after ED discharge for each of these periods.

**Methods:** In this prospective cohort study, we enrolled headache patients during their initial ED visit, interviewed them by using a standardized questionnaire, and followed them by telephone 24 hours and 3 months after ED discharge. Two emergency physicians classified all headaches according to criteria established by the International Headache Society, using a valid questionnaire and a reproducible technique.

**Results:** During an 18-month period, we enrolled 309 primary headache disorder patients in the cohort. The most common primary headache diagnoses assigned to patients were migraine, tension-type headache, and unclassifiable recurrent headache disorder. We successfully obtained follow-up in 94% of patients 24 hours after ED discharge and in 94% 3 months after ED discharge. Moderate or severe headache was present within 24 hours of ED discharge in 31% (95% confidence interval [CI] 25% to 38%) of migraine patients, 19% (95% CI 9% to 36%) of tension-type headache patients, and 27% (95% CI 18% to 38%) of the unclassifiable headache patients. Multiple functionally impairing headaches occurred during the 3 months after ED discharge in 37% of migraine patients (95% CI 30% to 44%), 38% of tension-type headache patients (95% CI 23% to 54%), and 26% of the unclassifiable headache patients (95% CI 17% to 37%). After multivariate adjustment, independent predictors of poor 24-hour outcomes were severe baseline pain, baseline nausea, screening positive for depression, and longer duration of headache; the independent predictor of poor 3-month outcomes was Medicaid insurance.

**Conclusion:** Regardless of type of primary headache disorder, ED headache patients frequently experience pain and functional impairment during the hours and months after discharge. [Ann Emerg Med. 2008;52:696-704.]

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## INTRODUCTION

### Background

Headache is the fifth most common emergency department (ED) chief complaint, causing 5 million visits annually in the United States.<sup>1,2</sup> The majority of these headache visits are for acute exacerbations of episodic primary headache disorders, most

commonly migraine, tension-type, and unclassifiable recurrent headache.<sup>3-5</sup> Effective treatments for the acute headache exist, but patients often have a recurrence or persistence of the initial headache after ED discharge.<sup>6-16</sup> A precise estimate of recurrence or persistence of headache after ED discharge is limited by methodologic differences in studies performed to date. These

### Editor's Capsule Summary

#### *What is already known on this topic*

Migraine headaches commonly recur after emergency department (ED) discharge, but estimates of the recurrence rate vary widely.

#### *What question this study addressed*

This prospective study enrolled 309 ED patients with primary headache disorders and determined the frequency of recurrent headache and degree of headache-related disability within 24 hours of discharge.

#### *What this study adds to our knowledge*

Moderate or severe headaches recurred within 24 hours in almost one third of patients with migraine. The method of analgesia management in the ED did not seem to influence the recurrence rate.

#### *How this might change clinical practice*

In light of the high likelihood of recurrent headache, emergency physicians should consider prescribing antimigraine agents at discharge.

differences include variability in inclusion criteria, inconsistency in defining the outcome of interest, and large numbers of patients lost to follow-up.<sup>6-16</sup> Despite these methodologic limitations, there is agreement among studies that headache within 24 hours of ED discharge is common, regardless of treatment. Postdischarge headache was reported by 23% to 71% of patients treated with an opioid,<sup>9,16,17</sup> 64% of those treated with dihydroergotamine,<sup>9</sup> 55% to 73% of those treated with sumatriptan,<sup>6,12,13</sup> 18% to 66% of those treated with an antiemetic,<sup>7,8,12-14,18,19</sup> and 87% of those treated with ketorolac.<sup>17</sup> Many of these 24-hour headaches are moderate or severe and often they are functionally disabling. It is not known whether there are differences in 24-hour pain and functional outcomes among various primary headache disorder diagnoses.

