

## Headache patients in the emergency department of a Greek tertiary care hospital

Emmanouil V. Dermitzakis · Georgios Georgiadis · Jobst Rudolf ·  
Dimitra Nikiforidou · Panagiotis Kyriakidis · Ioannis Gravas ·  
Chrysanthi Bouziani · Iakovos Tsiptsios

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**Abstract** The aim of this study was to record the demographic and epidemiological data on adult patients with headache who attend the emergency department (ED) and the diagnoses that made by the neurologists in the ED of a tertiary care hospital in metropolitan Thessaloniki (Greece). In an open prospective study, demographic and epidemiological data were collected on all patients who reported headache (as chief complaint or not) and presented to the ED of Papageorgiou Hospital between August 2007 and July 2008. Headache patients accounted for 1.3% of all ED patients and for 15.5% of patients primarily referred to the ED neurologist. Tension type headache was the most frequent diagnosis, followed by secondary headaches and migraine. The large number of patients without final ED diagnosis and ward admission for further evaluation sheds a light on the immense workload of Greek ED physicians. Furthermore, we found evidence for the misuse of Emergency Medical Services by chronic headache patients. These findings indicate shortcomings in the pre-hospital (primary care) management of headache patients in the Greek National Health System to an extent unreported so far.

**Keywords** Headache · Headache criteria · Emergency department · Emergency medical services

### Introduction

Headache is an almost universal human experience with a great impact on the public health. A recently published review summarizes the enormous social impact of headache, with absenteeism from work, reduced effectiveness when working with headache, the direct costs of medication and hospitalization, as well as its effect on the life of the patients, partners and family [1]. Migraine, e.g. is a frequent cause of absence from work, and generally of social isolation, so it is ranked 19th in the list of disability reasons worldwide [2]. In a study from the United Kingdom, 15% of the general population signed off work or had reduced work productivity due to headache during the previous three-month period. The 0.5–2% of all absences from work was due to headache [3]. A Danish study in 1992 showed that the 43% of migraineurs and the 12% of tension type headache (TTH) patients, i.e. a total of 14% of the entire population, had been absent from work during the previous year due to headache [4].

Headache is also one common symptom for which patients present to emergency departments (ED). Usually, patients attend the ED for a ‘First or Worst’ headache, but often the patients suffer from a chronic headache of moderate intensity and hope to find relief in the ED. Recording the demographic and epidemiologic data of these patients is essential in order to estimate the burden of headache for the national health systems (NHS, e.g. the use of Emergency Medical Services [EMS]), in clinical daily routine and society in general. To the best of our knowledge, there are no demographic data that address the impact of

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E. V. Dermitzakis (✉) · G. Georgiadis · J. Rudolf ·  
P. Kyriakidis · I. Gravas · C. Bouziani · I. Tsiptsios  
Department of Neurology, Papageorgiou General Hospital,  
Ring Road of Nea Efkarpia, 56403 Thessaloniki, Greece  
e-mail: Manolis.Dermitzakis@gmail.com

D. Nikiforidou  
Department of Statistics & Insurance Science,  
University of Piraeus, Piraeus, Greece

headache on the workload of the EDs of Greek public hospitals. The aim of this survey was to record the demographic and epidemiological data on adult patients with headache who attend the ED and the diagnoses that made by the neurologists in the ED of a tertiary care hospital in metropolitan Thessaloniki, with special respect to age- or gender-related differences among headache patients presenting to the ED. Furthermore, this study aimed at the estimation of possible misuse of EMS or ED resources by headache patients.

## Patients and methods

With a population of about 1,100,000 inhabitants, metropolitan Thessaloniki is the second largest town in Greece. Among the city's public hospitals, Papageorgiou General Hospital is one of its four tertiary health care facilities. The population covered by the hospital during on-call periods exceeds 1,500,000, as the hospital does not only cover the needs of the population of metropolitan Thessaloniki, but also the adjacent districts of Thessaloniki and Chalkidiki.

