

Emergency Department Headache Admissions in an Acute Care Hospital: Why Do They Occur and What Can We Do About It?

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Abstract

Introduction: Many patients present to the Emergency Department (ED) complaining of headache and a significant proportion of these visits would result in hospital admissions. This study analyses the demographics, presentation, work-up, reasons for admission, diagnoses and outcomes of patients admitted with the chief complaint of headache – to identify possible ways of reducing such admissions. **Materials and Methods:** A retrospective analysis was done of the electronic medical records/discharge summaries of all adult patients admitted during a 1-year period from January to December 2006 with the diagnosis of primary headaches or secondary headaches not related to trauma, intracranial infection, inflammation, mass lesion, raised intracranial pressure or a serious systemic illness from the ED of the National University Hospital of Singapore. **Results:** One thousand two hundred and seventy-six patients presented to the adult ED with primary headaches or secondary headaches not related to serious conditions in 2006. This represented 2% of the ED attendances in the period. Two hundred and twenty-three patients were admitted for various reasons – diagnostic uncertainty: 110 (49%), pain control: 73 (33%), social/patient request: 60 (27%) and others: 4 (2%). Sixty-six per cent of the patients had either computed tomography (CT) or magnetic resonance (MR) head imaging. Eighteen patients (8%) were eventually diagnosed with a “potentially serious” diagnosis (intracranial haemorrhage, brain metastasis, stroke, meningitis, cerebral inflammation, cysticercosis, cervical osteomyelitis, hydrocephalus, seizure and malignant hypertension). **Conclusion:** Specific strategies addressing the various reasons for admission including physician training, use of evaluation protocols, imaging to exclude secondary pathology, a longer duration of treatment and evaluation in the ED, effective pain control and patient education may help reduce headache admissions.

Ann Acad Med Singapore 2009;38:1007-10

Key words: Analgesia, Imaging, Lumbar puncture

Introduction

Headache is a common presenting complaint in the Emergency Department (ED), accounting for 1% to 4% of all visits.¹⁻³ A significant proportion of these visits would result in hospital admissions and the associated socioeconomic burden. Most of these patients seek pain relief and assurance that their persistent headache is not due to some serious underlying cause.

There is scanty information regarding reasons that these patients end up as hospital admissions and we sought to identify possible strategies to reduce this. We analysed demographics, presentation, work-up, reasons for admission, diagnoses and outcomes of all patients admitted from the ED of the National University Hospital (NUH) Singapore with headache as the chief complaint.

Materials and Methods

ED and inpatient medical records of all adult patients admitted during a 1-year period from January to December 2006 with ED diagnosis of either primary headaches or secondary headaches not related to trauma, intracranial infection, inflammation, mass lesion, raised intracranial pressure or serious systemic illness were reviewed. We collected data on age, sex, clinical features, length of stay in ED, treatment given in the ED, reasons for admission, performance of neuro-imaging and lumbar puncture (both in the ED and in-patient setting), in-patient length of stay, final discharge diagnosis and outcomes. We classified reasons for admission into 4 categories: uncertainty about diagnoses, pain control, patient or family's request and others. The first category consisted of patients that

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emergency physicians admitted as inpatients due to a diagnostic uncertainty despite an initial clinical diagnosis of primary or non-specific headache. The second category was patients admitted because of inadequate pain control after initial analgesia in the ED. The third group of patients was admitted because of patient or family's insistence. The last group of patients was admitted for reasons other than those enumerated above.

Final inpatient headache diagnosis was classified as either being benign or potentially serious according to presence or absence of intracranial infection or inflammation, mass lesion, raised intracranial pressure or any other significant condition potentially causing morbidity or mortality.

Results

Demographics

Over a 1-year period (January to December 2006), 1276 adult patients seen at the ED had either primary headaches diagnoses or secondary headaches diagnoses that were not related to trauma, intracranial infection, inflammation, mass lesion, raised intracranial pressure or serious system illnesses. This represented 2% of the 80,500 patients that presented to the ED during the same period. Of these 1276 patients, 223 (18%) were subsequently admitted. The average age of these admitted patients was 41 years (range, 19 to 96). One hundred and three (46%) were males and 120 (54%) were female. Fourteen patients were re-attenders (within 24 hours).