The discomfort of patients with primary headache disorders continues beyond the 24 to 48 hours of the acute attack and recurrence. Headache disorders are chronic diseases characterized by repeated acute exacerbations that occasionally merit an ED visit. It is possible to establish the severity of the underlying headache disorder with questionnaires that score an individual's headache-related functional disability during an extended period.<sup>20</sup> This type of assessment has yet to be performed in a US ED. Data from primary care clinics indicate substantial underlying headache-related functional disability in patients who consulted their primary care physician for management of headache.<sup>21</sup> There are effective interventions for patients with debilitating primary headache disorders. Thus, recognizing the severity of the underlying disease is important.

Various clinical features have been associated with poor pain outcomes after treatment for headache. Increasing levels of pain at ED discharge and longer headache duration before treatment are associated with a greater risk of 24-hour headache.<sup>11,22,23</sup> Migraines that are treated when the pain is mild are less likely to recur.<sup>24</sup> In the outpatient setting, a patient's history of headache-related functional disability can be used to predict long-term medication needs prospectively and to decrease the economic burden of illness.<sup>20</sup>

In the US health care system, many ED patients cannot access neurology or headache specialty care.<sup>25,26</sup> Timely primary care appointments can also be difficult to obtain,<sup>27</sup> and ED patients frequently fail to appear for scheduled appointments.<sup>28,29</sup> Therefore, it is important for the emergency physician to understand the magnitude of postdischarge headache and which patients are most at risk. Having this information can be used to guide choice of medication, discharge instructions, and urgency of specialty referral.

### Goals of This Investigation

We determined the frequency of moderate or severe headache during the 24 hours after an ED visit for primary headache disorder, determined the burden of headache-related functional impairment during 3 months after the ED visit, and tested 2 specific hypotheses: (1) that duration of headache and discharge pain intensity predict presence of a moderate or severe headache within 24 hours of ED discharge; and (2) that a patient's history of headache-related disability predicts burden of headache during the 3 months after ED discharge. Secondarily, we identified other predictors of poor pain and functional outcomes after ED discharge.

## MATERIALS AND METHODS

### Study Design

This was a prospective cohort study of patients who presented to the ED primarily for headache. We enrolled eligible patients at the ED visit and followed them 24 hours and 3 months after the initial visit. The study was approved by the institutional review board of Montefiore Medical Center. We obtained written informed consent from all enrolled patients.

### Setting

The study was conducted at Montefiore Medical Center, an urban, tertiary referral center serving a largely underrepresented minority population in the Bronx, New York.

### Selection of Participants

We enrolled adult patients who presented to the ED with a chief complaint of headache if they had a normal mental status and if the attending emergency physician thought the patient was unlikely to have a worrisome secondary cause of headache, such as subarachnoid hemorrhage, space-occupying lesion, or meningitis. Research associates were available to enroll patients 24 hours per day, 7 days per week.

## Methods of Measurement

We initially interviewed patients for 20 minutes in the ED, using questions from a computer-assisted telephone interview that has been validated in population-based headache research.<sup>30</sup> The interview instrument has been published.<sup>3</sup> Twenty-four hours after ED discharge, we contacted all patients by telephone and asked them to recall the intensity of their worst headache since ED discharge and the associated functional impairment. Three months after ED discharge, we again contacted all patients by telephone and asked them to complete a disability questionnaire for the preceding 3 months. Patients who could not be contacted by telephone were followed up by express courier and home visit by investigators.

During the initial interview, we asked patients about their headache history, their current headache attack, psychiatric comorbidities, and sociodemographic characteristics. Headache history included an assessment of headache-related disability measured by the Migraine Disability Assessment Questionnaire (MIDAS) disability questionnaire. The MIDAS is a 5-question, open-response questionnaire that evaluates the headache-related functional impairment experienced by a patient in work or school, household chores, and social activity during a 3-month period.<sup>31</sup> Characteristics of the current headache attack included duration of headache (time from initiation of the current headache attack through treatment in the ED), a verbal measure of pain intensity (none, mild, moderate, severe), an assessment of symptoms associated with headache such as nausea, treatment received in the ED, and outcome of that treatment. We used the Primary Care Evaluation of Mental Disorders (PRIME-MD) to screen patients for depression. The PRIME-MD is a well-validated questionnaire used in survey research and clinical care.<sup>32,33</sup> An affirmative response to either of the 2 screening questions was considered a positive response.<sup>34</sup> Sociodemographic variables included age, sex, insurance status, and presence of a regular health care provider.

