

ANALYSIS OF HEADACHE MANAGEMENT IN EMERGENCY ROOM

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SUMMARY – The aim of this study was to analyze the management of headache patients presenting to the emergency room (ER) at a university hospital in Zagreb. Retrospective analysis of all patients with headache was carried out during 2007. Patients were analyzed according to the diagnoses, diagnostic procedures, treatment and further referral. Among 6225 patients, 1385 (22.3%) complained of headache; there were 894 (64.5%) women and 491 (35.5%) men. Migraine with or without aura, tension-type headache or “cervicogenic headache” had 1004 (72.5%) patients (women 67.5% and men 32.5%); secondary headache had 381 (27.5%) patients: 89 (6.4%) stroke or intracranial hemorrhage, 33 (2.4%) primary tumor, 54 (3.9%) metastatic tumor, 200 (14.4%) head trauma with or without hemorrhage, and 5 (0.4%) had an infectious disease. Diagnostic procedure was performed in 413 (29.8%) patients: 314 (22.7%) underwent computerized tomography scan of the brain, 85 (6.1%) electroencephalography and 70 (5%) ultrasound examination. Nonsteroidal antiinflammatory drugs (NSAIDs) and diazepam were the most commonly prescribed medications, followed by fluids, simple analgesics and antiemetics, whereas opioids were prescribed to 3.0% of patients. Among patients with primary headaches, diagnostic procedure was performed in 235 (23.2%) patients, while 40 (4.0%) patients were hospitalized. In conclusion, one-fifth of the patients presenting to neurological ER complain of headache and approximately three-quarters have primary headache. The majority of patients are treated with NSAIDs and a minority with opioids. Better treatment for these patients should be provided by general practitioners and neurologists in outpatient headache clinics.

Key words: *Headache – diagnosis; Headache – therapy; Headache disorders, primary – therapy; Headache disorders, secondary – therapy; Emergency treatment*

Introduction

The prevalence of headache as the chief complaint on admission to an emergency room (ER) is between 1% and 16%, and is considered one of the most com-

mon symptoms that lead patients to the emergency department (ED)¹⁻⁵. Many patients in the ER receive a nonspecific diagnosis of “headache not other specified”, i.e. the International Classification of Headache Disorders (ICHD-II) code 14.1 and 14.2^{1,6}.

The prevalence of migraine worldwide is up to 15%, tension type headache 60%, chronic headache 2%-4%, and possible medication overuse headache 1%-2%; the prevalence of primary headaches in Croatia is similar as in other European countries and the

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USA^{7,8}. A recent study in our country has shown that triptans are used by 35.7% of patients with migraine, polypharmacy is common, and only 14% have ever used prophylaxis⁹.

The role of an ER physician is to rule out life-threatening conditions causing headache and to provide an adequate headache treatment. The correct diagnosis of a headache disorder in an ER is important for developing early management strategies and for determining optimal ER activities.

In this study, we investigated the frequency of headache presentation, diagnostic procedures performed, the rate of serious pathologic findings and treatment provided in patients with a chief complaint of headache presenting to the neurological ER at a university hospital in Zagreb over a 1-year period. The findings of this study will be compared to similar studies worldwide.

Materials and Methods

Retrospective analysis included all ED charts of patients presented with a chief complaint of headache to the Clinical Department of Neurology ER, Sestre milosrdnice University Hospital from January 1 to December 31, 2007. In Zagreb, patients are referred to an ER after triage made by general practitioners (GPs), an emergency department (ED) doctor, or are self-referred. Zagreb has a separate ED where patients are referred to by their GPs or are self-referred; from this department, doctors on call (not paramedics) go to see patients wherever needed and make further triage to specialized departments within hospitals (based on territorial catchment). In our hospital, the resident on call will first examine the patient, perform diagnostic work-up if needed, and the specialist neurologist will discharge the patient after evaluating all data. Diagnostic work-up (if needed) and observation period in most patients will last for 1-3 hours (up to maximally 24 hours). All doctors working at the Department of Neurology are obliged to be on call; the majority of them are not headache specialists. The ER is open 24 hours 7 days a week.

Our Department of Neurology is one of the four neurology departments in the capital city of Croatia, Zagreb, with a catchment area of approximately 250,000 inhabitants and receives approximately 6500

adult patients in the ER setting annually. Only patients aged 18 years and older are referred to our neurological ER. Patients with infectious symptoms will be referred by GPs to a separate department of infectious diseases (one for the whole city).