Clinical Features

The average duration of the headache was 4.9 days (range, 1 to 60). One hundred and twenty-four (56%) patients reported experiencing similar headaches in the past. Table 1 shows the incidence of common associated symptoms and signs. No patient had any new onset neurological deficit on examination in the ED.

Imaging and Lumbar Puncture

Twenty (9%) patients who were admitted after a computed tomography (CT) scan of the brain at the ED did not show any relevant pathology, while 128 (57%) others had imaging of the brain after admission [108 had CT brain, 20 had magnetic resonance imaging (MRI) of the head]. The following significant scan findings were noted – intracranial haemorrhage (4), brain metastasis (1), ischaemic stroke (2), meningioma (1) and systemic lupus erythromatosis-related cerebral inflammation (1).

No patients underwent a lumbar puncture (LP) at the ED, while 14 (6%) patients underwent such a procedure in the ward. Four patients had abnormal LP findings that led to a diagnosis of viral meningitis in 2 patients, cryptococcal meningitis in 1 patient and low pressure headache in another.

Table 1. Clinical Characteristics of Patients

Symptom	No. of patients (%)
Previous episodes of similar pain	124 (56)
Fever	19 (9)
Vomiting	84 (37)
Loss of consciousness	22 (10)
Neck pain	19 (9)
Photophobia	14 (6)
Focal weakness	29 (13)
Slurring of speech	2 (1)
Dizziness	60 (27)
Blurring of vision	29 (13)
Clinical examination	No. of patients (%)
Fever (>37.5 degrees Celsius)	3 (1)
Neck stiffness	6 (3)

(Figures rounded off to the nearest percent)

Treatment in ED

Table 2 shows the treatment given in the ED for patients who were admitted for pain control. Intramuscular non-steroidal anti-inflammatory drugs (NSAIDs) and opioids were the medications most received (80%) for analgesia.

Reasons for Admission

The most common reasons cited for admission were diagnostic uncertainty in 110 (49%), pain control in 73 (33%), followed by social reasons in 60 (27%) patients. Some patients had more than one identified reason for admissions. Identified reasons for diagnostic uncertainty included concern over the reliability of history obtained, difficult assessment due to comorbidities such as pre-existing neurological or psychological conditions and the high-risk ED patient (elderly, concomitant malignancy or immunosuppressed). Four (2%) patients were admitted for

Table 2. Emergency Department Medications Given to Patients Admitted for Pain Control

Treatment	No. of patients
IM NSAIDs	30
IM opioids	19
Oral opioids	4
Oral NSAIDs	3
Paracetamol	3
IV opioids	1
Triptans	1
Others	1

IM: intramuscular; NSAIDs: non-steroidal anti-inflammatory drugs

other reasons such as concomitant paracetamol overdose (2), herpes zoster infection in an elderly patient and scheduled admission the next day.

Length of Stay

The average length of stay (LOS) in the ED before admission was 230 minutes (range, 4 to 1815). The average LOS of patients who were admitted for reason of pain control was 195 minutes (range, 28 to 767).

The in-patient LOS of patients admitted for pain control was not much different from that for other reasons [2.5 days (range, 1 to 17) versus 2.8 days (range, 1 to 35)].

Discharge Diagnosis

Table 3 shows the final discharge diagnoses of the 223 patients and our classification of the diagnoses. Eighteen patients (8%) had “potentially serious” diagnoses. Of the 73 patients admitted for pain control, 3 were found to have “potentially serious” diagnoses.

Outcomes

The majority of admitted patients (177, 79%) were referred to the neurology specialist outpatient clinic for follow-up. Twenty-three patients (10%) were referred to the polyclinic, while 16 patients (7%) were discharged from follow-up. For patients with outcomes classified under “others” – 5 were discharged against medical advice (2 patients were diagnosed with non-specific headache, 1 with depression, 1 with migraine and 1 with cerebral cysticercosis), 1 absconded (diagnosed with tension headache) and 1 died (subdural haemorrhage with massive gastrointestinal bleeding).