The ED of Papageorgiou General Hospital provides EMS not on a daily, but a one-in-four-days basis. The Neurological Department is part of the hospital's section of Internal Medicine and in every on-call shift a neurologist is permanently present in the ED. Upon ED triage, patients presenting with the main or only complaint of headache are immediately referred to the on-call neurologist, while the on-call internists, cardiologists or surgeons, refer other patients (e.g. with headache due viral infection, head injury, or hypertension). The on-call paediatrician sees only patients younger than 14 years, irrespective of their chief complaint.

For 1 year (August 2007–July 2008), the ED neurologists prospectively collected the demographic data of all patients who attended the ED and were examined for complained headache. To avoid missing data, the data were filed in a standardized questionnaire that collected epidemiological data (age, gender) and information on means of transport, time of headache onset, waiting time in the ED until examination, headache family history, frequency of headache or headaches, Visual Analogue Scale (VAS), diagnosis of the ED neurologist and outcome (having three options for outcome: (1) pharmacological treatment or (2) no-pharmacological treatment in the ED [e.g. prescription or refer to Headache centre] or (3) admission to a ward). Headache was classified according to the IHS 2004 classification [5]. Whenever possible, the patients' self-assessment of pain intensity was measured on a VAS ranging from 0 (no pain) to 10 (maximum pain), as follows: patients were explained to place a moveable mark along the pain scale to indicate the pain level at the moment of

examination. VAS assessment was not performed in demented or otherwise uncooperative patients or in migrants with restricted knowledge of Greek.

All the patients gave their informed consent for this study. The study was approved by the hospital's ethic committee and complies with the Declaration of Helsinki.

The statistical data analysis was made with the SPSS 13 statistic package for PC. The Mann–Whitney *U*-test (non parametric) was used in order to compare headache patients presenting with or without the use of EMS, and to detect possible significant differences in the VAS score and treatment effects between two age categories (>50 years old and  $\leq 50$ ) and between the two sexes. *P*-values <0.05 were considered statistically significant.

## Results

From August 1st, 2007 until July 31st, 2008 a total of 67,439 patients older than 14 years presented to the hospital's ED and were examined by the ED physicians. Of them, 5,491 (8.1%) were examined from the ED neurologists for any reason and 851 of these had headache as chief complaint. Sixty-nine percentage of these headache patients were directly referred from triage to the on-call neurologist, the others after examination by an internist (19%), cardiologist (8%) or surgeon (4%). Thus, headache patients account for 1.3% of all ED patients presenting this year and for 15.5% of all patients examined by the ED neurologists.

Mean age of the 851 headache patients who presented to the ED was 39.9 years ( $\pm 15.6$ ) with an age range of 14–85 years. Sixty patients (7.1%) were transferred by EMS (ambulance). The average waiting time from ED presentation to neurological assessment was 75 min (varying from immediate evaluation to 175 min delay). 67.2% ( $n = 572$ ) patients were female with a mean age of 39.8 years ( $\pm 15.5$ ), and 32.8% ( $n = 279$ ) were male patients with a mean age of 40.2 years ( $\pm 15.8$ ).

The time elapsed between headache onset and ED presentation is shown in Table 1. It is of note that a significant part of female (27.3%) and male (33.3%) patients presented to the ED having headache for a period more than a week. Only 10.3% of the female patients attended directly immediately after headache onset, compared to 7.5% of the male patients.

Among the 60 patients who had called EMS for transportation to the ED, acute headache onset was reported in 31.7%, in 28.3% up to 24 h before, in 1.7% up to 3 days before, in 5.0% up to 1 week before and in 33.3% more than a week before presentation.

The final headache diagnosis that was made for all the patients by the neurologist in the ED is shown in Table 2.

