

Todd A. Smitherman · Donald B. Penzien
Jeanetta C. Rains · Robert A. Nicholson
Timothy T. Houle

Headache



**Advances in
Psychotherapy**

Evidence-Based Practice

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Headache

About the Authors

Todd A. Smitherman, PhD, FAHS, is Associate Professor of Psychology and Director of the Center for Behavioral Medicine at the University of Mississippi. He has published over 50 peer-reviewed journal articles and numerous book chapters, most pertaining to psychiatric comorbidities and other behavioral issues in headache disorders. His research has been supported by the Migraine Research Foundation, the American Headache Society, the University of Mississippi, and Merck Pharmaceuticals. Dr. Smitherman serves as associate editor for *Headache: The Journal of Head and Face Pain*, is a fellow of the American Headache Society and chair of its Behavioral Issues Section, and has served as a consultant for the Common Data Elements Working Group for Headache Clinical Trials (National Institute of Neurological Disorders and Stroke).

Donald B. Penzien, PhD, FAHS, is widely recognized for his expertise and contributions in headache research methodologies and development of cost-efficient behavioral interventions for headache (i.e., limited-therapist-contact therapies). He presently serves as Professor of Anesthesiology at the Wake Forest School of Medicine. In 1986, he founded the Head Pain Center at University of Mississippi Medical Center, where he served as Director and Professor of Psychiatry until 2014. He is a fellow of the American Headache Society and the Society of Behavioral Medicine. He has published extensively in behavioral medicine, with over 150 research articles, book chapters, and monographs to his credit. His work has been supported by grants from the National Institutes of Health, Department of Defense, and other funding agencies. He is associate editor for *Headache: The Journal of Head and Face Pain*, has served on editorial boards of other scientific journals, and has actively served numerous professional organizations. Key appointments have included chair of the Nonpharmacologic Therapies Review Group for the Headache Treatment Guidelines Project (Agency for Healthcare Research and Quality), Board of Directors as well as chair of the Behavioral Clinical Trials Guidelines Workgroup (American Headache Society), member of the US Headache Treatment Guidelines Consortium (American Academy of Neurology), and member of the Common Data Elements Working Group for Headache Clinical Trials (National Institute of Neurological Disorders and Stroke).

Jeanetta C. Rains, PhD, FAHS, is Clinical Director of the Center for Sleep Evaluation at Elliot Hospital in Manchester, New Hampshire. She is a fellow of the American Board of Sleep Medicine, the American Academy of Sleep Medicine, and the American Headache Society. She is a leading authority in the field of headache and sleep medicine, having worked in this area since 1991. She has authored more than 90 scientific publications. She is associate editor for *Headache: The Journal of Head and Face Pain* and serves on the editorial board for the *Journal of Applied Psychophysiology and Biofeedback*. Her research has been supported by the American Headache Society and Merck Pharmaceuticals, and she has served as a consultant for research supported by the Migraine Research Foundation and American Headache Foundation.

Robert A. Nicholson, PhD, FAHS, is Director of Research for Mercy Health System and Director of Behavioral Medicine at Mercy Health Research and Mercy Clinic Headache Center. He earned his doctorate in clinical psychology (specializing in behavioral medicine) at Virginia Commonwealth University and completed a predoctoral internship and postdoctoral research fellowship at Brown University Medical School. His research and clinical focus is on the use of maximally effective patient communication strategies for prevention and management of migraine and integrating patient reports into optimal migraine treatment design. He has received

grants from the National Institute of Neurological Disorders and Stroke, the National Cancer Institute, the National Headache Foundation, Saint Louis University, and the private sector to support his research. Dr. Nicholson has published extensively and made numerous presentations at scientific and professional conferences.

Timothy T. Houle, PhD, is Associate Professor of Anesthesiology at Wake Forest School of Medicine. He has published over 80 peer-reviewed journal articles and numerous book chapters principally addressing chronic pain and the triggers of headache, and much of his research has focused on the prediction of headache attacks in the individual. His work has been funded by the National Institute of Neurological Disorders and Stroke, Department of Defense, and numerous other agencies. He is statistical consultant for the journal *Headache: The Journal of Head and Face Pain* and statistical editor for the journal *Anesthesiology*. Key appointments have included serving as a member of the Behavioral Medicine: Interventions and Outcomes Study Section (National Institutes of Health), chair of the Methodology, Design, and Statistical Issues Section (American Headache Society), member of the Behavioral Clinical Trials Guidelines Workgroup (American Headache Society), and member of the Common Data Elements Working Group for Headache Clinical Trials (National Institute of Neurological Disorders and Stroke).

About the Cover Illustration

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The cover image is an etching done on a zinc plate, hand colored and printed by the artist. It was created as an original, limited edition print and commissioned as cover art for this volume.