Three neurology residents (M.S., M.KP. and J.TJ.) searched the ER Book of Admissions for patients who complained of headache. Patient charts were analyzed according to the diagnoses, diagnostic procedures, treatments, and further referral. We categorized patients according to the discharge diagnoses as follows: first group of primary headaches including migraine with or without aura (MO/MA), tension-type headache (TTH) and "cervicogenic headache" (CH), and second group of symptomatic headaches including intracranial hemorrhage, primary tumor, metastatic tumor, trauma with or without hemorrhage, and a probable infectious disease. According to the ICHD-II criteria¹⁰, cervicogenic headache should be classified into secondary headache disorders; this headache is considered not so frequent and should be confirmed by successful treatment. However, we classified the diagnosis of "cervicogenic headache" as a primary disorder because our doctors tend to make this diagnosis in patients who actually describe a tension-type headache. For a definite cervicogenic headache, one must have all criteria fulfilled; however, the majority of our patients did not meet all the criteria while being examined at the ER¹⁰. In patients with "cervicogenic" headache, typical history was dull pain in the occipital and/or neck area, mostly bilateral, in some patients spreading over time diffusely; a minority of patients may have had nausea, and none had photo- or phonophobia. Some may experience a tingling sensation in the head. Due to insufficient data in the charts, we could not re-classify the discharge diagnoses. Only patients with the diagnosis of "cervicogenic headache" were classified into the primary headache group because they were considered to have TTH.

Data analysis

The analytical method used in this study was descriptive. Continuous variables were presented as means with standard deviations (SD) and patient characteristics (frequency of occurrence) were presented as percentages for categorical variables.

Results

Prevalence of headache types

Primary headaches

Among 6225 patients, 1385 (22.3%) complained of headache; 894 (64.5%) women (mean age 49.3 years) and 491 (35.5%) men (mean age 39.1 years). Primary headache was present in 1004 (72.5%) and secondary headache in 381 (27.5%) patients.

Migraine with or without aura or tension-type headache had 670 (48.4%) patients; 452 (67.5%) women (mean age 44.9 years) and 218 (32.5%) men (mean age 42 years). The exact diagnosis of MO/MA was set in 81 (8%) patients; diagnoses such as “probable migraine” were not included in this group. For reasons discussed in the Methods section, the diagnosis of “cervicogenic headache” was also included in the group of primary headaches: CH had 334 (24.1%) patients; 224 (67.1%) women (mean age 49.7 years) and 110 (32.9%) men (mean age 48.8 years). If a patient was diagnosed with TTH and cervicogenic headache (N0=32), he was included in the group of primary headaches. A total of 607 (60.2%) patients were aged ≤50 years.

Secondary headaches

A headache with an underlying secondary disorder had 381 (27.5%) patients: 89 (6.4%) patients had intracranial hemorrhage (intracerebral hematoma or subarachnoid hemorrhage), 33 (2.4%) had a primary tumor, 54 (3.9%) had a metastatic tumor, 200 (14.4%) had head trauma with or without hemorrhage, and 5

Table 1. Patients with headache presenting to emergency room

Diagnosis	Number of patients (%)
MO/MA/TTH	670 (48.5)
CH	334 (24.2)
Head trauma	200 (14.4)
Intracranial hemorrhage*	89 (6.4)
Metastatic tumor	54 (3.9)
Tumor	33 (2.4)
Cerebral infection	5 (0.4)
Total	1385 (22.3)

MO/MA = migraine without or with aura; TTH = tension type headache; CH = cervicogenic headache; *intracranial hemorrhage (subarachnoid hemorrhage, intracerebral or subdural hematoma)

Table 2. Diagnostic procedures performed in emergency department

Diagnostic test	Number of patients (%)
Computed tomography scan	314 (22.7)
Electroencephalography	85 (6.1)
Ultrasound*	70 (5.0)
X-ray	22 (1.5)
Laboratory	10 (0.7)
Total	413 (29.8)

*ultrasound (e.g., extracranial color duplex of carotid and vertebral arteries, transcranial Doppler)

(0.4%) had a probable infectious disease (Table 1). A total of 122 (32.4%) patients were aged ≤50 and 254 (67.6%) were aged ≥50 years.