Twenty-four hours after ED discharge, we contacted patients by telephone and asked them to recall the intensity of their worst headache since ED discharge, using the same pain intensity scale as at the initial visit. Headache-related functional impairment was graded on a standard 4-point ordinal scale. Three months after ED discharge, we telephoned patients and asked them to complete a second MIDAS disability questionnaire for the preceding 3 months and to report the number of days with headache for the same period.

Two emergency medicine investigators used data from the study questionnaire and medical record to classify the headache of each patient independently according to the *International Classification of Headache Disorders, 2nd Edition*.<sup>35</sup> When discrepancies occurred, cases were referred to a headache specialist for adjudication. We classified headaches as migraine, tension-type headache, trigeminal autonomic cephalalgia (including cluster), or other primary headache. Additionally, we modified the classification scheme to include the category "primary headache disorder unclassifiable" because of the frequency with which headaches treated in the ED do not meet

criteria for a specific *International Classification of Headache Disorders, 2nd Edition* category.<sup>3</sup>

## Outcome Measures

The primary short-term outcome was presence of a moderate or severe headache within 24 hours of ED discharge.<sup>36</sup> Recurrent headaches were combined with persistent headaches into 1 category for analysis. This was done because the terms "recurrence" and "persistence" often merge in clinical practice<sup>37</sup>; separating them may create an artificial dichotomy that is not clinically meaningful. The presence of headache-related functional impairment within 24 hours of ED discharge was a secondary short-term outcome. The primary long-term outcome was a 3-month MIDAS disability score greater than 5, a clinically relevant cut point above which prescription headache treatment is recommended.<sup>20</sup> The secondary long-term outcome was the total number of days with headache the patient experienced during the 3 months since ED discharge.

## Data Collection and Processing

Salaried, fluently bilingual (Spanish and English) research associates who were present in the ED 24 hours per day, 7 days per week, collected the data. They used standardized paper questionnaires to collect data in the ED and over the telephone. A research secretary entered data into SPSS Data Entry version 4.0 (SPSS, Inc., Chicago, IL). Data were then double entered by a separate individual and all discordant fields reconciled for transcription errors.

