

Assessing and Managing All Aspects of Migraine: Migraine Attacks, Migraine-Related Functional Impairment, Common Comorbidities, and Quality of Life

DAWN C. BUSE, PhD; MARCIA F. T. RUPNOW, PhD; AND RICHARD B. LIPTON, MD

Migraine can be characterized as a chronic disorder with episodic attacks and the potential for progression to chronic migraine. We conducted a PubMed literature search (January 1, 1970 through May 31, 2008) for studies on the impact of migraine, including disability, health-related quality of life (HRQoL), comorbidities, and instruments used by health care professionals to treat patients with migraine. Numerous studies have shown that migraine substantially impairs a person's functions during attacks and diminishes HRQoL during and between attacks. Despite its impact, migraine remains underestimated, underdiagnosed, and undertreated. Several tools are available to help physicians assess the impact of migraine on the daily activities and HRQoL of their patients, such as the 36-Item Short-Form Health Survey and the Headache Impact Test. Improving communication during the office visit through active listening, use of open-ended questions, and use of the "ask-tell-ask" strategy can also help in assessing migraine-related impairment. Together, these tools and communication techniques can lead to a more complete assessment of how migraine affects patients' lives and can aid in the development of the optimal treatment plan for each patient. Both pharmacotherapy (acute and preventive treatment strategies) and nonpharmacological therapies play important roles in the management of migraine.

Mayo Clin Proc. 2009;84(5):422-435

AMCS = American Migraine Communication Study; HIT = Headache Impact Test; HRQoL = health-related quality of life; MIBS = Migraine Interictal Burden Scale; MIDAS = Migraine Disability Assessment; MPQ = Migraine Prevention Questionnaire; MSQ = Migraine-Specific Quality of Life Questionnaire; PHQ = Patient Health Questionnaire; SF = Short-Form Health Survey

Migraine is recognized as a major cause of disability worldwide. *The World Health Report 2001—Mental Health: New Understanding, New Hope* cited 135 health conditions, particularly mental and neurologic disorders, that accounted for nearly 40% of all years lived with disability worldwide. Migraine was cited as the 19th leading cause of years lived with disability among both males and females of all ages combined and the 12th leading cause of years lived with disability among females of all ages.¹ Females with migraine outnumber males with migraine by nearly 3 to 1.²

Migraine can be characterized as a chronic disorder with episodic attacks, with potential for progression to more frequent and severe patterns.³ Some patients whose migraine attacks are initially episodic experience increasing frequency of headaches over months or years, leading to chronic migraine, in which headaches occur at least 15 days per month.⁴ Migraine is associated with substantial functional impairment,⁵ which may include both physical and

emotional ramifications. Many aspects of the lives of migraineurs are commonly affected by the condition, including occupational, academic, social, leisure, and family life and responsibilities.⁵⁻⁸ It is well known that migraine headaches cause substantial impairment during attacks (ictal burden). However, mounting evidence suggests that migraines also cause impairment between attacks (interictal burden). In general, migraineurs report poorer subjective well-being and reduced health-related quality of life (HRQoL) during pain-free periods than do age- and sex-matched persons without migraine.⁸⁻¹¹

Health care professionals often do not recognize the degree and scope of functional impairment imposed by migraine.^{7,10,12-14} This contributes to missed opportunities for providing effective acute treatment (medication taken at the time of an attack) and preventive pharmacological (medication taken on a daily basis or other scheduled protocol to avoid attacks) and biobehavioral interventions.^{7,12,14}

We review the total burden of migraine and strategies for managing both the ictal and the interictal burden. A PubMed search of English-language articles published from January 1, 1970 through May 31, 2008 was conducted. The following keywords were used in our search: *migraine, headache, migraine prevention, migraine prophylaxis or treatment, migraine disability, headache disability, migraine quality of life or health-related quality of life, migraine functional*

For editorial comment, see page 397

From the Montefiore Headache Center, Bronx, NY (D.C.B., R.B.L.); Department of Neurology (D.C.B., R.B.L.) and Department of Epidemiology and Population Health (R.B.L.), Albert Einstein College of Medicine, Bronx, NY; and Outcomes Research, Ortho-McNeil Janssen Scientific Affairs, LLC, Titusville, NJ (M.F.T.R.). Dr. Rupnow is now with Ethicon, Inc, Somerville, NJ.

Dr Buse has received research grants and has been a consultant for Ortho-McNeil Neurologics, Endo Pharmaceuticals, Allergan, and Merck & Co. Dr Lipton has been an adviser, has been a member of the speaker's bureau, and has received research or education grants from Advanced Bionics, Allergan, AstraZeneca, Boehringer-Ingelheim, Bristol-Myers Squibb, Cierra, Endo Pharmaceuticals, GlaxoSmithKline, Minster Machine Co, Merck & Co, Neuralieve, Novartis, Ortho-McNeil Neurologics, Pfizer, Pozen, ProEthics, and St. Jude Medical. Dr Rupnow was an employee of Ortho-McNeil Janssen Scientific Affairs, LLC, a Johnson & Johnson company, at the time of manuscript development.

Individual reprints of this article are not available. Address correspondence to Dawn C. Buse, PhD, Director of Psychology, Montefiore Headache Center, 1575 Blondell Ave, Ste 225, Bronx, NY 10461 (dbuse@montefiore.org).