Diagnostic procedures

Some kind of diagnostic procedure was performed in the ER in 413 (29.8%) patients: 314 (22.7%) underwent computerized tomography (CT) scan, 85 (6.1%) electroencephalography (EEG), 70 (5%) ultrasound examination (extracranial color-coded duplex of carotid and vertebral arteries and transcranial Doppler), 22 (1.5%) x-ray of the head, and 10 (0.7%) laboratory testing (mostly blood glucose level) (Table 2). Magnetic resonance imaging (MRI) cannot be routinely performed in the ED, but is available if necessary.

Therapy

The majority of patients (≥60%) were treated with nonsteroidal anti-inflammatory drugs (NSAIDs) and diazepam, 41.6% received fluids, one-fifth of the patients received antiemetics (thiethylperazine) and simple analgesics (paracetamol, metamizol), and 3.0% opioids (Table 3).

Table 3. Therapy administered at emergency department

Therapy	All patients (%)	Primary headaches (%)
NSAIDs	63.2	67.7
Diazepam	59.9	64.1
Fluids	41.6	38.2
Antiemetics	22.3	22.1
Analgesics	19.7	21.9
Opioids	2.6	3.0

NSAIDs = nonsteroidal antiinflammatory drugs

Further referral

Patient referral (all patients with headache) was as follows: 1022 (73.8%) were dismissed home, 222 (16%) were referred to other departments and 141 (10.2%) were hospitalized.

Among patients with primary headache, 854 (84.6%) were dismissed home, 110 (10.9%) were referred to other departments, while 40 (4.0%) were hospitalized at the Clinical Department of Neurology. Among these 40 patients, lumbar puncture (LP) was performed in 6 (15%) of them to exclude possible hemorrhage (CT scan was normal), and all LPs were negative.

Among hospitalized patients there were 14 patients with the diagnosis of migraine on admission, 12 were dismissed after a couple of days and were given the diagnosis of migraine, one patient was dismissed as trigeminal neuralgia and one as TTH. The reason for admission of these patients was intractable headache and profound vomiting. Twenty-five patients with TTH were hospitalized (in order to perform additional diagnostic procedures such as MRI or LP) and were dismissed as the same diagnosis after 2-3 days. One patient with cluster headache was hospitalized due to very often attacks (to have access to oxygen) and was dismissed with the same diagnosis after initiating prophylactic therapy.

There was no significant seasonal difference in patient presentation to the ER: 257 (25.5%) patients presented in winter, 267 (26.5%) in spring, 227 (22.5%) in summer and 258 (25.6%) in autumn ($P>0.05$).

Discussion

Headache is a symptom related to many disorders, ranging from benign to serious life-threatening conditions. For patients presenting to ER, it is important to select those who need further diagnostic work-up. History should include information about headache onset, pain intensity and character, occurrence of aura, associated autonomic symptoms and trigger factors.

Our study showed that approximately one-fifth of patients presenting to ER had the chief complaint of headache, and approximately three-quarters had primary headache; similar data are found in the literature (migraine being the most often primary headache)¹¹⁻¹⁵. Migraineurs are 4 times more likely to visit ER than

patients with other types of headaches¹⁶. Furthermore, one out of five migraineurs visited ER for headache during one year¹⁷. Our study showed that like in other similar studies, the majority of our ER headache patients were women and younger than 50 years^{3,14,18}.

Our study showed that the exact diagnosis of MO/MA was made in only 81 (8%) patients. The reasons for this could be a small percentage of patients presenting with migraine according to ICHD-II diagnostic criteria or incorrect discharge diagnosis made by ER doctors. Most of the patients were diagnosed as "probable migraine" or "probable TTH" or "headache not other classified", and therefore were classified into the MO/MA/TTH group. The other possible explanation is that the doctors in the ER tend to refer patients with headache to a headache specialist in the outpatient clinic, where detailed history of headaches can be taken and correct diagnosis can be made.

If the physician is alerted by "red flags", interventions such as a CT scan or LP will be further warranted to exclude pathologic findings. "Red flags" for the recognition of secondary disorders include sudden onset of headache, new onset of headache with aura, onset of headache in a patient over 50 years of age, increasing frequency and intensity of headaches, new onset of headache in a patient with an underlying medical condition and headache with concomitant systemic condition^{4,19}. The ER practitioner must be aware of all symptoms and headache characteristics to be able to administer symptomatic therapy and a couple of recommendations to the patient on how to manage his headaches (e.g., further referral to a headache specialist, prescription of specific or preventive therapies).

