

Evaluation of headache in adults

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INTRODUCTION — Headache is among the most common medical complaints. An overview of the approach to the patient with headache is presented here. The approach to adults presenting with headache in the emergency department is reviewed elsewhere. (See "[Evaluation of the adult with headache in the emergency department](#)".)

The clinical features and management of specific primary headache syndromes are discussed separately. (See "[Pathophysiology, clinical manifestations, and diagnosis of migraine in adults](#)" and "[Tension-type headache in adults: Pathophysiology, clinical features, and diagnosis](#)" and "[Cluster headache: Epidemiology, clinical features, and diagnosis](#)".)

EPIDEMIOLOGY AND CLASSIFICATION OF HEADACHE — Many controversies exist in the literature regarding the nomenclature and classification of headache. The International Headache Society (IHS) classification and diagnostic criteria for headache were revised in 2004 [1]. This system gives operational diagnostic criteria for headaches, cranial neuralgias, and facial pain syndromes. The IHS classification also details which clinical features must be present and in what combination to establish a precise diagnosis. However, this classification system can be cumbersome for day to day use. The IHS criteria may be most useful for grouping patients for scientific purposes, such as clinical trials and epidemiologic studies [2].

As many as 90 percent of all benign headaches fall under a few categories, including migraine, tension-type, and cluster headache. While a population-based study found that the one-year prevalence of episodic tension-type headache was 38 percent [3], most of these people do not present to physicians for care. As an example, a study of two primary care units in Brazil found that migraine was the most prevalent primary headache disorder, accounting for 45 percent of patients reporting headache as a single symptom [4].

Cluster headache typically leads to significant disability and most of these patients will come to medical attention. However, cluster headache remains an uncommon diagnosis in primary care settings because of overall low prevalence in the general population (<1 percent). (See "[Cluster headache: Epidemiology, clinical features, and diagnosis](#)", section on 'Epidemiology'.)

Clinicians can easily become familiar with the most common headache disorders and how to differentiate between them ([table 1](#)). It is not necessary to follow the detailed classification and diagnostic criteria proposed by the IHS, although there are certain important points that should be kept in mind whenever describing, managing, or discussing patients with headache:

- It is not appropriate to use the term vascular headaches to describe migraine and cluster headaches, nor is it correct to use the term muscle contraction headaches to describe common headache types that are without typical migrainous or other autonomic features.
- Although often attributed to muscle contraction, the exact mechanism of tension-type headache is unknown. (See "[Tension-type headache in adults: Pathophysiology, clinical features, and diagnosis](#)", section on 'Pathophysiology'.)
- Headache due to vascular abnormalities, aneurysm, or arteriovenous malformation should be described separately from migraine or cluster headaches since these are different diseases pathophysiologically, and the management strategies are different.
- Use of the term "psychogenic headache" should be discouraged since it tends to be confusing to patients and wrongly suggests that organic processes are not involved. However, the revised 2004 IHS criteria do have a category of headache attributed to psychiatric disorder [1].

A number of other disorders may cause headaches. In the Brazilian primary care study, 39 percent of patients presenting with headache had a headache that was due to a systemic disorder (most commonly fever, acute hypertension, and sinusitis), and 5 percent had a headache that was due to a neurologic disorder (most commonly posttraumatic headache, headaches secondary to cervical spine disease, and expansive intracranial processes) [4]. Physicians who evaluate patients with headache should be alert to signs that suggest a serious underlying disorder (see '[Danger signs on history](#)' below).

Patients frequently attribute headaches to eye strain, and the IHS recognizes headaches associated with refractive errors (HARE). However, an observational study suggested that headaches are only rarely due to refractive error alone [5]. Nevertheless, correcting vision may improve headache symptoms in some of these patients.

HEADACHE TRIGGERS — Clinical studies have identified many potential triggers that may start an attack or worsen a preexisting headache. The role of most of these headache triggers has been well established in terms of migraine but remains less clear for other headache types. A partial list appears in Table 2 ([table 2](#)).

There is a common belief, particularly among patients, that hypertension can cause headaches. While this is true in the case of hypertensive emergencies, it is probably not true for typical migraine or tension headaches. As an example, a report from the Physicians' Health Study of 22,701 American male physicians ages 40 to 84 years analyzed various risk factors for cerebrovascular disease and found no difference in the percentage of men with a history of hypertension in the migraine and nonmigraine groups [6]. Furthermore, a prospective study of 22,685 adults in Norway found that high systolic and diastolic pressures were actually associated with a reduced risk of nonmigrainous headache [7].