Discussion

In our study, the most common reason that led to an admission was diagnostic uncertainty. ED physicians often work under the pressure of time constraints. In addition, their patients are often anxious and in pain.³ ED doctors may be concerned about the reliability of history obtained. Initial assessment can be difficult, especially when patients have pre-existing neurological or psychological conditions and the physicians are unfamiliar with the patients’ premorbid status. Other studies have reported similar difficulties in making definite headache diagnosis in the ED.³⁻⁶ Friedman showed that up to a third of acute headache patients presenting to the ED could not be assigned a specific International Classification of Headache Disorders (ICHD) diagnosis.⁴ Fiessler also showed that only 46% of patients with a prior diagnosis of migraine and/or final ED discharge diagnosis of migraine actually met the ICHD criteria.⁵ Recognising this difficulty, a workgroup has recommended guidelines on diagnostic workups in ED based on clinical scenarios instead of headache diagnoses.^{6,7}

Sixty-six per cent of the patients eventually had either CT or MR head imaging. This is a high percentage given that most headache diagnosis guidelines recommend the use of imaging only when the history or neurological examination suggests a secondary pathology.⁸ This issue is almost certainly linked to that of diagnostic uncertainty as discussed above. It is noted that many of the imagings were done after admission, suggesting that inpatient care physicians also had difficulty ruling out underlying

Table 3. Discharge Diagnoses

Diagnosis	No. of patients (%)	Classification
Migraine	64 (29)	Benign
Tension headache	55 (25)	Benign
Non-specific headache	35 (16)	Benign
Cervicogenic headache	17 (8)	Benign
Sinusitis	9 (4)	Benign
Psychogenic headache	5 (2)	Benign
Viral fever	2 (1)	Benign
Neck strain	3 (1)	Benign
Vestibular neuritis	3 (1)	Benign
Vasovagal episode	2 (1)	Benign
Meningioma	1 (1)	Benign
Low pressure headache	1 (1)	Benign
Otitis media	1 (1)	Benign
Parotiditis	1 (1)	Benign
Refractory eye disorder	1 (1)	Benign
Herpes zoster	1 (1)	Benign
Transient global amnesia	1 (1)	Benign
Post-traumatic	2 (1)	Benign
Social	1 (1)	Benign
Meningitis	3 (1)	Potentially serious
ICH/SAH/SDH*	4 (2)	Potentially serious
Ischaemic stroke	3 (1)	Potentially serious
Metastatic brain deposits	1 (1)	Potentially serious
SLE associated cerebral inflammation	1 (1)	Potentially serious
Cysticercosis	1 (1)	Potentially serious
Cervical osteomyelitis	1 (1)	Potentially serious
Partial seizure	1 (1)	Potentially serious
Transient ischaemic attack	1 (1)	Potentially serious
Hydrocephalus	1 (1)	Potentially serious
Malignant hypertension	1 (1)	Potentially serious

ICH: intracranial haemorrhage; SAH: subarachnoid haemorrhage; SDH: subdural haemorrhage; SLE: systemic lupus erythematosus (Figures rounded off to the nearest percent)

pathologies by history and examination. Nevertheless, eventually, only 8% of the patients had “potentially serious” diagnoses on discharge (Table 3) and the average LOS of the patients was 2.54 days. Therefore, arguably, the use of brain imaging and a longer period of observation in the ED could help diagnostic confidence and avoid a proportion of these admissions.

Seventy-three (33%) patients were admitted because of failure to achieve adequate pain control in ED. A review of Table 2 shows that the majority received NSAIDs or opioids. The use of triptans in the ED setting has been found to be effective in achieving headache relief but was used in only 1 patient.^{3,9,10} This low usage is due to low familiarity and availability of the drugs. Treatment regimens involving combination agents, early use of triptans, use of intravenous or intramuscular neuroleptics have been shown to have high efficacy in achieving pain relief^{3,9-15} and the use of an effective pain relief medication protocol may help avoid the need for admissions in these patients.