Artist’s Comment: *Although perhaps a bit over the top, I hope my depiction of what it feels like to suffer from a migraine captures those terrible moments so many of us sadly experience. Discussions with the authors (Don Penzien and others) were crucial in deciding on how to approach the image. My hat...and anvil...are off to them.*

About the artist: Enoch “Doyle” Jeter

- Born in Jena, Louisiana, USA
- Bachelor of Arts, Northeast Louisiana University, Monroe, Louisiana
- Master of Fine Arts, Highlands University, Las Vegas, New Mexico
- Printmaking Instructor and Artist in Residence, University of Louisiana–Monroe
- Public and private collections: USA, Ireland, Venezuela, Canada, Holland, Bali-Indonesia, Germany, Puerto Rico, etc.
- Numerous exhibitions, 1971 to present
- Artist’s web site: <http://www.enochdoylejeterart.com/>

To enquire about ordering signed prints of the cover illustration (*Going Against the Migraine*), please contact the author at doyle@enochdoylejeterart.com. All other enquiries are also welcome.

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Headache

Todd A. Smitherman

Department of Psychology, University of Mississippi, Oxford, MS

Donald B. Penzien

Department of Anesthesiology, Wake Forest School of Medicine,
Winston-Salem, NC

Jeanetta C. Rains

Center for Sleep Evaluation, Elliot Hospital, Manchester, NH

Robert A. Nicholson

Mercy Clinic Headache Center/Mercy Health Research, Mercy Health,
St. Louis, MO

Timothy T. Houle

Department of Anesthesiology, Wake Forest School of Medicine,
Winston-Salem, NC



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EUROPE: Hogrefe Publishing, Merkelstr. 3, 37085 Göttingen, Germany
Phone +49 551 99950-0, Fax +49 551 99950-425; E-mail publishing@hogrefe.com

OTHER OFFICES

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Preface

This book describes the conceptualization, assessment, and empirically supported treatment of headache from a behavioral perspective. Though headache most certainly is at its core a neurobiological phenomenon, a large and ever-growing body of research indicates that behavioral factors (e.g., stress, psychiatric comorbidities, coping skills, cognitions) play an integral role in the onset and maintenance of headache disorders over time. Many mental health providers encounter headache as a common and disabling comorbidity among their psychiatric patients but lack the knowledge of how to effectively work with headache patients. Hundreds of studies over the past 4 decades have amply established the efficacy of behavioral therapies for headache disorders as well as the relevance of psychological/behavioral factors in headache. This book reviews the relevant psychological factors and describes how to implement efficacious behavioral interventions for headache within clinical practice settings. The intended audience is principally mental/behavioral health practitioners and trainees who want to know how to implement these interventions with their patients. This volume is also useful for other health care professionals wishing to supplement routine medical treatment of headache patients with empirically supported behavioral strategies. Basic familiarity with psychological principles of behavior change is assumed.

This book is divided into five chapters. Chapter 1 describes the most common primary headache disorders, differentiating migraine and tension-type headache from each other and from other headache disorders, reviewing common comorbid conditions, and outlining empirically supported assessment strategies. Chapter 2 gives an overview of the pathophysiology of migraine and the behavioral conceptualization of headache. Chapter 3 presents a framework for conducting a diagnostic assessment and identifying factors affecting a patient's suitability for and response to treatment. Chapter 4 presents a step-by-step, manual-type guide to implementing the various interventions. This chapter includes a review of treatment efficacy and mechanisms of action, variations on the standard format of delivery, and strategies for addressing common problems in treatment. Chapter 5 provides a broad summary of the prior chapters. The Appendix provides a set of useful assessment and treatment forms and handouts.

Although tension-type headache is the most common of the primary headache disorders, migraine is the most common diagnosis among those who present for headache treatment within clinical settings. As such, the bulk of this volume focuses on migraine and migraine-specific comorbidities. However, the relevance and adaptation of assessment and treatment strategies for tension-type headache are integrated into various sections when appropriate and supported empirically. Although behavioral interventions are highly efficacious for children with headache, the primary focus herein is on adults with headache disorders; considerations for child and adolescent patients are incorporated when appropriate. This volume outlines multiple behavioral strat-

egies and interventions but is not intended as a one-size-fits-all, cookbook-type manual. The clinician is instead encouraged to individualize and select interventions tailored to patient needs, resources, and other considerations. As such, this volume is intended to provide a structured approach that can be adapted across multiple clinical contexts and among a variety of headache patients.

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We wish to extend our utmost gratitude to coauthor Dr. Donald Penzien, who directly trained three of us (T.A.S., J.C.R., and T.T.H.), who mentored our early headache careers, and whose experimental and clinical contributions to behavioral medicine are unparalleled.

We are grateful also to our colleagues and students at the University of Mississippi, University of Mississippi Medical Center, Elliott Hospital, Mercy Clinic Headache Center/Mercy Health Research, and Wake Forest School of Medicine.

The concepts and strategies included herein reflect our combined experience of nearly 100 years in seeing headache patients and conducting headache research. We are grateful to every patient and research participant who has entrusted us with your pain, suffering, and experiences – for in your strength and sharing these pages were born. You inspired us to attend to aspects of your pain beyond the symptoms alone. This book is dedicated to you.