© 2009 Mayo Foundation for Medical Education and Research

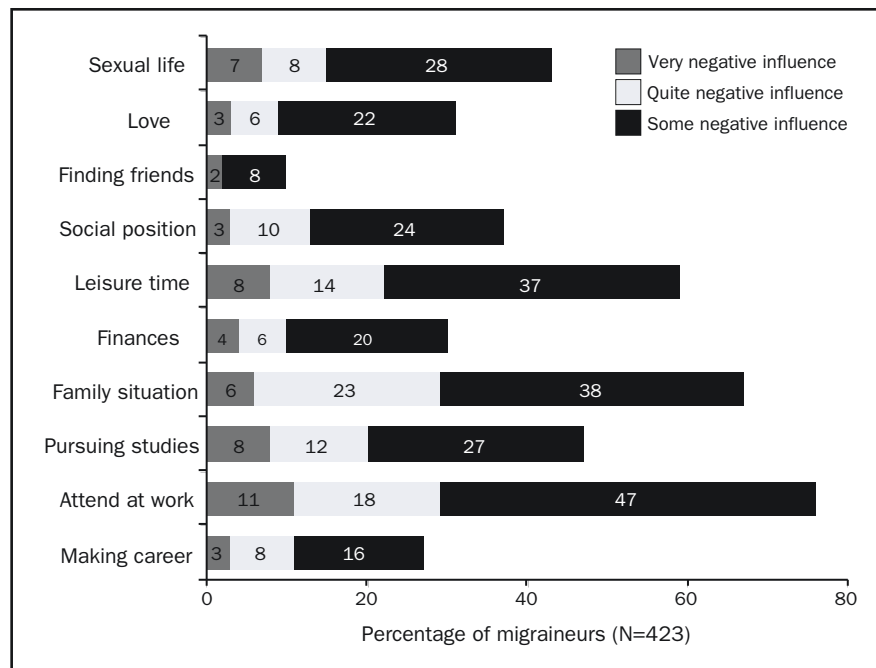


FIGURE 1. Impact of migraine on important aspects of life. From *Cephalgia*,⁸ with permission from Blackwell Publishing.

impairment, migraine assessment tools or scales or questionnaire, and migraine communication. The inclusion of specific studies was based on subjective, comparative evaluation and standard levels of evidence, with instruments that had the strongest psychosomatic data (validity, reliability) given more weight. Likewise, tools relevant to assist health care professionals with treatment of patients were selected.

FUNCTIONAL IMPAIRMENT AND INDIRECT COSTS

Numerous studies have shown that migraine adversely affects daily functioning. In a 5-nation study by Brandes,¹⁵ more than half (52.3%) of the 516 adults with migraine interviewed required bed rest to manage their headache attacks. Data from the National Health Interview Survey conducted in 1989 revealed that migraine caused an estimated 10% of US school-aged children to miss, on average, at least 1 day of school during a 2-week period; furthermore, migraine was responsible for restricting activity by an estimated 2.7 million days per year for employed men, 18.8 million days for employed women, and 38.5 million days for housewives (terminology used in original text).¹⁶

The indirect cost (ie, excluding direct medical costs) of migraine to employers is enormous. In the study by Stewart et al¹⁷ of lost productive time attributable to common pain conditions in the US workforce during a 2-week period, headache was the most common, leading to a mean \pm SD

loss in productive time of 3.5 ± 0.1 hours per week, followed by back pain and arthritis. Using a large employer database, Hawkins et al¹⁸ determined that, for employers, the cost associated with each employee with recognized migraine is approximately \$2800 more annually than that for each employee without migraine, primarily because of absenteeism but also because of short-term disability and workers' compensation claims. Projected nationally, the indirect cost of migraine to US employers is approximately \$12 billion annually. Migraine also affects the family lives and relationships of migraineurs.^{19,20}

FUNCTIONAL IMPAIRMENT BETWEEN MIGRAINE ATTACKS

Results of an online poll (N=505) conducted in the United States indicate that migraine imposes a substantial interictal burden (between migraine attacks).¹¹ Of migraineurs surveyed, 76% worried that they would have migraines for the rest of their lives, and 37% worried about migraines between attacks.¹¹ As a patient in another study explained, "I don't travel far by myself, 'cause I never know when it's gonna hit me."¹⁴ Of 423 Swedish adults with migraine surveyed by mail, fewer than half (43%) stated that they recovered completely between attacks. The adverse impact of migraine on key aspects of these respondents' lives is shown in Figure 1.⁸ In an earlier Swedish study, migraineurs (N=138) re-

ported more subjective symptoms (eg, disturbed vitality, sleep) and a lesser sense of well-being during headache-free periods than did age- and sex-matched controls.⁹

Anxiety in anticipation of the next migraine attack (interictal anxiety) may lead migraineurs to take pain medications before any symptoms of an attack occur, ultimately resulting in overuse of these medications. Phobic avoidance of activities because of fear of migraine or headache (cephalalgiphobia) is a contributor to the interictal burden of migraine.²¹ Peres et al²¹ suggest that cephalalgiphobia may decrease the threshold for initiating analgesics, leading to acute medication overuse. When episodic migraine is accompanied by acute medication overuse, rebound headaches can occur and may lead to medication overuse headache.^{22,23} Revised diagnostic criteria for medication overuse headache were published in 2005.²⁴

ASSESSMENT OF ICTAL FUNCTIONAL IMPAIRMENT

Several tools are available for assessing the ictal impact of migraine. The Migraine Disability Assessment (MIDAS) questionnaire²⁵ and Headache Impact Test (HIT)²⁶ can be used in headache assessment in general and in overall headache and migraine management.²⁷ MIDAS is a self-administered questionnaire that consists of 5 questions about days of missed activity or substantially reduced activity in 3 domains: school work or work for pay, household work or chores, and nonwork (family, social, and leisure) activities. Two additional questions pertain to pain frequency and intensity.²⁸ HIT is available in a brief 6-question version known as HIT-6.^{27,29} This test measures not only lost time in 3 domains but also other areas of impact (eg, pain severity, fatigue, mood).^{27,29,30} The Headache Disability Inventory³¹ and Headache Impact Questionnaire³² are helpful research tools but are not ideal for use in clinical practice, partly because they are difficult to score.³³ Another useful scale is the International Classification of Functioning, Disability, and Health, which was approved by the World Health Assembly in 2001.³⁴ The International Classification of Functioning, Disability, and Health is not an assessment tool but rather a framework for measuring and comparing the degree of disability caused by migraine and other mental and neurologic disorders and chronic illnesses.⁵

ASSESSMENT OF INTERICTAL BURDEN

The Migraine Interictal Burden Scale (MIBS) measures interictal migraine-related burden in 4 domains: impairment in work or school, impairment in family and social life, difficulty making plans or commitments, and emotional/affective and cognitive distress.³⁵ MIBS-4 is a 4-item, self-administered questionnaire for clinical use or

screening purposes (Figure 2). Because the burden of migraine during attacks only partially predicts the burden between attacks, physicians should routinely ask their patients about the interictal burden of their headaches as a prelude to developing an optimal treatment plan.³⁶