Up to 27% of patients will have symptomatic headache¹¹⁻¹⁵; our data on 27.5% of detected secondary headaches are within this range. An Italian study conducted 15 years ago showed the prevalence of secondary headaches in a neurological ED to be 56%²⁰.

In our study, the percent of patients aged ≥ 50 with secondary headache was 67.6%. In one study, a 6% rate of any pathologic finding was observed in patients aged over 50 *versus* 1% in the rest of the headache population; the odds ratio of patients aged 50 years and older to receive a pathologic diagnosis was 3.3¹⁴.

Up to 42% of patients that are seen in the ER do not receive precise diagnosis based on the ICHD-II criteria^{1,6,18}. Such diagnostic imprecision leads only

to generalized recommendations given to patients for pain treatment; patients with migraine will stay undiagnosed and under-treated. Therefore, even if a busy ER setting does not allow for precise headache diagnosing, the patient with a presumed primary headache should be referred for a follow up visit to a headache specialist. Our Neurology Department has a long established outpatient headache clinic and all patients upon being dismissed from the ER are recommended to visit the outpatient headache clinic for further treatment.

Neuroimaging (CT or MRI) is performed in 14% to 58.9% of cases in the ER setting^{6,14,18}. Our findings of 22.7% of CT scans performed in the ER are within these ranges. Guidelines for the management of patients presenting to ER with headache have been published; among the main statements, it is recommended that patients with acute sudden-onset headache and/or abnormal findings on neurological examination undergo emergent non-contrast CT-scan (Level B)²¹. Lumbar puncture is performed in 2.4% to 9% of headache patients in the ERs worldwide (14). LP was performed in 0.6% of all headache patients that presented to our ER, and in 6 out of 40 (15%) hospitalized patients in order to exclude hemorrhage.

Underutilization of medication is a major reason why patients come to ER; even one-third of patients seek help first in the ER without trying to self-medicate at home and even fewer take anti-migraine specific medications such as triptans^{6,22}.

Patients who seek help in ER commonly receive antiemetics, dopamine antagonists or phenothiazines (24% to 67.5%), opioids (25% to 64.1%), followed by NSAIDs, which are received by one-third of patients or less, simple analgesics (up to 27.6%) and triptans (up to 4.8%) as treatment^{3,6,18,23}. Some studies suggest that parenteral administration of NSAIDs should be the rescue therapy of choice in patients with migraine and allodynia seeking emergency care. Furthermore, treatment with opioids may lead to non-responsiveness to NSAIDs²⁴ and may become a risk factor for medication overuse headache²⁵. Most national guidelines for headache treatment recommend the use of dopamine antagonist antiemetics, dihydroergotamine, IV NSAIDs and 5-hydroxytryptamine (5-HT₁) receptor agonists over opioids^{10,21,26-28}. Despite recommendations that triptans should be used as the first-line drug

for migraine headache, studies show that triptans are not used often in the ER; the reasons for this might be that ER physicians are not familiar with their use and are afraid of adverse events^{22,29}. Patients without a clear diagnosis are more likely to be treated with nonspecific headache medications. Perhaps the fact that triptans are not available in our ER could explain the small number of exact diagnoses according to the ICHD-II criteria because doctors on call give the same kind of medication (approximately 60% NSAIDs and 20% analgesics) to all headache patients. Thiethylperazine is the antiemetic used in our ER and it was administered to 22% of our patients. Although studies show that in most ER settings, dopamine antagonists are given as antiemetics, studies support the use of prochlorperazine *versus* metoclopramide³⁰.

Although studies show that opioids are commonly used in ER settings, most physicians stated that they were not trained to use opioids as first-line therapy for migraine headache³¹. Opioids were given to only 3.0% of patients in our ER room; this is an exceedingly small proportion of patients compared to other ER settings, especially in the USA where even two-thirds of patients receive opioids^{6,23}. We believe that this reflects our department's policy of restrictive use of opioids in headache patients (except for oncologic patients). Instead of opioids, in our ER diazepam is frequently administered in the role of a "tranquilizer". Giving opioids as a rescue medication is not as efficient as previously thought; in some studies where follow up was performed, it was shown that even 64% of patients experienced headache recurrence within 24 hours after leaving the ER and that recurrence was twice as likely in patients given opioids^{6,23}. Briefly, we believe that the pattern of headache treatment in our ER is mainly influenced by the availability of medications and by practice patterns of the department.

The admission rates for headache patients are from 4% to 18% for all patients and 11% for those aged 50 years and older^{14,18}. In our study, the admission rate for all headache patients was 10.2% and for patients with primary headaches 4.0%.