To our families – your love and support made our careers, and ultimately this volume, possible.

Dedications

To my parents, Johnny and Kathy, for an unwavering foundation of support and love. (T.A.S.)

To my daughter, Caitlin Penzien – the joy of my life. And to the many trainees and colleagues who have served as treasured friends and collaborators over the years, including Dr. Jeanetta Rains, Dr. Tim Houle, Dr. Todd Smitherman, and Dr. Ken Holroyd, to name only just a few. (D.B.P.)

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1

Description

1.1 Terminology

Criteria for the diagnosis of headache disorders are outlined in the third edition of the *International Classification of Headache Disorders* (ICHD-3; Headache Classification Committee of the International Headache Society, 2013). *Migraine without aura* (ICHD-3 1.1; *International Classification of Diseases*, 10th ed. [ICD-10] G43.0) was known previously as common migraine. *Migraine with aura* (ICHD-3 1.2, ICD-10 G43.1) was known previously as classic or classical migraine. *Tension-type headache* (TTH; ICHD-3 2.1–2.4, ICD-10 G44.2) has in the past been termed muscle contraction headache, stress headache, and ordinary headache. These “primary” headache disorders represent the most common headache conditions that are not directly attributable to secondary abnormalities.

The term *episodic* is applied to most migraine (episodic migraine [EM]) and TTH (episodic tension-type headache [ETTH]) diagnoses and formally refers to headache attacks that occur fewer than 15 days per month. In rare cases in which patients report experiencing attacks on 15 or more days per month, a diagnosis of either *chronic migraine* (CM; ICHD-3 1.3, ICD-10 G43.3) or *chronic TTH* (CTTH; ICHD-3 2.3, ICD-10 G44.2) is warranted, depending upon which headache type is predominant. The term *chronic* is somewhat of a misnomer – although a history of over 3 months is required for a diagnosis of CM or CTTH, chronic headache disorders are those in which attacks occur with high *frequency* (≥ 15 days/month).

Chronic headache occurs on 15 or more days per month

1.2 Definition

Migraine is classified in the ICHD-3 as a neurological disorder characterized by recurrent headache attacks lasting hours or sometimes days (4–72 hr if untreated); its prototypical feature is severe head pain that is distributed unilaterally (on one side of the head), has a pulsating/throbbing quality, and interferes with usual activities. Migraine must also be accompanied by (1) nausea, (2) vomiting, or (3) sensitivity to *both* light (photophobia) and sound (phonophobia) (see Table 1). A significant minority of migraine patients experience *aura* symptoms, or temporary alterations in vision, sensation, or speech that typically precede but may occur simultaneously with the onset of

Migraine is severe, one-sided, throbbing head pain with nausea and/or sensitivity to light and sound

Migraine aura is usually visual in nature

Table 1
Diagnostic Criteria for Migraine

Migraine without aura

- A. At least 5 attacks fulfilling all criteria B–D
- B. Headache attacks lasting 4–72 hours (untreated or unsuccessfully treated)
- C. Headache has at least two of the following characteristics:
 1. Unilateral location
 2. Pulsating quality
 3. Moderate or severe pain intensity
 4. Aggravation by or causing avoidance of routine physical activity (e.g., walking or climbing stairs)
- D. During headache at least one of the following:
 1. Nausea and/or vomiting
 2. Photophobia and phonophobia
- E. Not better accounted for by another ICHD-3 diagnosis

Migraine with aura

- A. At least 2 attacks fulfilling all criteria B and C
- B. One or more of the following fully reversible aura symptoms:
 1. visual
 2. sensory
 3. speech and/or language
 4. motor
 5. brainstem
 6. retinal
- C. At least two of the following four characteristics:
 1. At least one aura symptom spreads gradually over ≥ 5 min, and/or two or more symptoms occur in succession
 2. Each individual aura symptom lasts 5–60 min
 3. At least one aura symptom is unilateral^a
 4. The aura is accompanied, or followed within 60 min, by headache
- D. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack has been excluded

Note. ^aAphasia is always regarded a unilateral symptom.

Excerpted from the ICHD-3 beta diagnostic criteria for migraine without aura (Code 1.1) and migraine with aura (Code 1.2): Headache Classification Committee of the International Headache Society. (2013). The International Classification of Headache Disorders (3rd ed., beta version). *Cephalalgia*, 33, 629–808. © SAGE. Reprinted with permission.

headache. Most commonly, migraine aura is experienced as a slowly evolving but temporary visual distortion (e.g., seeing lights, spots, zigzag lines) that lasts less than an hour and is followed quickly by onset of headache and other migraine symptoms. Migraine attacks in children are often of shorter duration than in adults (commonly < 4 hr), and the pain is often distributed bilaterally.

TTH is a recurrent headache disorder typically characterized by symptoms opposite those of migraine: mild to moderate pain that is distributed bilaterally across the head, which is nonpulsatile, does not interfere with activity, and is not accompanied by nausea, vomiting, or both photophobia and phonophobia (see Table 2). The duration of TTH may be as short as 30 min or as long as 1 week.