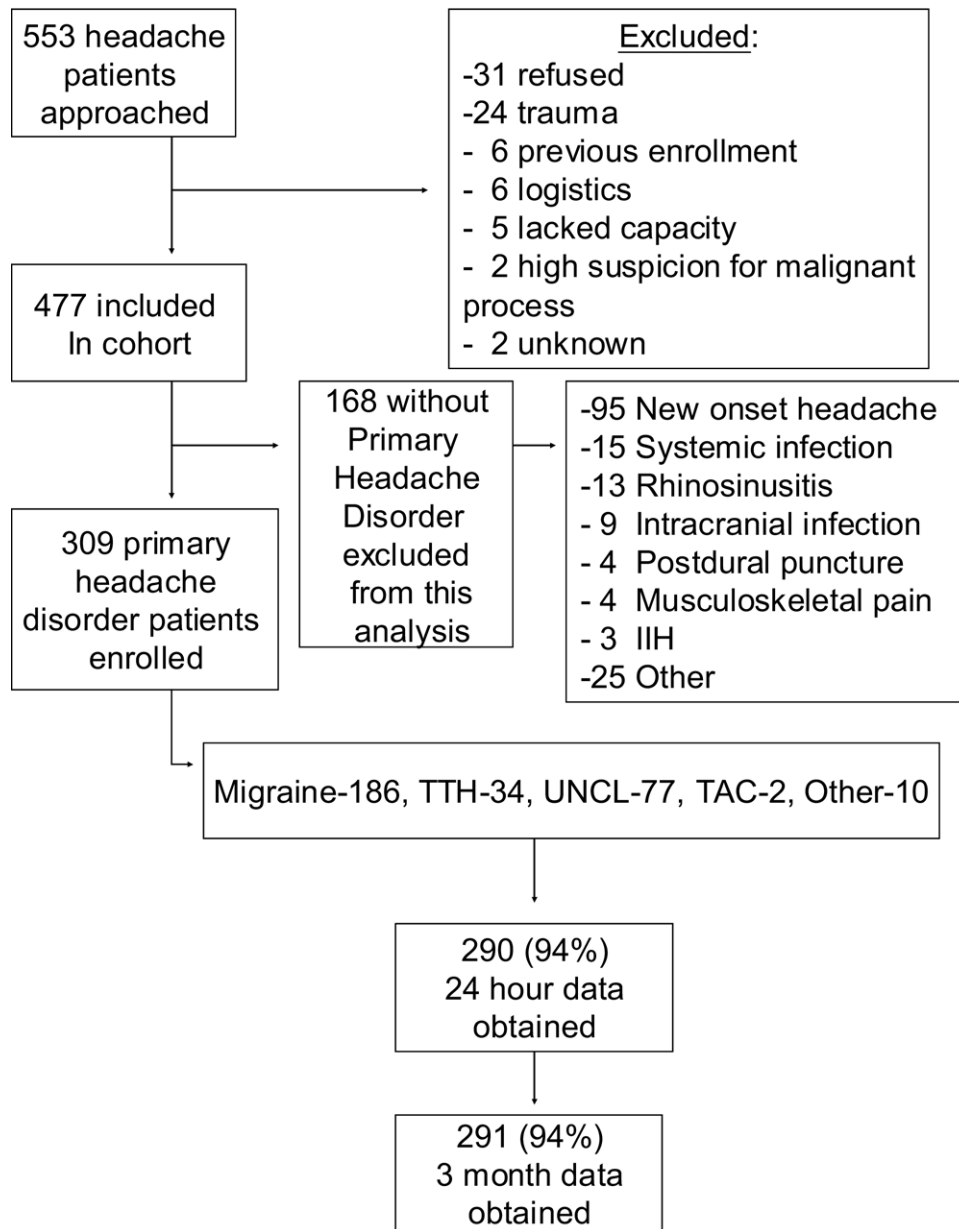
## Primary Data Analysis

Frequency of primary and secondary 24-hour and 3-month outcomes is presented with 95% CI and medians, with interquartile range. For descriptive analyses, primary headache disorders are divided into migraine, tension type, and unclassifiable. Frequency of a poor outcome is compared among the common types of primary headache disorders with a  $\chi^2$  test. The Kruskal-Wallis test is used to compare total number of days with headache.

We used logistic modeling to test the independent association between each of our primary predictor variables and the outcomes while adjusting for sociodemographic variables, other headache-specific variables, and psychiatric comorbidity. Sociodemographic, headache-specific, and psychiatric variables thought to be plausible confounders were included in the model, along with the hypothesized predictors. Model results are presented with adjusted odds ratios (ORs) and 95% CI. Hosmer-Lemeshow tests were used to assess fit of the models. The influence of each individual's covariate pattern on the model as a whole was determined by examining the distribution of the regression residuals, screening for data acquisition or data entry errors among the outliers and then reanalyzing the data without these outliers to determine their effect on the model.