**Table 1** Onset of headache in 851 patients presenting between August 2007 and July 2008 to the ED of Papageorgiou Hospital in Thessaloniki, Greece

Onset of headache	n (%)
Shortly before the attendance (directly)	80 (9.4)
Up to 24 h before the attendance	198 (23.3)
Up to 3 days before the attendance	168 (19.7)
Up to 1 week before the attendance	148 (17.4)
More than a week before the attendance	249 (29.3)
Unknown	8 (0.9)
Total	851 (100)

**Table 2** ICHD-2 diagnosis [5] for the 851 headache patients presenting from August 2007 to July 2008 to the ED of Papageorgiou Hospital in Thessaloniki, Greece

Diagnosis	n (%)
Tension type headache (chronic or episodic)	286 (33.6)
Migraine	131 (15.4)
Cluster headache	10 (1.2)
Secondary headache (due to viral infection, anxiety, hypertension, sinusitis, alcohol ingestion, probably SAH or meningitis)	188 (22.1)
Headache not other specified	236 (27.7)
Total	851 (100)

The most frequent diagnosis in female headache patients was TTH (35.5%), and the second most frequent was headache not other specified (Headache NOS) (26%). In male patients, headache NOS was the most frequent diagnosis (31.2% of male), followed by TTH (29.7%). Except for 1 case, the cluster headaches concerned exclusively male.

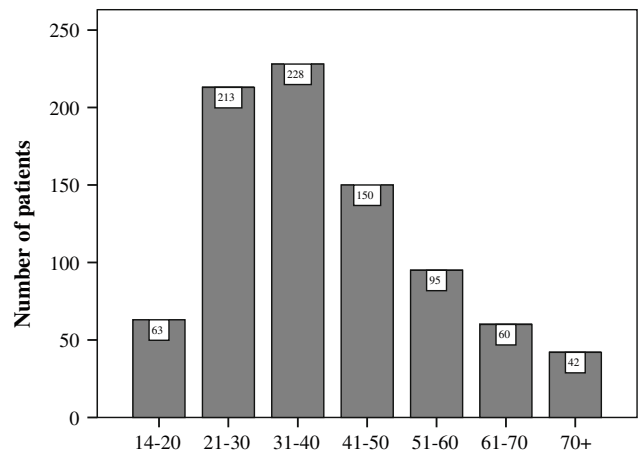
In patients who had been transported by the EMS, the neurologist diagnosed TTH in 18.3%, migraine in 21.7%, secondary headache in 26.7% and headache NOS in 33.3%.

The age distribution in our headache patients is shown in Fig. 1. Of the 851 patients, 654 (76.8%) were ≤50 years old. Nine (1.4%) of them were diagnosed as having cluster headache, 221 (33.8%) had TTH, 117 (17.9%) had migraine, 141 (21.6%) had a secondary headache and 166 (25.4%) headache NOS.

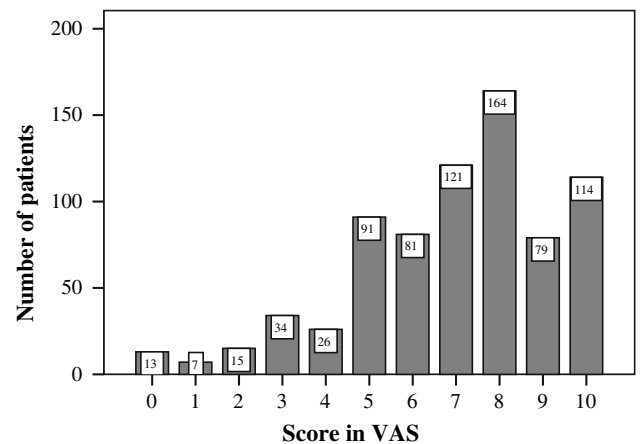
Among the remaining 197 patients older than 50, one patient (0.5%) was diagnosed with cluster headache, 65 (33.0%) had TTH, 14 (7.1%) migraine, 47 (23.9%) secondary headache and 70 patients (35.5%) had headache NOS.

Three-hundred and seventy-one patients (43.6%) suffered from headache for the first time, 431 patients (50.6%) had experienced headache before, while 49 (5.7%) were unable to answer this question (demented or agitated patients).