**Tension-type
headache symptoms
are commonly the
opposite those of
migraine**

Table 2
Diagnostic Criteria for Tension-Type Headache (TTH)

- A. At least 10 episodes occurring on 1–14 days per month on average for > 3 months (≥ 12 and < 180 days per year) and fulfilling all criteria B–D
- B. Lasting from 30 min to 7 days
- C. At least two of the following four characteristics:
 1. Bilateral location
 2. Pressing or tightening (non-pulsating) quality
 3. Mild or moderate intensity
 4. Not aggravated by routine physical activity such as walking or climbing stairs
- D. Both of the following:
 1. No nausea or vomiting
 2. No more than one of photophobia or phonophobia
- E. Not better accounted for by another ICHD-3 diagnosis

Note. Excerpted from the ICHD-3 beta diagnostic criteria for frequent episodic TTH (Code 2.2): Headache Classification Committee of the International Headache Society. (2013). The International Classification of Headache Disorders (3rd ed., beta version). *Cephalalgia*, 33, 629–808. © SAGE. Reprinted with permission.

1.3 Epidemiology

Most people will experience headache at some point in life, and nearly half of the population (46%) has a headache disorder currently (Stovner et al., 2007). In fact, data from the 2010 Global Burden of Disease Study indicate that tension-type headache and migraine are, respectively, the second and third most common medical conditions worldwide (Vos et al., 2012). Studies adhering to ICHD diagnostic criteria document that migraine affects approximately 12% of Americans each year (Lipton et al., 2007) and 3 out of 10 in their lifetime (Stewart, Wood, Reed, Roy, & Lipton, 2008), although somewhat higher prevalence rates have been obtained from national surveillance studies (Smitherman, Burch, Sheikh, & Loder, 2013). Migraine differentially affects women (three times more often than men; 17.1% vs. 5.6% for 1-year prevalence, 43% vs. 18% for lifetime incidence) and is more prevalent among Whites than individuals of other races, as well as those of lower (vs. higher) socioeconomic status (SES; Lipton et al., 2007; Stewart et al., 2008). Prevalence is highest during young-to-middle adulthood, peaking between ages 30 and 39 (28.1% of women, 9.0% of men) and declining thereafter, being least common among those ages 60 and above. Migraine thus occurs most commonly during the peak years of adult productivity. Two thirds of migraine cases occur without regular aura symptoms. Despite the impact of migraine, approximately one third of migraineurs have never consulted a physician about their condition and of those who have, 40% remain with their condition undiagnosed (Lipton, Stewart, & Simon, 1998). Considered together, these statistics indicate that over half of individuals with migraine never receive a diagnosis.

ETTH is the most common headache type among the general population, affecting roughly 40% of Americans each year (Schwartz, Stewart,

Migraine is frequently underdiagnosed and thus undertreated

Simon, & Lipton, 1998; Stovner et al., 2007). ETTH will affect half or more of Americans in their lifetime. As with migraine, prevalence of ETTH is greater among women than men, higher among White Americans than Black Americans, and peaks between ages 30 and 39. Unlike migraine, however, the sex discrepancy in ETTH prevalence is much less striking (5:4 female to male ratio), and ETTH occurs most frequently among those of higher education and income levels. CM and CTTH each affect approximately 2% of the population each year (Lipton, Bigal, Hamelsky, & Scher, 2008) and, like their episodic counterparts, are more common among women than men.

1.4 Course and Prognosis

Migraine is conceptualized as a chronic *disease*, not merely a severe headache

Migraine is now recognized as a disorder involving far more than head pain itself and includes sensitivity to headache between attacks, cortical abnormalities, associated neurological symptoms, and impairments in functioning and quality of life both during and between attacks. As with other chronic conditions (e.g., obesity, cardiovascular disease, cancer), migraine is indisputably associated with both biological and environmental risk factors, and thus management of associated lifestyle factors is fundamental to optimal care.

The majority of migraineurs have 1–4 days with migraine per month and experience substantial functional impairment during attacks, including the need for bed rest or restricted activity, and interference with home and occupational obligations. Indeed, migraine ranks as the eighth leading cause of disability worldwide and alone accounts for over half of the years lived with disability from all neurological disorders (Vos et al., 2012). Most ETTH sufferers experience 1–3 headaches per month. Although TTH can be disabling, TTH is usually accompanied by less functional impairment than is typical of migraine. The high prevalence of ETTH nevertheless confers significant cumulative direct and indirect burdens to society.

Most migraine and TTH conditions affecting adults emerge in late adolescence or early adulthood as episodic conditions; 75% of migraineurs experience onset prior to age 35 (Stewart et al., 2008). The majority of EM and ETTH sufferers can manage their headaches with lifestyle accommodations and occasional use of over-the-counter remedies, without intervention by a physician. Many of these individuals will experience a reduction or cessation of headache within several months or years.