Limitations of the study

This study had several limitations. First, it was a single-center survey conducted at a university hospital

and our results may not be applicable to other hospital settings such as general hospitals in small towns. Second, data on the diagnoses were collected from ER charts retrospectively and we cannot be sure whether all discharge diagnoses were correct; this is the main reason why the diagnosis of “cervicogenic headache” was classified into the primary headache group. Other more rare types of headache such as “cluster headache” or “medication overuse headache”, if recognized, were probably classified as “migraine” or “tension type headache” and therefore were not listed as a separate headache category. Third, it is possible that a certain number of prescribed medications or diagnostic procedures were not recorded on ER charts.

Conclusions

Patients with primary headaches visit ER in a relatively high number, posing a huge economic burden upon the healthcare system. This study indicated that better treatment for these patients should be provided by GPs and neurologists in outpatient headache clinics. Migraine should not be regarded as “just a headache”, but as a troublesome disorder that affects a relatively high percentage of the population and these patients should receive more attention. We believe that discharge diagnoses from ER should be more accurate, which reflects the need of additional education in headache diagnosis for ER doctors. Especially “cervicogenic headache” should more often be reclassified as TTH. Patients should be given specific diagnosis of a primary headache and prescribed specific medication (i.e. triptans in cases of migraine). The results of our and similar studies³² reflect the importance of follow-up visit to a headache specialist for definitive, accurate diagnosis according to ICDH-II criteria and appropriate treatment. We hope that the results of this and similar studies on the management of patients in the ER³³ will help physicians and health authorities elucidate the problems that need to be improved in order to provide patients seeking help in ERs the best possible treatment.

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Sažetak

ANALIZA TRETMANA BOLESNIKA S GLAVOBOLJOM U HITNOJ SLUŽBI

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Cilj ove studije bio je analizirati tretman bolesnika koji dolaze sa simptomom glavobolje u hitnu neurološku ambulantu u KB „Sestre milosrdnice“ u Zagrebu.

Retrospektivno su analizirani svi bolesnici koji su tijekom 2007. godine pregledani u hitnoj neurološkoj ambulanti sa simptomom glavobolje te su razvrstani po dijagnozama. Analizirana je dijagnostička obrada, terapija i daljnji tretman bolesnika. Od ukupno 6225 pregledanih bolesnika, 1385 (22,3%) se žalilo na glavobolju; 894 (64,5%) žena i 491 (35,5%) muškarac. Migrenu s aurom ili bez nje, tenzijsku glavobolju ili „cervikogenu glavobolju“ je imalo 1004 (72,5%) bolesnika (žene 67,5%, muškarci 32,5%); sekundarnu glavobolju je imalo 381 (27,5%) bolesnika: 89 (6,4%) moždani udar ili intrakranijsku hemoragiju 89 (6,4%), 33 (2,4%) primarni tumor, 54 (3,9%) metastatski tumor, 200 (14,4%) traumu glave s krvarenjem ili bez njega i 5 (0,4%) je imalo infektivnu bolest. Dijagnostička obrada je provedena kod 413 (29,8%) bolesnika: kod 314 (22,7%) kompjutorizirana tomografija mozga, kod 85 (6,1%) elektroencefalografija i kod 70 (5%) ultrazvučna obrada. Nesteroidni antireumatici (NSAR) i diazepam su bili najčešće propisivani lijekovi, potom infuzije, obični analgetici i antiemetici, dok su opioidi bili propisani kod 3,0% bolesnika. Kod bolesnika s primarnom glavoboljom dijagnostička obrada je provedena u 235 (23,2%) bolesnika, dok je 40 (4,0%) bolesnika bilo hospitalizirano. Zaključno, jedna petina bolesnika pregledanih u hitnoj službi se žalila na glavobolju, a tri četvrtine je imalo primarnu glavobolju. Većina bolesnika je liječena NSAR-ima, a manjina opioidima. Hitna služba ne bi smjela služiti kao mjesto za liječenje primarnih glavobolja; liječnici obiteljske medicine i neurolozi u ne-hitnoj ambulanti bi trebali pružiti bolji tretman bolesnika s primarnom glavoboljom.

Ključne riječi: *Glavobolja – dijagnostika; Glavobolja – terapija; Glavobolja, poremećaji, primarni – terapija; Glavobolja, poremećaji. Sekundarni – terapija; Hitno liječenje*