In contrast to these studies, a meta-analysis of 95 randomized controlled trials examining antihypertensive treatment with four different medication classes found that patients assigned to blood pressure treatment had a significant reduction in headache prevalence compared with placebo treatment, and that headache prevalence was significantly reduced in each of the four classes of drugs compared individually with placebo [8]. These results suggest that hypertension plays a role in headache pathogenesis. However, the study is limited by the lack of data regarding headache classification, and it is possible that many of the patients reporting headache had migraine, which is known to be responsive to many different antihypertensive medications. (See "[Preventive treatment of migraine in adults](#)", section on 'Antihypertensives'.)

PRINCIPLES OF THE HEADACHE EVALUATION — Evaluating a patient with new onset headache pain can be challenging. It requires a systematic approach based upon an understanding of the common headache syndromes. Making a correct diagnosis is the first and foremost step in the proper management of headache patients.

History — A systematic case history is the single most important factor in establishing a headache diagnosis and determining the future work-up and treatment plan. A thorough history also helps focus the physical examination and prevent unnecessary investigation and imaging studies.

A systematic case history should include the following:

- Age at onset
- Presence or absence of aura and prodrome
- Frequency, intensity and duration of attack
- Number of headache days per month
- Time and mode of onset
- Quality, site, and radiation of pain
- Associated symptoms and abnormalities
- Family history of migraine
- Precipitating and relieving factors
- Effect of activity on pain
- Relationship with food/alcohol
- Response to any previous treatment
- Any recent change in vision
- Association with recent trauma

- Any recent changes in sleep, exercise, weight, or diet
- State of general health
- Change in work or lifestyle (disability)
- Change in method of birth control (women)
- Possible association with environmental factors
- Effects of menstrual cycle and exogenous hormones (women)

As mentioned above, the most common headache syndromes frequently present with characteristic symptoms ([table 1](#)). However, there may be considerable symptom overlap; one population-based survey found that less than one-half of patients who complained of headaches that met the IHS criteria for migraine were properly diagnosed [9]. Migraine symptoms may also overlap with other causes of headache. As an example, a significant number of patients with migraine may have nasal symptoms that suggest sinus disease [10]; in addition, a study of primary care patients with recurrent sinus headache found that 90 percent experienced attacks that met the IHS criteria for migraine [11]. (See "[Headache syndromes other than migraine](#)", section on 'Sinus headache'.)

Diagnostic instruments — Given the pitfalls described above, a number of diagnostic instruments have been proposed, primarily to assist with the diagnosis of migraine, the most common primary headache syndrome in patients presenting to primary care physicians. A simple and recently validated instrument, the brief headache screen, appears to be well suited to identify migraine in the primary care setting. Different versions of the brief headache screen have been promoted, including anywhere from three to six questions. A version adopted by the American Academy of Neurology includes the following four questions:

- How often do you get severe headaches (ie, without treatment it is difficult to function)?
- How often do you get other (milder) headaches?
- How often do you take headache relievers or pain pills?
- Has there been any recent change in your headaches?

In one validation study, the presence of episodic disabling headache correctly identified migraine in 136 of 146 patients (93 percent) with episodic migraine, and 154 of 197 patients (78 percent) with chronic headache with migraine, with a specificity of 63 percent [12]. Only 6 of 343 patients (1.7 percent) with migraine were not identified by disabling headache. Thus, virtually any patient with severe episodic headaches can be considered to have migraine.

Questions 2 and 3 can be helpful for identifying patients with medication overuse (eg, patients who use symptomatic medications more than three days per week and/or who have daily headaches). Question 4 is particularly helpful for identifying patients who may have an important secondary cause of headache; a patient with a stable pattern of headache for six months is unlikely to have a serious underlying cause.

Danger signs on history — Paying attention to danger signs is important since headaches may be the presenting symptom of a space-occupying mass or vascular lesion, infection, metabolic disturbance, or a systemic problem. The following features in the history can serve as warning signs of possible serious underlying disease [13-15]. (See "[Evaluation of the adult with headache in the emergency department](#)".)