Among a minority of individuals, EM and ETTH progress in frequency over time to become chronic in nature (i.e., headache on ≥ 15 days per month). For more than a decade, the nature and predictors of headache progression and remission have been under increasingly intense scrutiny by headache researchers (Penzien, Rains, & Lipton, 2008). This research has revealed that observed increases in headache frequency are sometimes attributable to risk factors such as overusing analgesic medications, psychiatric comorbidities, and development or exacerbation of concurrent medical conditions such as obesity (Scher, Midgette, & Lipton, 2008). This pattern of “headache chronification” (progressing from an episodic to chronic frequency) is estimated to occur among approximately 3% of headache sufferers each year (Scher,

Headache “chronification” occurs in a minority of individuals

Stewart, Ricci, & Lipton, 2003), although actual rates of chronification may be somewhat lower (Houle, Turner, Smitherman, Penzien, & Lipton, 2013). High-frequency headaches also revert from CM to EM or from CTTH to ETTH at a much higher rate than chronification occurs. Not surprisingly, a higher frequency of headache is associated with higher headache-related disability, more frequent medical visits, and a poorer long-term prognosis. Most patients with CM or CTTH suffer for years with headache and, although the frequency of their attacks may fluctuate over time, they rarely become completely headache-free.

1.5 Differential Diagnosis

Primary headache disorders are diagnosed by their phenotypic presentations, and therefore differentiating between migraine and TTH is usually straightforward. As a general rule, most treatment-seeking patients with recurrent severe headaches accompanied by nausea and substantial functional impairment have migraine. Severe unilateral and pulsating pain that lasts for hours or days, interferes with activity, and is accompanied by nausea and sensitivity to light and sound are prototypical symptoms of migraine, although many patients will not present with all of these symptoms. A helpful mnemonic for distinguishing migraine from other headaches is the P.O.U.N.D.ing algorithm (see box below). The presence of three or more of these five features makes a migraine diagnosis highly probable (Detsky et al., 2006).

Recurrent severe headaches that impair functioning are usually migraines

P.O.U.N.D. is a useful mnemonic for migraine symptoms

P.O.U.N.D.ing Algorithm for Identifying Migraine (Detsky et al., 2006)

Pulsating
4–72 hOur duration (if left untreated)
Unilateral
Nausea
Disabling

By contrast, TTH attacks are typically the opposite of migraine: They involve less severe pain that is typically distributed bilaterally, they are described as a constant tight pressure (nonpulsatile), and they lack the impairment and accompanying symptoms of migraine. Occasionally, a patient will present with some headache attacks consistent with migraine and others with TTH, in which case both diagnoses are assigned. Other headache conditions that may be mistaken for migraine are discussed below and should be ruled out before beginning treatment.

1.5.1 Cluster Headache

Cluster headache is a rare headache disorder (0.1% lifetime prevalence) that affects men more often than women and is characterized by excruciating pain commonly centered around the orbital socket. Cluster headache is typi-

Cluster headache is a very rare headache condition that affects men more often than women

cally accompanied by facial swelling, perspiration, and tearing of the eye on the same side of the head as the pain. The term *cluster* refers to the fact that headache episodes tend to cluster together in time and may occur up to several times a day. Cluster periods can last for weeks, months, or longer, and are then followed by a period of remission until another recurrence. Characteristics that differentiate cluster headache from migraine are the former's high predominance among males (4:1 to 5:1 male to female ratio), briefer attack duration (< 3 hr), common localization to the orbital socket, visibly obvious swelling or tearing around the eye, greater pain severity, and clustered patterning of attacks. Unlike migraineurs who tend to withdraw to a darkened, quiet place and lie down, many cluster patients shun resting and instead pace the floor because the pain is so extreme.

1.5.2 Medication Overuse Headache

Overuse of analgesic medications is the most common precipitant of chronic migraine

Overuse of acute headache medications is the most common variable known to precipitate the development of a chronic headache condition. Medication overuse headache (MOH) is diagnosed when an individual experiences chronic headache (≥ 15 days/month) and has used acute migraine medications (analgesics, ergotamine, triptans) for at least 10 days per month (for opioids, ergotamine, triptans, combination analgesics, or multiple drug classes) or at least 15 days per month (in the case of simple analgesics) for more than 3 months. The headaches typically worsen during the period of medication overuse. In cases in which the patient meets criteria for both CM and MOH, both diagnoses should be applied (see Table 3).

In clinical practice, medication overuse should be suspected and assessed in any patient reporting chronic headaches (15 or more days/month), even among those who do not identify their own medication use as excessive. Opioid analgesics are the most common culprits, but MOH can occur even among frequent users of over-the-counter pain medications (e.g., aspirin, acetaminophen). Daily use of medications approved by the US Food and Drug Administration (FDA) for migraine prevention is not a recognized cause of

Table 3
Diagnostic Criteria for Medication Overuse Headache (MOH)

- A. Headache occurring on ≥ 15 days per month in a patient with a preexisting headache disorder
- B. Regular overuse^a for > 3 months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache
- C. Not better accounted for by another ICHD-3 diagnosis

Note. ^aOveruse defined as use of opioids, ergotamine, triptans, combination analgesics, or multiple drug classes at least 10 days per month, or use of simple analgesics at least 15 days per month.