## RESULTS

During an 18-month period beginning in March 2004, we approached 553 patients for participation and enrolled 477. Of



**Figure.** Study flow diagram. Ninety-five patients with new-onset headache had no history of similar headaches, were evaluated as appropriate by the attending emergency physician, and had no recurrence of headache within the 3-month follow-up period. *TTH*, Tension-type headache; *UNCL*, unclassifiable primary headache disorder; *TAC*, trigeminal autonomic cephalalgia including cluster; *IIH*, idiopathic intracranial hypertension.

these, 309 had a primary headache disorder and consented to follow-up. Ninety-four percent were successfully followed 24 hours and 3 months after ED discharge (Figure).

Baseline characteristics, listed by type of headache, are presented in Table 1. Differences in some features, such as duration of headache, baseline nausea, and baseline pain intensity, reflect the criteria for classification. About 50% of all patients, regardless of headache diagnosis, reported a positive response to the depression screening questions.

There was substantial headache-related morbidity both within 24 hours of ED discharge and during the 3 months after

ED discharge (Table 2) for patients with every headache type. There were no statistically significant differences in primary outcome among patients with migraine, tension type, and unclassifiable headaches ( $P=.32$ ). Type of medication received in the ED was not associated with 24-hour outcome (overall  $P$  value for this dummy variable=.72). As depicted in Table 2, headache-related functional disability for the 3 months after ED discharge was not statistically different among the headache types ( $P=.23$ ).

Of the 2 hypothesized predictors of poor 24-hour outcome, duration of headache and discharge pain intensity, only

**Table 1.** Baseline characteristics by headache type.\*

Baseline Characteristic	Migraine, n=186	Tension-type, n=34	Unclassifiable Recurrent Headache Disorder, n=77
<b>Sociodemographic variables</b>			
Age, y, mean (SD)	38 (12)	40 (12)	42 (14)
Female, No. (%)	169 (91)	25 (74)	54 (70)
Race/ethnicity, No. (%)			
Latino	100 (54)	15 (44)	29 (40)
Black	64 (35)	13 (38)	36 (49)
White	10 (5)	0	1 (1)
Other	10 (5)	6 (18)	7 (10)
Missing/refused	2 (1)	0	4 (5)
Insurance, No. (%)			
None	20 (11)	6 (18)	9 (12)
Medicaid	65 (35)	11 (32)	22 (29)
Private insurance/Medicare	101 (54)	17 (50)	46 (60)
Regular health care practitioner, No. (%)	143 (78)	23 (70)	57 (77)
<b>Headache specific variables for the ED visit</b>			
Duration of headache, median (IQR)	24 (12-72)	25 (13-72)	66 (10-168)
Baseline pain intensity, No. (%)			
Severe	146 (80)	9 (27)	38 (51)
Moderate	31 (17)	14 (41)	26 (35)
Mild	6 (3)	10 (29)	10 (13)
None	0	1 (3)	1 (1)
Missing	3 (2)	0	2 (3)
Nausea at baseline, No. (%)	149 (80)	0 (0)	34 (45)
Discharge pain intensity, No. (%)			
Severe	9 (5)	0	4 (6)
Moderate	45 (26)	3 (9)	14 (19)
Mild	86 (50)	19 (58)	43 (59)
None	33 (19)	11 (33)	12 (16)
Missing	13 (7)	1 (3)	4 (5)
Baseline MIDAS score, median (IQR), No. (%)	4 (1-12)	1 (0-5)	2 (0-15)
0-5 (Little/none)	101 (55)	25 (76)	42 (55)
6-10 (Mild)	25 (14)	4 (12)	12 (16)
11-20 (Moderate)	26 (14)	1 (3)	13 (17)
>20 (Severe)	31 (17)	3 (9)	9 (12)
Medication in the ED, † No. (%)			
Metoclopramide	114 (61)	15 (44)	39 (51)
Nonsteroidal	50 (27)	10 (29)	27 (35)
Opioid	41 (22)	4 (12)	14 (18)
Sumatriptan	10 (5)	0	1 (1)
None	20 (11)	7 (21)	14 (18)
Medication after discharge, No. (%) †			
NSAID, acetaminophen, OTC combination	58 (35)	8 (27)	22 (32)
Triptan	8 (5)	0	1 (1)
Opioid, valium, butalbital	11 (7)	2 (7)	6 (9)
None	90 (55)	19 (63)	33 (48)
Other	7 (4)	1 (3)	7 (10)
Missing data/unknown	21 (11)	4 (12)	8 (12)
<b>Psychiatric comorbidity</b>			
Affirmative response to depression screener, No. (%)	91 (50)	14 (44)	30 (41)