- Sudden onset of headache, or severe persistent headache that reaches maximal intensity within a few **seconds or minutes** after the onset of pain, warrants aggressive investigation. Subarachnoid hemorrhage, for example, often presents with the abrupt onset of excruciating pain. In contrast, migraine headaches generally begin with moderate pain and then gradually increase to a maximal level over one to two hours. (See "[Clinical manifestations and diagnosis of aneurysmal subarachnoid hemorrhage](#)", section on 'Diagnosis of subarachnoid hemorrhage' and "[Pathophysiology, clinical manifestations, and diagnosis of migraine in adults](#)".)
- Cluster headache may sometimes be confused with a serious headache, since the pain from a cluster headache can reach full intensity within minutes. However, cluster headache is transient (usually lasting less than one to two hours) and is associated with characteristic ipsilateral autonomic signs such as tearing or rhinorrhea. (See "[Cluster headache: Epidemiology, clinical features, and diagnosis](#)".)
- The absence of similar headaches in the past is another finding that suggests a possible serious disorder. The "first" or "worst" headache of my life is a description that sometimes accompanies an intracranial hemorrhage or central nervous system (CNS) infection. On the other hand, patients suffering from migraine usually have had similar types of headaches in the past.
- A worsening pattern of headache suggests a mass lesion, subdural hematoma, or medication overuse headache. (See "[Headache syndromes other than migraine](#)", section on 'Medication overuse headache'.)
- Focal neurologic symptoms other than typical visual or sensory aura should raise suspicion for a mass lesion, arteriovenous malformation, or collagen vascular disease.
- Fever associated with headache may be caused by intracranial, systemic, or local infection, as well as other etiologies ([table 3](#)). Infection in a non-intracranial location (such as the lungs or paranasal or mastoid sinuses) may serve as a nidus for the development of meningitis or intracranial abscess. Fever is not a characteristic of migraine headache; it may, however, follow a subarachnoid hemorrhage by a few days.
- Any change in mental status, personality, or fluctuation in the level of consciousness suggests a potentially serious abnormality.
- The rapid onset of headache with strenuous exercise, especially when minor trauma has occurred, raises the possibility of carotid artery dissection or intracranial hemorrhage.
- Head pain that spreads into the lower neck and between the shoulders may indicate meningeal irritation due to either infection or subarachnoid blood; it is not typical of a benign process.
- New headache in patients under the age of 5 or over the age of 50 may suggest underlying pathology.
- New headache type in a patient with cancer suggests metastasis.
- New headache type in a patient with Lyme disease suggests meningoenzephalitis.
- New headache type in a patient with HIV suggests an opportunistic infection or tumor.
- Headache during pregnancy or postpartum suggests possible cortical vein or venous sinus thrombosis, carotid dissection, and pituitary apoplexy.

Other features suggesting a specific headache source — Other features that suggest a specific source of headache pain include the following:

- Chronic nasal stuffiness or chronic respiratory infection suggests a diagnosis of sinusitis, although, as mentioned above, patients with migraine may also have nasal symptoms. (See "[Headache syndromes other than migraine](#)", section on 'Sinus headache'.)
- Impaired vision or seeing "holes" around light suggests the presence of glaucoma. Suspicion for subacute angle closure glaucoma should be raised by relatively short duration (often less than one hour) unilateral headaches that do not meet criteria for migraine arising after age 50 [16].
- Visual field defects suggest the presence of a lesion of the optic pathway (eg, due to a pituitary mass).
- Blurring of vision on forward bending of the head, headaches upon waking early in the morning that improve with sitting up, and double vision or loss of coordination and balance should raise the suspicion of raised intracranial pressure; this disorder should also be considered in patients with chronic, daily, progressively worsening headaches associated with chronic nausea.
- In patients who present with headache that is relieved with recumbency and exacerbated with upright posture, the diagnosis of low cerebrospinal fluid (CSF) pressure headache should be considered. An additional major feature of this headache syndrome is diffuse meningeal enhancement on brain MRI. The accepted etiology is CSF leakage, which may occur in the context of rupture of an arachnoid membrane. (See "[Headache attributed to spontaneous intracranial hypotension: Pathophysiology, clinical features, and diagnosis](#)".)
- The presence of nausea, vomiting, worsening of headache with changes in body position (particularly bending over), an abnormal neurologic examination, and/or a significant change in prior headache pattern suggest the headache was caused by a tumor. (See "[Clinical presentation and diagnosis of brain tumors](#)".)