Excerpted from the ICHD-3 beta diagnostic criteria for MOH (Code 8.2): Headache Classification Committee of the International Headache Society. (2013). The International Classification of Headache Disorders (3rd ed., beta version). *Cephalalgia*, 33, 629–808. © SAGE. Reprinted with permission.

MOH. The headaches in MOH often have migrainous features but also may share some features of TTH.

Many patients are unaware that frequent use of acute medications can inadvertently worsen headache over time. When MOH is suspected, treatment typically requires supervised medical withdrawal from the overused medication(s), sometimes in an inpatient setting. This process usually results in initial exacerbation of headache over the first several days, with gradual improvement thereafter.

1.5.3 Posttraumatic Headache

Posttraumatic headache (PTHA) is diagnosed when an unremitting or recurrent headache disorder develops (i.e., begins anew or constitutes a substantive change in a preexisting headache pattern) in temporal proximity following a head, neck, or brain injury. Observable physical or neurological signs or symptoms may or may not be present; in fact, they are often absent. The PTHA label is applied regardless of the characteristics of the headache itself, which often vary across individuals. Any headache that develops within a week of a head injury (or after regaining consciousness from a head injury) should be considered PTHA until determined otherwise. Fortunately, PTHA generally improves within a few months of onset. By convention, once PTHA has been present for 6 months, it is termed chronic: The longer the chronicity of PTHA, the more refractory it becomes. Although conventional wisdom holds that patients with chronic PTHA may not prove as responsive to behavioral interventions as those with migraine or TTH, empirical evidence and clinical experience supporting that impression are limited.

1.5.4 “Sinus Headache”

Both patients and physicians alike often mistakenly attribute head pain in the facial region (particularly the nose and eyes) or that accompanied by nasal congestion to inflammation of the paranasal sinuses. Many, if not most, of these patients in fact meet criteria for migraine that is triggered by weather/seasonal changes or accompanied by autonomic nasal symptoms (Schreiber et al., 2004). The presence of clear symptoms of acute rhinosinusitis is the most important determinant for differential diagnosis.

Many patients who attribute their headaches to sinus problems in fact have migraine

1.5.5 Menstrual Migraine

Many premenopausal women experience migraine attacks 1–2 days before or after the onset of menstrual bleeding. Some women have migraine attacks only around menstruation (*pure menstrual migraine*; ICHD-3 A1.1.1), while others have migraine attacks also during other times in the month (*menstrually related migraine*; ICHD-II A1.1.2). Migraine attacks associated with menstruation usually do not include aura symptoms.

Migraine attacks often coincide with menses

Patients with prototypical migraine symptoms and a normal neurological exam very rarely have significant abnormalities upon neuroimaging

1.6 Diagnostic Red Flags

The overwhelming majority of headaches are benign and *not* attributable to progressive or life-threatening intracranial pathology (e.g., neoplasm, hydrocephalus, subarachnoid hemorrhage). For patients who have recurrent but typical migrainous or TTH presentations and a normal neurological examination, neuroimaging including magnetic resonance imaging (MRI) and computed tomography (CT) is usually unwarranted, as fewer than 1% of such patients will evidence meaningful intracranial pathology upon imaging (Sempere et al., 2005). The strongest predictor of significant intracranial pathology is any abnormal finding during a routine neurological examination. The presence of neurological abnormalities and other “red flags” should raise suspicion of intracranial pathology, and referral to a physician for medical evaluation and possible neuroimaging is recommended. A popular mnemonic for red flags warranting medical evaluation is “SNOOP” (Dodick, 2003; see Table 4).

Table 4
SNOOP Algorithm for Headache Red Flags

Systemic symptoms or disease

Fever, chills, weight changes
Chronic medical comorbidity (malignancy, immunocompromised)

Neurological signs or symptoms

Abnormal neurological exam, altered mental state, confusion, seizures

Onset is sudden and severe

“Worst headache of my life” that peaks within minutes^a

Onset in a patient over 40

Pattern change in headache presentation

Current headache is of different type or much more frequent than prior history
Headache is never-ending versus prior history

Note. ^aRequires urgent medical investigation (regardless of other features). Based on Dodick, 2003.

Migraine is associated with increased rates of other comorbid disorders

1.7 Comorbidities

The burden and impact of primary headache disorders are compounded by the presence of other disorders that commonly co-occur with them. Comorbid psychiatric disorders, pain conditions, and other chronic medical conditions are observed more commonly among both migraine and nonmigrainous headache sufferers than among individuals without headache (Saunders, Merikangas, Low, Von Korff, & Kessler, 2008). The likelihood and severity of comorbidities increase proportionally with headache frequency. These comorbid disorders increase disability (Saunders et al., 2008) and complicate the treatment and prognosis of headache patients. Many also represent modifiable

risk factors for the development of headache chronification (Dodick, 2009; Smitherman, Rains, & Penzien, 2009) and MOH (Radat et al., 2005).