Four-hundred and twenty-five patients (49.9%) did not have a family history of headache, while 188 (22.1%) of them had. The remaining 238 (28%) were unable to recall



**Fig. 1** Age distribution among 851 headache patients presenting during 1 year to the ED of Papageorgiou Hospital in Thessaloniki



**Fig. 2** Distribution of subjective headache intensity (as measured on a Visual Analogous Scale) reported from 851 headache patients upon presentation to the ED

family members with headache or were unable to answer the question.

Seven-hundred and forty-five of all the 851 patients evaluated the intensity of their headache with a mean score of 6.9 (±2.32) on the VAS. The number of patients for every possible score in the 0–10 VAS is given in Fig. 2. Five-hundred and four females evaluated their headache pain with a mean score of 7.2 (±2.2) on the VAS, while 241 males evaluated it with a mean score of 6.3 (±2.4). This difference in evaluation is statistically significant (*P*-value = 0.000).

Five-hundred and ninety-one patients younger than 50 years rated their headache intensity with a mean score of 7.0 (±2.2) on the VAS, while 154 patients over the age of 50 rated it with a mean score of 6.5 (±2.6). This difference in the evaluation of headache intensity was statistically significant (*P*-value = 0.023).

Patients who were transferred by EMS-ambulance rated their headache pain significantly higher ( $P$ -value = 0.003) in comparison with the remaining headache patients: The headache intensity of 50 of the 60 patients who were transferred by an ambulance and could answer the question, reached a mean score of 7.66 ( $\pm 2.37$ ) on the VAS and the mean score for the remaining 695 patients who were not transferred by ambulance was 6.84 ( $\pm 2.30$ ).

Treatment outcome in the headache patients in relation to patients' sex is shown in Fig. 3. 16.4% of all headache patients younger than 50 years were admitted to a ward and underwent neuroimaging, while the respective percentage for patients older than 50 years was 19.3%. This difference is not statistically significant ( $P$ -value = 0.22).

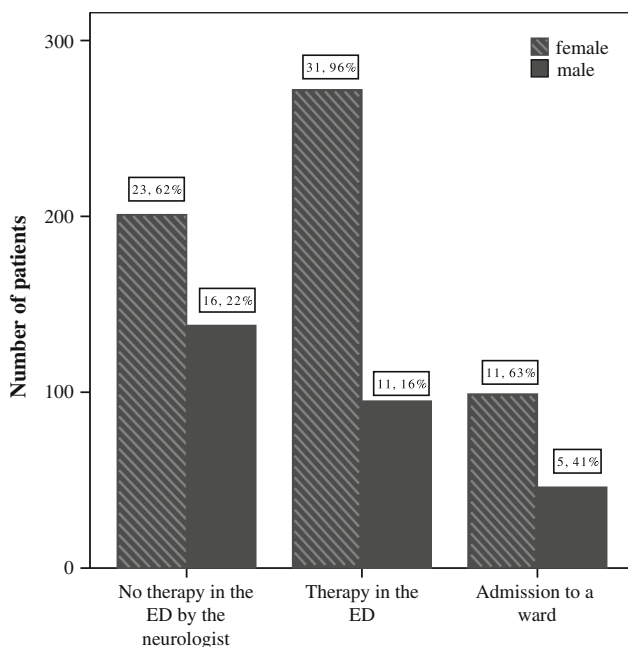
Of 60 patients who were transferred by EMS, only 18 (30%) were admitted to a ward and underwent neuroimaging.

## Discussion

In our survey, headache patients account for 1.3% of all adult patients presenting to the ED during the study period. This percentage is concordant to pertinent data from the comparable studies that report a headache incidence of 0.4–4.5% among ED patients [6–13]. Headache was the leading complaint in 15.5% of all patients assessed by the ED neurologist. This percentage can also be compared with the results (12.7%) of an Italian study in 2005 [7]. 'Headache' was the second most frequent reason—after the

symptom of 'dizziness-vertigo' (17%)—for which patients were examined by a neurologist in the ED of our hospital.