GENERIC AND DISEASE-SPECIFIC MEASURES OF HRQoL

The most widely used generic measures of HRQoL are the 36- and 12-Item Short-Form Health Surveys (SF-36 and SF-12). The SF-36 assesses a range of symptoms associated with common diseases.³⁷ Migraineurs have significantly lower SF-36 scores than persons without migraine, and migraine adversely affects functioning at least as much as depression, diabetes mellitus, and recent myocardial infarction.³⁷ Also, migraineurs have significantly lower HRQoL than those in the general population with no chronic condition.³⁸⁻⁴⁰ One of the instruments specifically designed to assess the impact of migraine on HRQoL, the Migraine-Specific Quality of Life Questionnaire (MSQ) version 2.1, consists of 14 items that measure the degree to which migraine affects the patient's daily activities (social life, work) and emotions during a 4-week period.⁴¹

SELECTED STUDIES OF ICTAL AND INTERICTAL MIGRAINE-RELATED FUNCTIONAL IMPAIRMENT, REDUCED QUALITY OF LIFE, AND PSYCHIATRIC COMORBIDITIES IN MIGRAINEURS

The results of the following studies indicate that migraine is associated with functional impairment, reduced HRQoL, and an increase in comorbid psychiatric conditions. Using personal interviews and follow-up telephone interviews, Breslau and Davis⁴² studied the association between migraine and psychiatric disorders, physical complaints, indicators of functional impairment, and use of mental health services in 1007 young adults living in southeastern Michigan. Among the key findings were that persons with a history of migraine had significantly more physical symptoms (other than headache) than persons with no history of migraine (Table 1). Migraineurs also had higher lifetime rates of depressive disorders, panic disorder, obsessive-compulsive disorder, generalized anxiety disorder, specific phobias, and suicide attempts than controls and were more likely to have missed work in the preceding month, to assess their general health as "fair" or "poor," and to use mental health services.⁴² Increased comorbidity rates between migraine and certain psychiatric disorders were also found in the 2002 Canadian Community Health Survey.⁴³ Mental health data collected in that study indicated that major depressive disorder, bipolar disorder, panic disorder,

Please answer each of the following statements about the effect of your headaches in the past 4 weeks on days when you are not having an attack. **(X one box for each statement)**

Between headache attacks or at times when I do not have a headache

1. My headaches affect my work or school at times when I do not have a headache
2. I worry about planning social or leisure activities because I might have a headache
3. My headaches impact my life at times when I do not have a headache
4. At times when I do not have a headache, I feel helpless because of my headaches

Total number of checks in column

Multiply number of checks by value = total score per column

Total score per column

Total score

Don't know/NA	Never	Rarely	Some of the time	Much of the time	Most or all of the time
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
×0	×0	×1	×2	×3	×3
	+	+	+	+	+
					=

Score	Level of interictal burden	Treatment recommendations
0	None	• No action needed
1-2	Mild	• Offer non-pharmacological strategies for reducing interictal burden • Offer/optimize acute pharmacological treatment
3-4	Moderate	• Offer non-pharmacological strategies for reducing interictal burden • Offer/optimize acute pharmacological treatment • Consider preventive pharmacological treatment
5+	Severe	• Offer non-pharmacological strategies for reducing interictal burden • Offer/optimize acute pharmacological treatment • Offer preventive pharmacological treatment

FIGURE 2. Four-item clinic version of the Migraine Interictal Burden Scale (MIBS-4).

and social phobia were more than twice as common in migraineurs as in controls. Mental health care use and HRQoL were poorest in those individuals who had both migraine and a psychiatric disorder.

In a population-based, case-control study of residents of greater London, England, Lipton et al⁴⁴ compared HRQoL between persons with and without migraines and studied the association between HRQoL and work-related disability due to headache. By means of a telephone survey, the investigators randomly selected 200 migraineurs and matched them to 200 controls. The migraineurs scored significantly lower than the controls in 8 of the 9 HRQoL domains of the SF-36, as well as in the 2 summary scores (total physical component summary and total mental component summary). In another analysis, migraineurs were classified as having low, moderate, or high work-related disability according to the number of days during the past year that headache caused them to either miss work or experience reduced work productivity (by half or more). Migraineurs in the high-disability group had substantially lower HRQoL scores than those in the low-disability group for the role-physical (ability to do work or perform other

daily activities as a result of physical health), bodily pain, vitality (energy), and social functioning domains of the SF-36. As the degree of disability increased from low to moderate or severe, HRQoL decreased. The investigators concluded that migraine profoundly affects HRQoL and that migraine disability is inversely correlated with HRQoL.⁴⁴

Dueland et al⁴⁵ used a telephone survey to study the impact of migraine on work, family, and leisure among 1810

TABLE 1. Physical Complaints in Young Women With and Without Migraine^a

Physical complaints	Migraine (n=101)	No migraine (n=520)
All symptoms ^b (n=32)	6.8 (4.6)	3.5 (2.9)
Sexual (n=3)	0.5 (0.8)	0.3 (0.5)
Conversion (n=14)	2.1 (2.0)	1.1 (1.2)
Cardiopulmonary (n=4)	1.6 (1.2)	0.8 (0.8)
Various pains (n=5)	1.5 (1.2)	0.8 (0.9)
Gastrointestinal (n=6)	1.3 (1.4)	0.7 (1.1)

^a Data are presented as mean (SD). All comparisons are significant at P<.001. Males had similar results.

^b Not including gynecologic symptoms.

From *J Psychiatr Res*,⁴² with permission from Elsevier. Copyright © 1993.