Twenty seven per cent of headache admissions were due to varied social reasons. The common denominator of these was that the patient or family wanted it. Others have found that a discharge plan that includes a diagnosis, patient education, prescriptions and a referral to see an appropriate healthcare provider at an early date for definitive management of the headache condition are components that may make outpatient management more acceptable to the patient.³

Conclusion

Our study identified the main factors that lead to headache admissions. Strategies to address these may therefore decrease such admissions. Diagnostic confidence in headache conditions can be increased by physician training, use of evaluation protocols or pathways, imaging to exclude secondary pathology and a longer duration of treatment and evaluation in the ED. An effective pain control protocol as well as a discharge plan that provides diagnosis, patient education, prescriptions and a referral to see an appropriate healthcare provider for definitive management at an early date are the other components needed in reducing headache admissions.

REFERENCES

1. Goldstein JN, Camargo Jr CA, Pelletier AJ, Edlow JA. Headache in United States Emergency Departments; demographics, work-up and frequency of pathological diagnoses. *Cephalalgia* 2006;26:684-90.
2. Gaini SM, Fiori L, Cesana C, Vergani F. The headache in the Emergency Department. *Neurol Sci* 2004;25:S196-S201.
3. Friedman BW, Grosberg BM. Diagnosis and management of the primary headache disorders in the emergency department setting. *Emerg Med Clin North Am* 2009;27:71-87.
4. Friedman BW, Hochberg ML, Esses D, Grosberg B, Corbo J, Toosi B, et al. Applying the International Classification of Headache Disorders to the emergency department: an assessment of reproducibility and the frequency with which a unique diagnosis can be assigned to every acute headache presentation. *Ann Emerg Med* 2007;49:409-19.
5. Fiesseler FW, Kec R, Mandell M, Eskin B, Anannab M, Riggs RL, et al. Do ED patients with migraine headaches meet internationally accepted criteria? *Am J Emerg Med*. 2002;20:618-23.
6. Cortelli P, Cevoli S, Nonino F, Baronciani D, Magrini N, Re G, et al. Multidisciplinary Group for Nontraumatic Headache in the Emergency Department. Evidence-Based Diagnosis of Nontraumatic Headache in the Emergency Department: A Consensus Statement on Four Clinical Scenarios. *Headache* 2004;44:587-95.
7. Grimaldi D, Nonino F, Cevoli S, Vandelli A, D'Amico R, Cortelli P. Risk stratification of non-traumatic headache in the emergency department. *J Neurol* 2009;256:51-7.
8. Practice parameter: the utility of neuroimaging in the evaluation of headache in patients with normal neurologic examinations (summary statement). Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 1994;44:1353-4.
9. Martelletti P, Farinelli I, Steiner TJ; Working Group for Specialist Education, WHO's Global Campaign to Reduce the Burden of Headache Worldwide (Lifting The Burden). Acute migraine in the Emergency Department: extending European principles of management. *Intern Emerg Med* 2008;3Suppl1:S17-24.
10. Trainor A, Miner J. Pain treatment and relief among patients with primary headache subtypes in the ED. *Am J Emerg Med* 2008; 26:1029-34.
11. Cerbo R, Centonze V, Grazioli I, Tavolato B, Trenti T, Uslenghi C, et al. Efficacy of a fixed combination of indomethacin, prochlorperazine, and caffeine in the treatment of episodic tension-type headache: a double-blind, randomized, nimesulide-controlled, parallel group, multicentre trial. *Eur J Neurol* 2005;12:759-67.
12. Di Monda V, Nicolodi M, Aloisio A, Del Bianco P, Fonzari M, Grazioli I, et al. Efficacy of a fixed combination of indomethacin, prochlorperazine, and caffeine versus sumatriptan in acute treatment of multiple migraine attacks: a multicenter, randomized, crossover trial. *Headache* 2003;43:835-44.
13. Peroutka SJ. Beyond monotherapy: rational polytherapy in migraine. *Headache* 1998;38:18.
14. Friedman BW, Corbo J, Lipton RB, Bijur PE, Esses D, Solorzano C, et al. A trial of metoclopramide vs sumatriptan for the emergency department treatment of migraines. *Neurology* 2005;64:463.
15. Tfelt-Hansen P, Henry P, Mulder LJ, Scheldewaert RG, Schoenen J, Chazot G. The effectiveness of combined oral lysine acetylsalicylate and metoclopramide compared with oral sumatriptan for migraine. *Lancet* 1995;346:923.