In contrast to other studies on headache incidence among ED patients, the most frequent diagnosis for primary headaches was the TTH with 33.6% and not migraine (with 15.4%), which was diagnosed less often than secondary headache and headache NOS. In all other reports, the most frequent ED diagnosis for primary headache was migraine [6, 14–18]. In a nationwide study covering the period between 1992 and 2001 on headache management in US EDs, Goldstein et al. [8] reported that the diagnosis of migraine was made in 63.5% of patients who attended the ED suffering from headache. This percentage is four times higher than in our sample. But it has to be taken into account that in other studies, especially in the USA, the majority of the ED headache patients were seen by the ED physician and *not* by a board certified neurologist [6–9, 11, 13, 14, 17–19]. This difference in the management of headache patients does also lead to differences in treatment practice: In our hospital's ED, opioids are rarely used for acute headache treatment, in contrast with US studies [13, 19]. It also may be argued that migraine is often underdiagnosed and under-treated in the ED [17, 18], or that the ICHD-2 criteria for migraine are underused in the ED, with the result that many patients leave without a clear discharge diagnosis and medications [13]. However, we are convinced that in our study the main reason for the discrepancy in the incidence of migraine diagnosis is the fact that almost one-third of our patients had been suffering from headache for more than a week before attendance. This time interval rules out uncomplicated migraine attacks that may be observed more often in patient samples with smaller referral intervals. Our explanation is corroborated by the fact that headache patients in the Greek NHS usually have to wait for months for an appointment in a specialized Headache Outpatient Department and often try to speed up their management presenting to the busy ED rather than waiting for a regular appointment at a Headache Centre. This goes in line with the finding that 33.3% of the patients suffering from headache for more than a week used a very urgent mean of transport (EMS-ambulance), in order to present to the ED. Thus, recurrent headaches, mainly (chronic or episodic) TTH, make up the great part of the neurologists workload at the ED, and not patients suffering either from 'first or worst' headache or migraine attacks. It is of note that a study from another Mediterranean country (Italy) shows similar conclusion, suggesting that Italian EDs are used instead of a visit to the general practitioner [16]. The assumption that chronic headache patients overuse Greek ED services is confirmed by the fact that 40% of headache patients who attended the ED were neither given any acute analgesic medication nor IV fluids by the on-call neurologist, a percentage lower than reported



**Fig. 3** Treatment and outcome among 851 headache patients presenting to the ED, in relation to patient's sex

from a recent US study [13] and from the Italian study [16]. Most of our patients received a prescription to start medical treatment with non-steroidal anti-inflammatory analgesics drugs (never narcotics) home or were informed to consult a specialized Headache Centre.

In our study, the ratio of female–male headache patients was approximately 2:1. This goes in line with other studies reporting a female–male sex ratio between 2:1 [6, 8, 13] and 3:1 [9, 14, 15]. Even though the overall VAS pain score was high (almost 50% of patients rated their headache with a score higher or equal to 7), female patients rated their headache intensity with a higher score than male. Therefore, they received more often analgesic treatment from the on-call neurologist. Thus, female headache patients were ‘more frequent and younger’ with ‘more headache’ resulting in ‘more treatment’.

As most primary headaches are observed with equal frequency among the genders, it does not astonish that, with the exception of cluster headache (90% male patients) there was no statistically significant sex difference in the incidence of primary headaches in our sample.

50.2% of patients were diagnosed to suffer from primary headache and the rest from secondary (22.1%) or headache NOS. The high percentage (27.7%) of patients suffering from headache NOS in our study may be considered high, as in other reports, the incidence of primary headaches in the EDs reaches 64 [19], 80 [11] and 81.2% [20] and headache NOS was diagnosed in 14.9 [14] or 26% [6] of all headache patients only. However, other studies report a higher incidence of headache NOS, ranges from 42% [15, 16] to 59% [17]. Even in well structured reports from the US, a relevant portion of the primary headaches could not be classified, and therefore, 20% [19] to 36% [13] of the acute patients were not given a diagnosis in the ED. Comparable data were reported from an Italian study [7] with more than one-third of headache patients classified as headache NOS (Table 3). In our study, this percentage of headache NOS diagnosis increased to 33.3% among patients who were transferred by an EMS-ambulance. Given the high number of patients ( $n = 5,491$ ) referred to the ED neurologist for assessment during the study period,