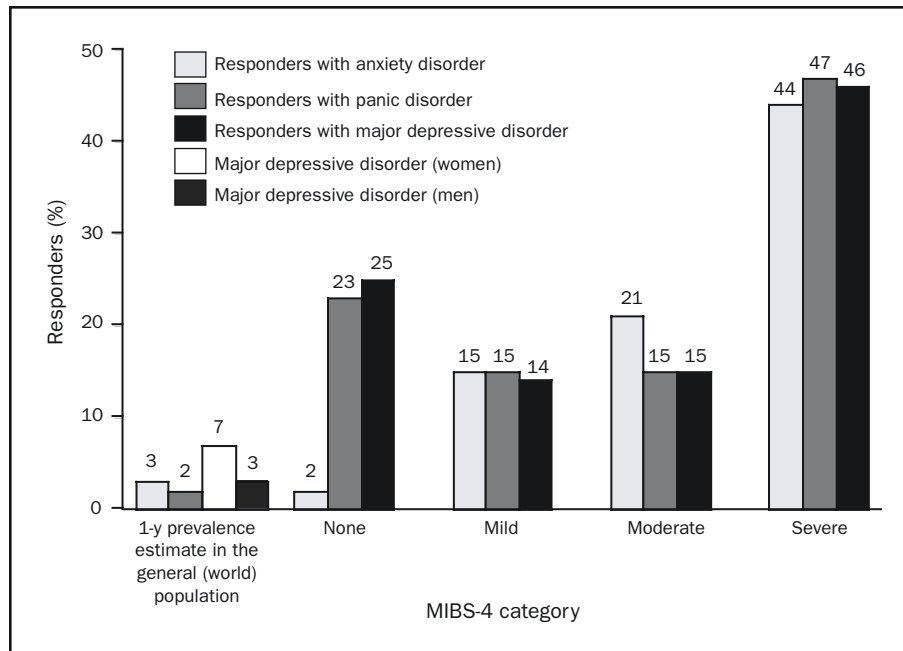


FIGURE 3. Depression, anxiety, and panic disorder in persons with migraine by level of interictal burden as measured by the 4-item Migraine Interictal Burden Scale (MIBS-4).

young women living in Israel and 8 European countries. During the prior 6 months, the mean number of missed work or school days due to migraine for the study participants was 1.9, and the mean number of days that they arrived late or left early was 1.5. During the preceding 6 months, 74% of participants reported being unable to function fully at work or school because of migraine, 62% reported 1 or more instances of being unable to spend time with family or friends because of migraine, and 67% reported 1 or more instances of being unable to enjoy recreational or leisure activities because of migraine.⁴⁵ Lantéri-Minet et al⁴⁶ analyzed responses to a 2-phase survey designed to explore the influence of anxiety and depression on functional ability and HRQoL in adults with migraine. Compared with individuals who did not have migraine, the 1652 respondents with active migraine had significantly lower mean scores on all 8 scales ($P<.01$) of the SF-12⁴⁷ except the physical functioning scale. A significantly higher percentage of individuals with migraine vs those without ($P<.01$) had anxiety symptoms alone or combined depression and anxiety symptoms.

To examine headache-related interictal burden, Buse et al³⁶ mailed surveys to an independent, stratified population-based sample of 2500 individuals with severe headache. Headache symptoms were used to identify migraine cases based on International Classification of Headache Disorders II criteria.⁴⁸ Valid returns were obtained from 1734 individuals (69%), and of these, 1391 (80%) met International Classification of Headache Disorders II criteria for migraine.

Surveys also included MIBS, MIDAS,³³ Patient Health Questionnaire (PHQ) depression module,⁴⁹ PHQ anxiety and panic disorder modules,⁵⁰ MSQ version 2.1,⁴¹ Migraine Prevention Questionnaire (MPQ), HIT-6 version 1.1,²⁹ Migraine Treatment Optimization Scale,^{51,52} and Lost Productive Time Work and Health Questionnaire, which includes measures of absenteeism (missed work) and presenteeism (reduced efficiency and productivity during work).⁵³

The researchers found moderate positive correlations between MIBS-4 and measures of ictal disability (MIDAS, HIT-6) and several psychological disorders (Figure 3).^{36,54} As interictal burden increased, so did the prevalence of anxiety disorder, panic disorder, and major depressive disorder. The researchers noted moderate negative correlations between MIBS-4 and HRQoL indicators (as measured by the 3 subscales of MSQ); as interictal burden increased, HRQoL decreased and vice versa (Figure 4).³⁶ In addition, the researchers found moderate positive correlations between MIBS-4 and measures of workplace productivity (lost productive time, absenteeism, presenteeism) (Figure 5).³⁶

ROLE OF HEALTH CARE PROFESSIONALS IN ASSESSING MIGRAINE-RELATED FUNCTIONAL IMPAIRMENT, HRQoL, AND COMMON COMORBID CONDITIONS

Effective communication plays a key role in the quality of medical care. Consensus statements from medical profes-

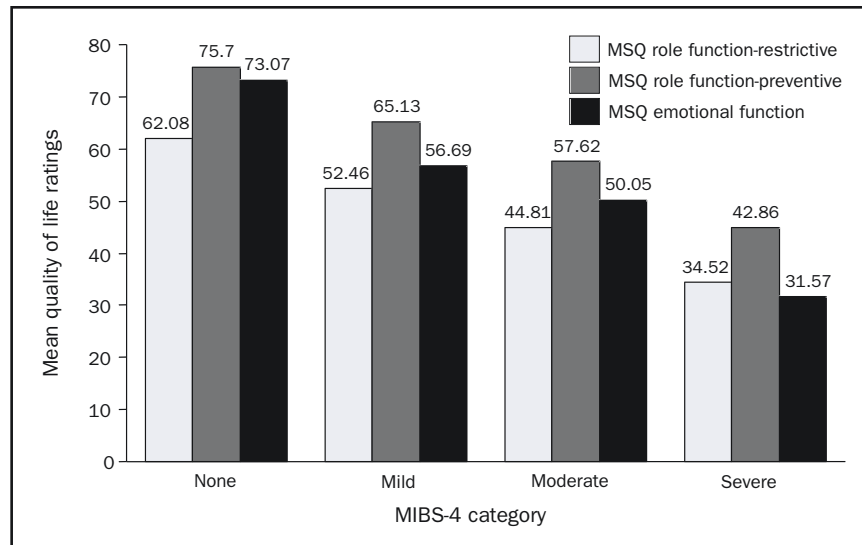


FIGURE 4. Mean quality of life ratings (Migraine-Specific Quality of Life Questionnaire [MSQ] subscales) in persons with migraine by level of interictal burden as measured by the 4-item Migraine Interictal Burden Scale (MIBS-4). MSQ role function-restrictive is a measure of the degree to which performance of daily activities is limited by migraines; MSQ role function-preventive is a measure of the degree to which performance of daily activities is interrupted by migraines; MSQ emotional function examines feelings of frustration and helplessness due to migraine.