- Sudden, severe, unilateral vision loss suggests the presence of optic neuritis.
- Headache, fatigue, generalized aches and pain, and night sweats in subjects age 55 years or older suggest the presence of temporal arteritis. (See "[Clinical manifestations of giant cell \(temporal\) arteritis](#)" and "[Diagnosis of giant cell \(temporal\) arteritis](#)".)
- Intermittent headaches with high blood pressure are suggestive of pheochromocytoma. (See "[Clinical presentation and diagnosis of pheochromocytoma](#)".)

Physical examination — The majority of patients with headache complaints have a completely normal physical and neurologic examination. If a complete and careful history does not point to an organic etiology, further examination is warranted in the following areas:

- Obtain blood pressure and pulse
- Listen for bruit at neck, eyes, and head for clinical signs of arteriovenous malformation
- Palpate the head, neck, and shoulder regions
- Check temporal and neck arteries
- Examine the spine and neck muscles
- A functional neurologic examination including getting up from a seated position without any support, walking on tiptoes and heels, cranial nerve examination, funduscopy and otoscopy, tandem gait and Romberg test, and symmetry on motor, sensory, reflex and cerebellar (coordination) tests.

Danger signs on examination — Signs on examination that suggest serious pathology include the following [14] (see "[Evaluation of the adult with headache in the emergency department](#)", section on 'High-risk examination findings'):

- Neck stiffness and especially meningismus (resistance to passive neck flexion) suggests meningitis.
- Papilledema suggests the presence of an intracranial mass lesion, benign intracranial hypertension (pseudotumor cerebri), encephalitis, or meningitis. (See "[Idiopathic intracranial hypertension \(pseudotumor cerebri\): Clinical features and diagnosis](#)".)
- Focal neurologic signs suggest an intracranial mass lesion, arteriovenous malformation, or collagen vascular disease.

Indications for imaging studies — Patients with any of the danger signs noted above need urgent brain imaging. (See '[Danger signs on history](#)' above.) In the remaining patients, there are no randomized, controlled trials that help delineate when imaging is necessary, and no such trials are likely to be forthcoming as blinding and randomization would present ethical problems. As a result, the decision to scan or not to scan in headache is likely to remain one of clinical judgment [17].

The vast majority of patients without danger signs do not have secondary causes of headache [18,19]. As an example, in a study of 373 patients with chronic headache at a tertiary referral center, all had one or more of the following characteristics that prompted referral for head CT scanning: increased severity of symptoms or resistance to appropriate drug therapy; change in characteristics or pattern of headache; or family history of an intracranial structural lesion [20]. Only four scans (1 percent) showed significant lesions (two osteomas, one low grade glioma, and one aneurysm); only the aneurysm was treated.

The American Academy of Neurology, American Academy of Family Physicians, American College of Physicians-American Society of Internal Medicine, and four other groups formed a consortium and issued a year 2000 practice guideline that came to the following conclusions regarding the need for brain imaging in patients with headache [21]:

- Neuroimaging should be considered in patients with nonacute headache and an unexplained abnormal finding on neurologic examination.
- Evidence is insufficient to make specific recommendations in the presence or absence of neurologic symptoms (eg, headache worsened by Valsalva, causing awakening from sleep, new headache in older population, or progressively worsening headache).
- Neuroimaging is usually not warranted for patients with migraine and a normal neurologic examination, although a lower threshold for imaging is warranted in patients with atypical migraine features or in patients who do not fulfill the strict definition of migraine.
- Data were insufficient to make a specific recommendation for patients with tension-type headache.
- Data were insufficient to make a specific recommendation regarding the relative sensitivity of MRI compared with CT in patients who have an imaging study performed.

Given the lack of definitive data, one approach is to consider neuroimaging in the following situations [22]:

- Recent significant change in the pattern, frequency or severity of headaches
- Progressive worsening of headache despite appropriate therapy
- Focal neurologic signs or symptoms
- Onset of headache with exertion, cough, or sexual activity
- Orbital bruit
- Onset of headache after age 40 years

It may also be reasonable to image a patient presenting with nonmigrainous featureless headache, ie, bilateral nonthrobbing headache without nausea and without sensitivity to light, sound, or smell [17]. Such an approach would have an estimated yield of 2 percent for detecting a treatable cause.

Brain imaging for no other reason than reassurance is sometimes performed in clinical practice. In the end, patients are seeking a reason for the problem. It is important that the clinician provide the patient with a clear explanation of both the diagnosis and the reason for the brain scan, especially if the decision is made to obtain imaging in someone suspected of having primary headache [17].