the ED neurologist’s first concern is to recognize headache secondary to an acute neurological disease, and his second concern should be to give specific headache treatment (e.g. for migraine). The exact diagnosis of primary headache subtypes is difficult to be made in ED settings and is a typical task for a Headache Center. On the ED level, it may be sufficient to distinguish primary from secondary headache, especially benign from possibly life-threatening causes of acute headache, and to give an acute pharmacological treatment. Furthermore, Bø et al. [21] demonstrated that this distinction must not be based on clinical features alone, and that all unclear cases have to be admitted to a neurological ward for further evaluation, including neuroimaging, where appropriate.

From our data, it is obvious that headache in the ED is a symptom that concerns mainly patients younger than 50 years. This finding is concordant with other respective reports [6, 8, 12, 14]. It is of note that patients younger than 50 years rated their headaches with statistically significant higher VAS scores than older patients. This higher subjective pain intensity is the reason why patients under 50 years of age more easily present to attend the ED. In our study, the mean age of headache patients was approximately 40 years. A lower mean age is reported from other studies that—in contrast to our survey—also included children. Apparently, headache diagnosis was more easy in patients younger than 50 years, as headache NOS was diagnosed in one quarter of these patients, in contrast to older patients, where headache NOS was diagnosed in 1/3 of the patients. Ninety percentages of cluster headaches patients were younger than 50 years, and migraine was also more often diagnosed among these patients. In contrast to the nationwide US survey that showed that the patients older than 50 years had a fourfold risk to have a headache secondary to an underlying disease [8], in our study this risk was not statistically significant from the risk in older patients, although our admission rate for headache patients over 50 years of age (19.3%) was higher than reported from the US study.

An overall 17% of headache patients presenting to the ED were admitted to a ward for further examinations, a value comparable to other studies [12, 16]. Of the 60 patients who

**Table 3** ED headache diagnoses from tertiary care hospitals from Thessaloniki (Greece), Trieste (Italy) and New York (USA)

Diagnosis	ED, Papageorgiou Hospital, 2007–2008 (%)	ED, University Hospital, Trieste, 2004 [7] (%)	ED, Albert Einstein Coll. of Medicine, NY, 2005 (modified from [19]) (%)
Primary headache	50.2	24.3	64
TTH (chronic or episodic)	33.6		7.1
Migraine	15.4	16.7	38.7
Secondary headache	22.1	41.3	25
Headache NOS or no diagnosis	27.7	34.4	20

were transferred by an ambulance, only 30% were admitted to a ward, even though the diagnosis of headache NOS was more often and these patients rated their headache pain intensity with a higher score compared to patients who used private transportation means. In a study by Nemer et al. 12.2% of headache patients examined in the ED had been transported by an ambulance (a percentage higher than the 7.1% observed in our study). These patients had a 18.5-fold risk to have a serious reason for their headache (such as meningitis, intracranial haemorrhage or tumour of the central nervous system), compared to ED headache patients that had used private transportation means [22]. We are convinced that in our study, chronic headache patients show a tendency to misuse EMS ambulances.

## Conclusion

To the best of our knowledge, this is the first report on the impact of headache patients on the workload of on-call neurologists in a tertiary care health facility from Greece. From our data, it becomes obvious that the majority of headache patients presenting to the ED are suffering from recurrent or chronic headache and could easily be managed out of hospital. These headache patients tend to overuse both ED and EMS services, as they seem to prefer ‘immediate management’ to regular outpatient care, even that of specialized headache centres. The relatively large number of patients with the ED diagnosis of headache NOS documents that under the time pressure that the large number of headache patients exerts on the on-call neurologist, the diagnostic criteria of the ICHD-2 are applicable only with severe restrictions. In the ED settings it is important to distinct between benign and possibly life-threatening headache and to give a specific acute pharmacological treatment (especially for migraine), and not to waste time seeking for diagnostic criteria of benign headache subtypes.

**Conflict of interest** None.

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