sional groups, regulatory agencies, health care professionals, researchers, and patients all recognize its importance.⁵⁵⁻⁵⁸ Although high-quality medical communication contributes to patient satisfaction,⁵⁹⁻⁶² adherence to treatment plans,⁶³ improved medical outcomes,^{64,65} and decreased risk of malpractice,⁶⁶ many health care professionals have not had relevant training and lack confidence in their commu-

nication skills.^{13,67-70} Fortunately, research shows that medical communication skills can be successfully taught and acquired,^{12,14,71,72} leading to improved outcomes.¹² Many patients think that their physicians do not understand the impact of headaches on their lives.¹⁰ Patients rarely spontaneously mention functional impairment and emotional consequences,²⁷ and physicians do not routinely seek disability

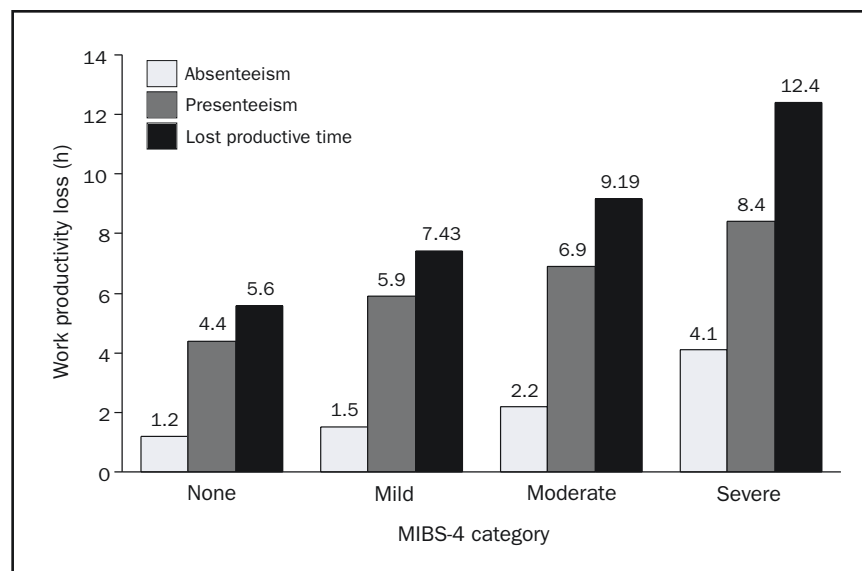


FIGURE 5. Absenteeism, presenteeism, and lost productive time in persons with migraine by level of interictal burden as measured by the 4-item Migraine Interictal Burden Scale (MIBS-4).

TABLE 2. The “Ask-Tell-Ask” Strategy

Step 1	“Ask” the patient to explain the issue, problem, or treatment in his/her own words. <i>The response will help guide you in creating an appropriate explanation for the patient, taking into account his/her level of knowledge, understanding, personal beliefs, and emotional responses</i>
Step 2	“Tell” the patient the relevant facts, diagnosis, and/or treatment plan in language that he/she will understand. <i>In this explanation, clarify any misperceptions or incorrect information given by the patient in response to the first question and/or reinforce and validate the correct information that the patient shared</i>
Step 3	“Ask” the patient to rephrase in his/her own words the information that you just provided. <i>This will allow you to assess the patient’s level of understanding and give the patient an opportunity to ask questions and express concerns</i>

For a detailed example and vignette using the “Ask-Tell-Ask” strategy with patients with headache, see the chapter by Hahn from *Wolff’s Headache and Other Head Pain*.⁷⁹

information from their patients with migraine.¹² However, information about the functional consequences of headache has been shown to positively affect physicians’ perceptions and prescribing behavior.¹² Eliciting that information helps physicians assess the effect of migraine on their patients’ lives and may uncover the need for more aggressive and/or comprehensive treatment plans.

Researchers in the American Migraine Communication Study (AMCS) examined routine communication in headache care (AMCS I)¹³ and the effectiveness of a brief educational intervention aimed at improving communication in headache care (AMCS II).¹⁴ The AMCS I was an observational study in which researchers audiotaped and videotaped actual office visits and conducted separate postvisit interviews with both health care professionals and patients. During these discussions, health care professionals asked an average of 13 questions, of which 91% of those that were migraine specific were closed-ended or short-answer questions focused on frequency (primarily number of attacks per month), severity, headache symptoms, triggers, and other similar features. Questions regarding headache-related impairment and quality of life were rare. Of 20 patients in the study who would be considered appropriate candidates for preventive medication according to a predetermined algorithm, 80% did not receive a preventive treatment strategy, and 50% did not discuss preventive treatment options during the appointment. Interviews with health care professionals and their patients separately after their visits indicated that 55% of health care professional and patient pairs did not report matching information on frequency, and 51% did not agree on impairment. By relying almost exclusively on closed-ended questions, these health care professionals limited their patients’ ability to communicate the effect of migraine on their lives. In addition, asking about migraine *attacks* and not migraine *days* led professionals to underestimate the number of headache days per month.