The data are insufficient to recommend CT or MRI when neuroimaging is deemed necessary. A head CT scan (without and with contrast) is likely to be sufficient in most patients [23]. An MRI along with MRA are indicated when posterior fossa or vascular lesions are suspected.

Indications for lumbar puncture — Lumbar puncture (LP) for cerebrospinal fluid analysis is urgently indicated in patients with headache when there is clinical suspicion of subarachnoid hemorrhage in the setting of a negative or normal head CT scan. In addition, LP is indicated when there is clinical suspicion of an infectious or inflammatory etiology of headache. These issues are discussed elsewhere. (See "[Clinical manifestations and diagnosis of aneurysmal subarachnoid hemorrhage](#)", section on 'Diagnosis of subarachnoid hemorrhage' and "[Lumbar puncture: Technique, indications, contraindications, and complications in adults](#)", section on 'Indications'.)

INFORMATION FOR PATIENTS — UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "[Patient information: Headache \(The Basics\)](#)")
- Beyond the Basics topics (see "[Patient information: Headache causes and diagnosis in adults \(Beyond the Basics\)](#)" and "[Patient information: Headache treatment in adults \(Beyond the Basics\)](#)")

SUMMARY — While episodic tension-type headache is common in population-based studies, migraine is the most common diagnosis in patients presenting to primary care physicians with headache. The appropriate evaluation of headache complaints includes the following:

- Rule out serious underlying pathology and look for other secondary causes of headache. (See '[Danger signs on history](#)' above and '[Danger signs on examination](#)' above.)
- Determine the type of primary headache using the patient history as the primary diagnostic tool ([table 1](#)). There may be overlap in symptoms, particularly between migraine and tension-type headache and between migraine and some secondary causes of headache (such as sinus disease). Use of an instrument such as the brief headache screen appears to be helpful in identifying patients with migraine in particular. (See '[Diagnostic instruments](#)' above.)
- An imaging study is not necessary in the vast majority of patients presenting with headache. Nevertheless, imaging (usually CT scan) is warranted in the patients outlined above. (See '[Indications for imaging studies](#)' above.)

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GRAPHICS

Characteristics of migraine, tension-type, and cluster headache syndromes

Symptom	Migraine	Tension-type	Cluster
Location	Unilateral in 60 to 70 percent; bifrontal or global in 30 percent	Bilateral	Always unilateral, usually begins around the eye or temple
Characteristics	Gradual in onset, crescendo pattern; pulsating; moderate or severe intensity; aggravated by routine physical activity	Pressure or tightness which waxes and wanes	Pain begins quickly, reaches a crescendo within minutes; pain is deep, continuous, excruciating, and explosive in quality
Patient appearance	Patient prefers to rest in a dark, quiet room	Patient may remain active or may need to rest	Patient remains active
Duration	4 to 72 hours	Variable	30 minutes to 3 hours
Associated symptoms	Nausea, vomiting, photophobia, phonophobia; may have aura (usually visual, but can involve other senses or cause speech or motor deficits)	None	Ipsilateral lacrimation and redness of the eye; stuffy nose; rhinorrhea; pallor; sweating; Horner's syndrome; focal neurologic symptoms rare; sensitivity to alcohol

Graphic 68064 Version 3.0

Headache triggers

Diet	Stress
Alcohol	Let-down periods
Chocolate	Times of intense activity
Aged cheeses	Loss or change (death, separation, divorce, job change)
Monosodium glutamate	Moving
Aspartame	Crisis
Caffeine	Changes of environment or habits
Nuts	Weather
Nitrites, Nitrates	Travel (crossing time zones)
Hormones	Seasons
Menses	Altitude
Ovulation	Schedule changes
Hormone replacement (progesterone)	Sleeping patterns
Sensory stimuli	Dieting
Strong light	Skipping meals
Flickering lights	Irregular physical activity
Odors	
Sounds, noise	

Graphic 57424 Version 3.0

Differential diagnosis of headache with fever

Intracranial infection
Meningitis
Bacterial
Fungal
Viral
Lymphocytic
Encephalitis
Brain abscess
Subdural empyema
Systemic infection
Bacterial infection
Viral infection
HIV/AIDS
Other systemic infection
Other causes
Familial hemiplegic migraine
Pituitary apoplexy
Rhinosinusitis
Subarachnoid hemorrhage
Malignancy of central nervous system

Graphic 80966 Version 3.0