1.7.1 Depression

Depression has long been recognized as a common comorbidity among headache patients, and epidemiological studies confirm that migraineurs are two to four times more likely to suffer from major depressive disorder (MDD) than are individuals without migraine (Breslau, 1998; Hamelsky & Lipton, 2006). Lifetime prevalence of MDD among migraineurs ranges from 21% to 32%, although prevalence as high as 57% has been observed among individuals with CM (Breslau, 1998; Juang, Wang, Fuh, Lu, & Su, 2000). The relationship between migraine and depression is bidirectional in nature (Breslau, Lipton, Stewart, Schultz, & Welch, 2003), such that having either condition increases one's risk of developing the other. Depression is thus not simply a reaction to living with a recurrent headache condition. Patients with CTTH also have increased rates of MDD (Heckman & Holroyd, 2006).

1.7.2 Anxiety Disorders

Although migraine studies on depression outnumber those on anxiety disorders by a ratio of 2:1 (Smitherman, Penzien, & Maizels, 2008), anxiety disorders are nearly twice as common among migraine sufferers as depression. Approximately 50% of all migraine sufferers will meet criteria for an anxiety disorder at some point (Breslau, 1998), the most common of which are panic disorder, generalized anxiety disorder (GAD), and phobias (Radat & Swendsen, 2005; Smitherman, Kolivas, & Bailey, 2013). Anxiety disorders may precede or follow onset of migraine. Among patients with both depressive *and* anxiety disorders, onset of anxiety usually precedes onset of migraine, which in turn precedes depression. As with depression, rates of anxiety disorders are highest among those with chronic (vs. episodic) migraine and TTH.

Anxiety disorders are more common than depression among migraine patients

Bidirectional relationships between mood/anxiety disorders and migraine imply shared mechanisms, although research on mechanistic underpinnings is in its infancy. The most likely contributors are serotonergic dysfunction, sensitization of the central nervous system (CNS), and hormonal influences, though these factors interact and none is likely to be the sole contributor (Baskin & Smitherman, 2009).

Both migraine and affective conditions are associated with reduced serotonergic availability and respond to pharmacological agents that increase central serotonin levels (Hamel, 2007). Specifically, selective serotonin (5HT) agonists (i.e., triptans) are the mainstay of current acute treatments for migraine, and selective serotonin reuptake inhibitors (SSRIs) are the agents-of-choice for mood and anxiety disorders. Prolonged sensitization of the CNS, particularly sensory/emotional neural networks, is likely involved among patients with chronic headache subforms (Baskin & Smitherman, 2009). Ovarian hormone changes are implicated because affective disorders and migraine are

much more common among women than men and because dramatic declines in estrogen (e.g., during the late luteal phase of the menstrual cycle, the postpartum period, and during perimenopause) often trigger episodes of these conditions (Martin & Behbehani, 2006).

1.7.3 Other Psychiatric Comorbidities

Although other psychiatric disorders have been studied less frequently than depression and anxiety, migraineurs also appear to be at significantly increased risk for bipolar spectrum disorders (Breslau, 1998; Saunders et al., 2008). Recent data indicate an association between migraine in adulthood and a history of childhood abuse/neglect (Tietjen & Peterlin, 2011), although this relationship may be mediated by development of posttraumatic stress disorder (Smitherman & Kolivas, 2013). At present it is unclear whether migraineurs are at increased risk for substance use disorders, as existing studies have produced largely mixed findings. Individuals in inpatient treatment for chronic headache, in particular, have significantly increased rates of personality disorders, most commonly those with dramatic and anxious features (Lake, Saper, & Hamel, 2009). Migraineurs also are at increased risk for suicide attempts, even after controlling for psychiatric comorbidities (Breslau, Schultz, Lipton, Peterson, & Welch, 2012).

1.7.4 Insomnia and Other Disturbances of Sleep

Headache may result from, be aggravated by, or contribute to sleep disturbance, and both too little and too much sleep can trigger migraine (Rains & Poceta, 2006). In addition, many migraineurs have disrupted sleep schedules because migraine attacks often prompt bed rest. Obstructive sleep apnea and other sleep-related breathing disorders associated with hypoxemia or hypercapnia may contribute to headache among individuals with morning headaches or chronic headaches. Patients at risk for sleep-disordered breathing should be advised to consult with their physician to determine whether referral to a sleep medicine specialist is needed.