In a subsequent study, researchers developed and tested a brief educational intervention (AMCS II) designed to target deficits observed during AMCS I. In AMCS II, 15 health care professionals who participated in AMCS I participated in an audio interactive, 90-minute, Internet-based training session that reviewed the results of AMCS I and provided 2 communication strategies: the patient-centered “ask-tell-ask” strategy to assess frequency^{73,74} and use of open-ended questions to assess migraine-related impairment.⁷⁵ These types of communication techniques are effective⁷⁶ and are linked to higher levels of both patient and health care professional satisfaction.^{31,77,78} According to the theory that effective education requires assessing what the patient already knows and believes and then building on (or correcting when necessary) that understanding, the “ask-tell-ask” strategy can be used for any medical communication. In this study, it was used primarily to ensure optimal communication about migraine frequency in headache days. The “ask-tell-ask” strategy is based on 3 simple steps, which can be continued for as long as appropriate (Table 2).⁷⁹

Use of open-ended questions and the “ask-tell-ask” strategy was found to shorten office visits. In AMCS I (no intervention used), the average visit lasted a median of 11 minutes, whereas in AMCS II (“ask-tell-ask” strategy used), the average visit lasted a median of 9.5 minutes. Furthermore, the median time spent discussing impairment was just more than 1 minute in AMCS I vs less than 30 seconds in AMCS II.¹⁴ The recommended techniques led to a more accurate picture of patients’ migraine frequency and impairment during and between attacks, more frequent discussion and prescription of preventive and acute treatment, and greater satisfaction with office visits on the part of health care professionals and patients. Open-ended questions about migraine-related impairment and disability yielded information on ictal and interictal burden in 75% of sessions compared with 52% of sessions with closed-ended questions. Using the “ask-tell-ask” strategy increased the frequency of discussion of preventive therapy from 50% of eligible candidates (AMCS I) to 74% (AMCS II).

In addition to gathering data on headache-related functional impairment and HRQoL, health care professionals should inquire about comorbidities, such as mood disorders (eg, depression and anxiety), loss of sleep, low energy level, and poor occupational, social, and family functioning (eg, parenting, marital issues such as conflict, sexual issues). Epidemiological studies show an association between migraine and anxiety, mood, and personality disorders.^{80,81} Questions about the patient’s mood and well-being show concern, contribute to a positive therapeutic alliance, and are associated with higher levels of patient satisfaction,⁸² reduced emotional distress,⁶⁸ and symptom resolution.⁸³

Brief screening instruments can be used to assess depression and anxiety and have been shown to significantly improve the detection of comorbid conditions in clinical practice (Table 3). The PHQ-2 is a 2-item screening instrument that has been empirically shown to detect the presence of depression.⁸⁴ The PHQ-9 can be used to conduct a more detailed yet still time-efficient evaluation.⁴⁹ Clinically significant anxiety can be evaluated using the Generalized Anxiety Disorder 7, a 7-item, self-administered questionnaire.⁸⁵ Once the questionnaires are completed, the health care professional can review them with the patient during the visit; they may facilitate discussion about other areas of concern and further inform treatment decisions. The remaining steps are to educate the patient about migraine, common comorbidities, the taxing effect migraine can have on an individual's life, and treatment options. The patient can then be encouraged to participate in the management of his or her migraines and work with the professional to develop an individualized treatment plan.⁸⁶ Strategies for building rapport with patients and teaching them how to work with their health care professionals have been reviewed elsewhere and are beyond the scope of this review. (For reviews of effective medical communication strategies, see Hahn⁷⁹ and Buse and Lipton.⁸⁷ For reviews of techniques to enhance patient compliance and motivation, see Rains et al⁸⁸ and Miller and Rollnick.⁸⁹)

TREATMENT OF MIGRAINE

An array of effective acute and preventive pharmacological and nonpharmacological (ie, biobehavioral) therapies is available to the health care professional for use in treating migraine. The main goals of therapy are to avoid attacks when possible, treat attacks rapidly and consistently with no recurrences, and restore the patient's ability to function and HRQoL.⁹⁰ Treatment should be individualized for each patient, taking into account variables such as frequency and severity of migraine episodes, trigger factors, comorbidities, patient's lifestyle, and patient preferences.⁹¹

PHARMACOTHERAPY

Pharmacotherapy for migraine has been extensively reviewed.^{90,92-95} The mainstay of acute migraine therapy consists of certain nonspecific agents used for various pain disorders, including headache (eg, aspirin, acetaminophen, nonsteroidal anti-inflammatory drugs), and migraine-specific agents (eg, ergotamine, dihydroergotamine, and the triptans).⁹³ In the stepped-care approach to acute care, treatment is escalated across or within attacks, beginning with simple analgesics. If these agents provide inadequate relief, an analgesic plus an antiemetic or some other combination of medications may be tried. Migraine-specific agents are

TABLE 3. Tools and Scales Commonly Used by Health Care Professionals for Assessing Functional Impairment, Health-Related Quality of Life, and Comorbidities in Patients With Migraine

Assessment tool or scale ^a	Reference(s)
Disability	
MIDAS	25, 28
HIT and HIT-6	26, 27, 29, 30
ICF	5, 34
MIBS-4	35, 36
Quality of life	
SF-36 and SF-12	37, 38
MSQ	41
Comorbidities	
PHQ-2 and PHQ-9	49, 84
GAD-7	85

^a GAD = Generalized Anxiety Disorder; HIT = Headache Impact Test; ICF = International Classification of Functioning, Disability, and Health; MIBS = Migraine Interictal Burden Scale; MIDAS = Migraine Disability Assessment Questionnaire; MSQ = Migraine-Specific Quality of Life Questionnaire; PHQ = Patient Health Questionnaire; SF = Short-Form Health Survey.

reserved for use when simpler, inexpensive treatments have failed.⁹⁶ The US Headache Consortium guidelines recommend a stratified-care approach in which the choice of agent is guided by frequency and severity of the migraine attack, degree of disability, associated nonheadache symptoms such as nausea, previous response to medications, and presence of any comorbid disorders.⁹⁰

Medications with the highest quality of evidence of efficacy are aspirin, ibuprofen, butorphanol nasal spray, oral opiate combinations, dihydroergotamine nasal spray, and triptans (injectable, oral, and nasal spray). Migraine-specific agents such as the triptans are recommended for patients with moderate to severe migraines or milder headaches that do not respond adequately to nonsteroidal anti-inflammatory drugs or a combination of medications, such as aspirin, acetaminophen, and caffeine.^{90,92,93} Health care professionals must be sure that patients know how to use acute medications for migraine correctly and understand that overuse can increase the frequency and severity of headaches and reduce treatment efficacy. Medication overuse can be detected by routinely asking questions. (1) Do you ever take a pill before social events or work meetings or because you are anxious before migraine symptoms start? (2) Do you ever take a pill just in case? (3) Do you use acute treatment 3 or more days a week? (4) In addition to your prescription medications, about how often do you take over-the-counter pain medications?⁹⁷ Health care professionals should discourage patients from anticipatory use of symptomatic medications and set limits on their use to prevent the development of medication overuse headache. Although the majority of migraineurs take acute medication, almost 40% meet the criteria for preventive treatment.