NSAID, Nonsteroidal anti-inflammatory drug; OTC, over the counter.

\*Patients assigned a headache diagnosis other than migraine, tension-type, or unclassifiable primary headache disorder are not included in this table because they are a small, heterogeneous group.

†Some patients were administered more than 1 medication. Hence, the total exceeds 100%.

duration of headache seemed an independent predictor of moderate or severe headache in the 24 hours after ED discharge (Table 3). Additional independent predictors of moderate or severe headache within 24 hours were severe baseline pain, presence of nausea, and a positive response to depression

screening questions (Table 3). Headache type also did not prove to be an independent high-risk feature. Of patients without any positive predictors, 8% (95% CI 1% to 34%) had a moderate or severe headache within 24 hours of discharge versus 56% (95% CI 39% to 72%) of patients with 4 positive predictors.

**Table 2.** Outcomes of primary headache disorder patients after ED discharge, by headache type.\*

Outcome	Migraine, n=186	Tension-type, n=34	Unclassifiable, n=77
<b>24-h Outcomes</b>			
Moderate or severe headache within 24 h of ED discharge, % <sup>†</sup>	31 (25-38)	19 (9-36)	27 (18-38)
Functional disability within 24 h of ED discharge, % <sup>†</sup>	50 (43-57)	23 (12-41)	43 (32-54)
<b>3-mo Outcomes</b>			
3-mo MIDAS disability score >5 for 3 mo after ED discharge, % <sup>§</sup>	37 (30-44)	38 (23-54)	26 (17-37)
Median number of days with headache during 3 mo after ED discharge <sup>  </sup>	4 (0-15) <sup>†</sup>	1 (0-5) <sup>†</sup>	2 (0-10) <sup>†</sup>

\*Results presented as frequency with 95% CI, or median with IQR, when appropriate. Patients assigned a diagnosis other than migraine, tension-type headache, or unclassifiable primary headache disorder are not included in this table because they are a small, heterogeneous group. At 24 hours, 14 migraine patients, 2 tension-type patients, and 2 unclassifiable patients were unavailable for follow-up. At 3 months, 11 migraine patients, 2 tension-type patients, and 5 unclassifiable patients were unavailable for follow-up.

<sup>†</sup>Primary short-term outcome.

<sup>‡</sup>Secondary short-term outcome.

<sup>§</sup>Primary long-term outcome. A MIDAS disability score of >5 is a threshold for prescription medication.

<sup>||</sup>Secondary long-term outcome.

<sup>¶</sup>In a statistical comparison of number of days with headache among the 3 headache types, the Kruskal-Wallis test resulted in  $P=.03$ . Pairwise comparison was then performed with the Mann-Whitney test:  $P$  value for tension type versus migraine=.01; for unclassifiable versus migraine=.22; for unclassifiable versus tension type=.10.

Contrary to our hypothesis, poor 3-month outcomes were not independently associated with a patient's history of headache-related disability at the ED visit. Headache type also did not predict the primary long-term outcome. One stronger predictor of poor 3-month outcomes was identified: Medicaid insurance (Table 3). Of patients with Medicaid insurance, 45% (95% CI 35% to 55%) had substantial 3-month disability versus 28% (95% CI 22% to 35%) of patients with private insurance and Medicare.