Although a variety of sleep disorders are more common among those with headache than those without, insomnia is the most prevalent sleep disorder among treatment-seeking patients with migraine or TTH (Kelman & Rains, 2005). Generally, insomnia refers to recurrent difficulty initiating or maintaining sleep, short duration of sleep, or nonrestorative sleep, which results in daytime functional impairment (e.g., fatigue, difficulty concentrating, irritability). Research diagnostic criteria for insomnia have been operationalized as sleep onset latency > 30 min, awakenings > 30 min after falling asleep, total sleep time < 6 hr, or subjective complaints of nonrestorative sleep in the context of daytime impairment.

At least half of all headache clinic patients will meet the diagnostic criteria for insomnia. As with other comorbidities, the prevalence of insomnia increases with headache frequency, such that the overwhelming majority of chronic migraineurs experience insomnia, often on a daily basis. Treating

Insomnia is an extremely common comorbidity, particularly among chronic headache sufferers

the comorbid sleep disorder directly often reduces the frequency of headache (Calhoun & Ford, 2007).

1.7.5 Obesity

Perhaps because it is a proinflammatory state, obesity is associated with increased frequency of headache. Headache frequency increases proportionally with body mass index (BMI), such that individuals who are obese (BMI of 30–34) or morbidly obese (BMI \geq 35) are, respectively, 2.9 and 5.7 times more likely than those of normal weight to have headache on 10 or more days per month (Bigal, Liberman, & Lipton, 2006). Similarly, obesity is a risk factor for progression from episodic to chronic headache frequency (Scher et al., 2003).

1.7.6 Cardiovascular Disease

Although an individual migraine attack itself rarely triggers a stroke, migraine may be associated with increased risk for stroke (Bigal et al., 2010; Schürks et al., 2009). Risk is highest among women and those with aura symptoms, and increases further with cigarette smoking and use of oral contraceptives (particularly contraceptives containing high doses of estrogen).

1.8 Headache Triggers

Headache “triggers” are personal or environmental stimuli that precipitate an individual headache attack. Importantly, failure to address triggering or exacerbating factors is one of the most common reasons for failure of headache treatment (Lipton, Silberstein, Saper, Bigal, & Goadsby, 2003). Nearly all of the major headache triggers have strong behavioral components, and thus identification of relevant triggers provides multiple opportunities for behavioral intervention. Problematically, most research on headache triggers has relied on retrospective self-report rather than direct experimental manipulation of potential triggers. Table 5 lists the percentage of headache clinic patients endorsing various triggers across three major survey studies. The top triggers across self-reported studies are stress, menstruation, dietary factors (e.g., skipping meals, fasting), and sleep disturbance (e.g., insufficient sleep, irregular sleep/wake schedule, too much sleep), three of which have substantive behavioral influences. Other commonly reported triggers include weather changes, exercise, odors, and noises, although experimental studies have not always verified the potency of these triggers (see Table 5).

Although triggers are usually considered independently of one another, they are unlikely to act in isolation, and different individuals will usually have differing thresholds for headache onset. An ambitious prospective study of triggers analyzed 28,325 days of daily headache diary data collected from 327 migraineurs in Europe over a 3-month period (Wöber et al., 2007). These authors examined 116 variables pertaining to hormonal factors, psychological states, sleep, diet, activities, physical factors (e.g., hunger), environmental

Stress, menstruation, dietary factors, and sleep disturbance are the most common triggers of migraine

Table 5
Headache Triggers Across Three Major Survey Studies

Trigger	Kelman (2007)	Scharff et al. (1995)	Robbins (1994)
Stress	80%	72%	62%
Menstruation	65%	68%	50%
Fasting/missing meals	57%	45%	40%
Sleep disturbance	50%	52%	31%
Weather	53%	46%	43%
Perfume or odor	44%	----	----
Neck pain	38%	----	----
Lights	38%	----	----
Alcohol	38%	35%	----
Smoking	36%	----	26%
Foods	27%	----	30%
Exercise	22%	----	----
Sexual activity	5%	----	----
Caffeine	----	14%	----

Note. Most common, modifiable self-reported headache triggers are shown in bold.

variables, and meteorological events. Among these numerous potential triggers, menstruation was identified as the most potent risk factor in predicting subsequent headache; occurrence of migraine or other headache was increased during all days of menstruation as well as during the 2 days preceding menstruation. Stress, neck tension, fatigue, noise, and odors also increased risk for migraine or other headaches. This study confirmed that myriad potential triggers act on the migraineur at any given time, including factors usually outside of awareness (e.g., atmospheric pressure changes, hormonal fluctuations). A recent study by our group also showed that high stress and poor sleep resulted in greater risk of subsequent headache than either trigger factor alone (Houle et al., 2012), again underscoring the interactive effect among various triggers.

Healthy lifestyle recommendations to minimize stress, practice good sleep habits, and avoid skipping meals are encouraged for *all* patients, and many will benefit from more formal trigger management training as described later in this work (see Section 4.1.5).

**Healthy lifestyle
recommendations
are useful for all
headache patients**

1.9 Diagnostic Procedures and Documentation

Pain is a subjective experience that is not accessible to others. As such, and because consistent biomarkers for migraine and TTH have not yet been identified, assessment of headache in clinical practice relies on self-report methods.