TABLE 4. Percentage of Patients With Headache Frequency and Attack-Related Impairment and Corresponding Need for Prevention^a

Headache-related impairment	Headache frequency, days per month					
	≤1	2	3	4-5	6-10	11-14
None	4.5	0.6	0.7	0.6 ^b	0.5 ^c	0.4 ^c
Some	22.6	3.5 ^b	4.4 ^b	3.5 ^c	3.1 ^c	2.0 ^c
Severe or bed rest required	33.0	4.6 ^b	5.2 ^b	4.1 ^c	3.9 ^c	2.9 ^c

^a On the basis of 18,968 individuals 12 years or older with migraine.
^b Panel of experts recommended *considering* migraine prevention (13.1%).
^c Panel of experts recommended *offering* migraine prevention (25.7%).
 From *Neurology*,¹⁰⁰ with permission from Lippincott Williams & Wilkins.

Preventive therapy is intended to reduce the frequency of attacks or eliminate them, to reduce the cumulative impact of repeated attacks on the patient’s HRQoL and level of disability, to improve the efficacy of acute treatment, and, in some patients, to prevent transformation of episodic migraine to chronic migraine.^{98,99} Preventive therapies are commonly underused in patients who may be appropriate candidates and who may benefit from treatment. In the American Migraine Prevalence and Prevention survey, 43.3% of migraineurs had never used a migraine preventive agent, although among them 32.4% met expert guideline criteria for considering it (13.1%) or being offered it

(19.3%).¹⁰⁰ One reason for undertreatment of migraine may be health care professionals’ lack of awareness of the positive effects of preventive medications on the HRQoL of migraineurs.⁹⁹ Using the interviewing techniques of AMCS II to determine the number of migraine days and degree of impairment will help physicians decide whether to consider or offer preventive therapy.

Guidelines for determining the need for preventive therapy based on headache frequency and degree of impairment are presented in Table 4.¹⁰⁰ To facilitate clinical implementation of these guidelines in practice, researchers developed the MPQ-5 (Figure 6); psychometric testing demonstrated good reliability and validity.¹⁰¹ The MPQ-5 assesses headache frequency, use of acute treatment, headache-related impairment in several domains, and worry and anxiety related to headache. Responses are summed for a total score, which falls into 1 of 3 categories: preventive treatment not indicated, consider preventive treatment, and offer preventive treatment. In addition, each of the 5 questions has individual cutoff scores, which may raise a “yellow flag” or “red flag.” This information should be used as an indicator that the health care professional should gather additional information and consider appropriate treatments. The β-blockers propranolol and timolol and the neuromodulators divalproex sodium and topiramate are approved for migraine prevention in adults.¹⁰²⁻¹⁰⁵

	Write in number of days	Yellow flag warning	Red flag warning
1. On how many days in the LAST MONTH did you have headaches that were moderate to severe?		4-7	8 or greater
2. On how many days in the LAST MONTH did you use over-the-counter or prescription medications to treat your headaches? (Do not count medications that you use on a daily basis to prevent your headaches or medications you take for reasons other than headache.)		4-7	8 or greater
3. On how many days in the LAST 3 MONTHS did your headaches make it hard to work, study, or carry out household work?		9-11	12 or greater
4. On how many days in the LAST 3 MONTHS did your headaches spoil or prevent family, social, or leisure activities?		9-11	12 or greater
5. How many days in the LAST MONTH were you worried that your headaches would keep you from doing important activities?		9-11	12 or greater
Total score:			
Scoring algorithm: Less than 15: preventive therapy not indicated* 16-29: consider preventive therapy 30 or greater: offer preventive therapy *It is recommended that clinicians note any individual item score that reaches the “yellow flag” or “red flag” cutoff levels (irrespective of total score). Flags indicate the need for further examination in a particular area.			

FIGURE 6. Migraine Prevention Questionnaire 5 (MPQ-5).

Other agents used for migraine prevention include antidepressants^{98,106} and calcium channel blockers; natural products, such as vitamin B₂, botulinum toxin, *Petasites*, and coenzyme Q-10, are useful in some patients.^{99,107} Our focus is on studies of daily activities and HRQoL with medications that have achieved regulatory approval for use in migraine prophylaxis. With the exception of divalproex sodium, for which improvements in HRQoL measures have been reported in adolescents with migraine,¹⁰⁸ most studies have been conducted with topiramate. Garcia-Monco et al¹⁰⁹ recently compared the effects of preventive therapy with topiramate and nadolol (which is used off-label for migraine prophylaxis) on HRQoL in patients with migraine. Both drugs significantly improved the SF-36 role-physical domain, but the improvement associated with topiramate treatment was greater than that associated with nadolol treatment.

Several placebo-controlled studies have shown topiramate to be effective for migraine prevention in individuals with episodic migraine or chronic migraine.¹¹⁰⁻¹¹⁴ The adverse events that occurred in at least 5% of patients receiving topiramate (50-200 mg/d) were largely mild or moderate and included paresthesia, fatigue, memory and concentration difficulties, mood problems, infection, and taste perversion.¹¹⁰⁻¹¹⁴ Topiramate is effective not only in preventing migraine attacks but also in reducing their frequency; such a reduction may be associated with improvements in the daily work, home, and social activities of migraineurs, as determined by an analysis of MSQ, SF-36, and productivity data from placebo-controlled trials.¹¹⁵⁻¹¹⁸ Diamond et al¹¹⁵ analyzed data from the 3 pivotal topiramate trials. Results of the pooled analysis indicated that topiramate (100 mg/d) was associated with significant improvement compared with placebo in all MSQ domains (role-restrictive, role-preventive, and emotional function).