## LIMITATIONS

These data were drawn from 1 urban ED with a predominantly underserved population. Its applicability to different patient populations is uncertain. In populations without barriers to health care access, the premise of the long-term model is less compelling—patients with private insurance will be able to see their physician more readily.<sup>38</sup>

For this study, we based the classification of headache on the clinical features of the acute headache attack that brought the patient to the ED, which were not necessarily characteristic of a patient's underlying primary headache disorder. For example, patients with underlying migraine can have acute tension-type attacks<sup>39</sup> or a bland attack that results in an "unclassifiable" categorization. Thus, these results are most applicable to emergency physicians, who have 1 opportunity to evaluate and diagnose a patient, rather than the outpatient physician, who can make an accurate diagnosis based on headache diaries or sequential interviews with patients.

## DISCUSSION

It is common for patients with an acute exacerbation of a primary headache disorder to have a moderate or severe headache within 24 hours of ED discharge. Depending on the specific headache diagnosis, 23% to 50% of patients are functionally disabled by their headache during this period. The frequency of poor 24-hour outcome was not statistically

associated with medication received in the ED; therefore, poor outcomes are a concern regardless of medication used. Although it is known that patients with migraine experience postdischarge headache, the extent of the pain and functional disability is not widely appreciated. The frequency with which tension-type patients have postdischarge headache is also of interest because many regard this headache as milder than migraine. Perhaps those with tension-type headache who present to an ED represent the severe end of the tension-type spectrum.<sup>39,40</sup>

Although our data identified 4 features associated with poor 24-hour outcomes, the inferences to be drawn from these findings are limited because only 1 of these 4 predictors, longer duration of headache, was hypothesized to be associated with the 24-hour outcome.

Longer duration of headache has been identified in other work as associated with recurrence or persistence of headaches.<sup>11,22</sup> Longer duration has also been associated with sensitization of higher-order neurons within the nociceptive pathway of migraine.<sup>41,42</sup> This in turn has been associated with headaches refractory to certain treatments.<sup>43</sup> Some clinical trials have suggested that in patients with migraine headache, those with longer duration of headache may benefit from corticosteroids.<sup>44,45</sup>

Although specific headache diagnosis did not independently predict poor outcomes, the presence of nausea, a clinical feature that by definition cannot be present in tension-type headache,<sup>35</sup> doubled the odds of a moderate or severe postdischarge headache. Nausea may be a marker for severe pain, but the association between nausea and poor outcomes persisted even after baseline pain severity was controlled. Limited clinical data suggest that in migraine, patients with nausea may be more refractory to treatment than those without nausea.<sup>46</sup>

It is not immediately clear how to apply these findings to one's clinical practice. To date, no parenteral medication can reliably abort acute headaches and prevent recurrence. No studies have been performed to determine the relative efficacy of

**Table 3.** Predictors of poor 24-hour outcomes and poor 3-month outcomes from multivariate regression model.

Predictor	Moderate or Severe Headache Within 24 h of ED Discharge,* OR (95% CI)	Substantial Headache-Related Disability During 3 mo After ED Discharge, OR (95% CI)
<b>Sociodemographic variables</b>		
Age	0.99 (0.96-1.01)	0.99 (0.97-1.01)
<b>Sex</b>		
Female	†	1.00
Male		1.00 (0.44-2.29)
<b>Insurance</b>		
Private insurance/Medicare	†	1.00
None		1.83 (0.72-4.62)
Medicaid	†	2.23 (1.24-4.01)
<b>Primary care provider</b>		
No		1.00
Yes		1.72 (0.82-3.61)
<b>Headache specific variables for the ED visit</b>		
<b>Headache type</b>		
Unclassifiable primary	1.00	1.00
Tension-type headache	0.96 (0.26-3.62)	1.49 (0.56-3.96)
Migraine	0.75 (0.36-1.59)	1.49 (0.76-2.90)
<b>Duration of headache, h</b>		
<24	1.00	
>24	1.67 (0.89-3.12)	†
<b>Baseline pain intensity</b>		
Not severe	1.00	
Severe	2.41 (1.16-5.02)	†
<b>Nausea at baseline</b>		
No	1.00	
Yes	2.10 (1.00-4.41)	†
<b>Discharge pain intensity</b>		
More than none	1.0	
None	0.71 (0.33-1.55)	
<b>Baseline MIDAS score</b>		
0-5 (little/none)	1.00	1.0
>6	1.00 (0.52-1.91)	1.5 (0.87-2.67)
<b>Psychiatric comorbidity</b>		
<b>Depression screener</b>		
Negative	1.00	1.0
Affirmative	1.82 (0.99-3.35)	1.4 (0.83-2.49)

\*The dependent variable is moderate or severe headache within 24 hours of ED discharge. Goodness of fit was assessed with Hosmer-Lemeshow test ( $P=.65$ ), indicating adequate fit. Four “influential” cases were identified, based on regression residuals greater than 2 SDs from the mean. Removing these cases from the model did not alter our conclusions, though nausea weakened as a predictor (OR 1.96; 95% CI 0.89 to 4.32), whereas the 3 other identified predictors became more robust.

†The dependent variable is 3-month MIDAS disability score >5, a threshold for initiating prescription medication. Goodness of fit was assessed with Hosmer-Lemeshow test ( $P=.21$ ), indicating adequate fit. One “influential” case was identified based on regression residuals >2 SDs from the mean. Removing this case from the model did not alter the conclusions.

\*Not included in the regression model because this variable is not a plausible predictor of the outcome.

the various analgesics and antimigraine medications for the treatment of postdischarge headache. Absent data, it is reasonable practice to provide an oral agent with known efficacy in acute migraine or acute tension-type headache, such as a triptan, a migraine-specific combination, an oral antiemetic combined with a nonsteroidal anti-inflammatory drug, or a nonspecific analgesic.

Although it is not surprising that primary-headache patients continue to experience headache-related disability during the months after ED discharge, the extent of the experience has not been reported: one third of patients with migraine and tension-type headache are limited in their

ability to participate at work, perform household chores, and function in social situations and, in the case of migraine patients, would benefit from prescription medication. As with the short-term outcome, conclusions based on the high-risk predictor identified, Medicaid insurance, are limited because this was not our hypothesized predictor.

Although the MIDAS disability scale has been validated as an effective risk-stratification tool in the outpatient setting,<sup>20</sup> it is not as strong a predictor in the ED. Perhaps this is because ED headache patients have limited periods of headache-related disability around the time of their ED visit that resolve during the long term. Another possibility is that effective unmeasured

interventions, such as advice or referrals, were initiated in the ED.

It is not surprising that patients with Medicaid have worse outcomes than patients with private insurance or Medicare. Lack of physician availability and lower socioeconomic status, an independent risk factor for undertreatment of migraine,<sup>47</sup> are strongly associated with Medicaid insurance. It is unclear why uninsured patients had better outcomes than Medicaid patients; this may be confounded by severity of the underlying illness.

Although unclassifiable primary headache is not a diagnosis recognized by the International Headache Society, a specific diagnosis cannot be assigned to one quarter of primary headaches treated in the ED despite a thorough interview.<sup>3</sup> In this study, unclassifiable headache patients experienced short- and long-term outcomes comparable to those of migraine patients. Most likely, these patients had one of the named headache disorders and presented to the ED with a bland acute exacerbation that was not classifiable at the time. The similarity in long-term outcome between migraine and tension-type headache may be explained by the variability in acute manifestation of headache that patients with these primary headache disorders experience. Many patients with severe acute tension-type attacks often prove to have underlying migraine disorder, once headache diaries are used.<sup>40</sup>

In conclusion, pain and functional disability are common after an ED visit for acute headache. Risk factors for poor outcomes post-ED discharge include longer duration of headache, severe baseline pain, baseline nausea, screening positive for depression, and Medicaid insurance.

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