A prospective analysis of data from the trial by Silberstein et al¹¹² demonstrated that patients treated with topiramate had statistically significant improvements in MSQ role-restrictive domain scores compared with the placebo group ($P=.035$ for topiramate, 50 mg/d, and $P\leq.001$ for topiramate, 100 and 200 mg/d). Topiramate-treated patients (100 mg/d) also had significantly improved role-preventive domain scores compared with the placebo group ($P=.045$). Greater improvements were also observed for the SF-36 role-physical and vitality domain scores in patients receiving topiramate compared with the placebo group, but the difference between the 2 groups was not statistically significant.¹¹⁶ In a similar analysis of data from the trial by Brandes et al,¹¹⁰ patients treated with topiramate (50-200 mg/d) had significantly greater improvement in MSQ role-restrictive ($P=.02$ for topiramate, 50 mg/d, and $P<.001$ for topiramate, 100 and 200 mg/d) and role-preventive ($P=.007$ for topiramate, 50

mg/d; $P=.001$ for topiramate, 100 mg/d; and $P=.002$ for topiramate, 200 mg/d) domain scores compared with individuals receiving placebo. Statistically greater improvement was also observed in SF-36 role-physical domain scores in the topiramate, 100 and 200 mg/d, groups ($P=.02$ vs placebo). The differences in the SF-36 vitality domain scores were not statistically significant between the topiramate-treated and placebo-treated groups, although greater improvements were observed in patients receiving topiramate.¹¹⁷

Dahlöf et al¹¹⁹ assessed the longitudinal effect of topiramate on daily activities and function in the 3 pivotal topiramate trials analyzed by Diamond et al.¹¹⁵ The investigators examined patients' MSQ and SF-36 scores at weeks 8, 16, and 26 of the double-blind phase of each trial, the time points at which the MSQ and SF-36 were given. Compared with the placebo group, patients treated with topiramate (100 mg/d) had significantly improved mean scores for all 3 domains of the MSQ and at all 3 time points ($P<.001$ for all except role-preventive [$P=.024$ at week 8]). In addition, topiramate-treated patients (100 mg/d) had significant improvements in 7 of the 8 subscores (not role-emotional) of the SF-36 at week 26 compared with patients receiving placebo. Specifically, topiramate treatment was associated with significant improvements in the physical component summary scores throughout the double-blind phase of the trial ($P<.001$) and in the mental component summary scores at week 26 ($P=.043$).

A multicenter, randomized, double-blind, placebo-controlled trial by Dodick et al¹²⁰ studied the effect of topiramate, 100 mg/d, on migraine-related disability, emotional distress, daily activities, and global impression of change in individuals with chronic migraine. The percentage of patients whose MIDAS scores reflected a greater than 50% improvement in migraine-related disability from baseline was higher in the topiramate group than in the placebo group, but these differences were not statistically significant ($P=.074$). The MSQ scores (last item carried forward) were significantly improved in patients receiving 100 mg/d of topiramate compared with the placebo group at week 4 in all 3 domains (role-restrictive, role-preventive, and emotional function) and at weeks 8 and 16 in role-restrictive and emotional function ($P<.05$). The percentage of patients who reported improvement in the Subject's Global Impression of Change scale score was significantly higher in the topiramate treatment group than in the placebo treatment group (75% vs 61%, respectively; $P=.025$). Findings were similar for the Physician's Global Impression of Change scale scores (72% for topiramate vs 59% for placebo; $P=.037$).

Workplace productivity has been evaluated in a post hoc analysis of pooled data from 2 randomized, double-blind, placebo-controlled topiramate trials. Lofland et al¹¹⁸ found

that the number of hours worked with migraine, the decreased effectiveness caused by migraine (presenteeism), and total lost productivity (absenteeism and presenteeism) were significantly reduced in the group of patients treated with topiramate (100 mg/d) compared with the placebo-treated group.

NONPHARMACOLOGICAL INTERVENTIONS

Several nonpharmacological interventions have demonstrated empirical efficacy for headache management. As a result, they have become standard components of specialty headache centers and multidisciplinary pain management programs and are endorsed by the US Headache Consortium,¹²¹ which consists of several professional agencies, including the American Headache Society, the American Academy of Neurology, and the National Headache Foundation.¹²² Empirically validated effective nonpharmacological interventions may play an important role in both the acute and the preventive phases of the comprehensive headache management plan and may be offered individually or in conjunction with pharmacotherapy. These interventions offer the benefit of being cost-effective without the potential for drug interactions or adverse effects. Nonpharmacological treatments are useful for patients who need to avoid medication, such as women who are pregnant or trying to become pregnant.¹²³ Also, nonpharmacological therapy may augment the effectiveness of other treatments or minimize the need for their use.¹²⁴ Several factors, including obesity, depression, anxiety, and stressful life events, have been established as common comorbidities of migraine with bidirectional influences.^{125,126} Therefore, treating any of the conditions listed previously may also benefit migraine and vice versa.

Headache is a multifaceted disorder that can affect all aspects of patients' lives. Multidisciplinary treatment approaches are often the most effective for the management of headache.¹²⁷⁻¹²⁹ Multidisciplinary headache and pain programs typically involve a range of pain specialists, which may include physicians, nurses, psychiatrists, psychologists, physical therapists, occupational therapists, and social workers, among other health care professionals. For health care professionals who have no multidisciplinary staff, appropriate referrals may be necessary. For more information about finding specialists and making referrals, see the study by Buse and Andrasik.¹³⁰

Nonpharmacological treatments of migraine include cognitive behavioral therapy, biobehavioral training (ie, biofeedback, relaxation training, and stress management), physical therapy, education, and lifestyle modification or healthy lifestyle training.¹³¹ Cognitive behavioral therapy is an empirically tested method that helps patients identify behaviors that may increase or maintain headaches (eg, triggers, stressors, unhealthy lifestyle or habits) and mal-

adaptive or dysfunctional thoughts (ie, cognitions) regarding their headaches.¹³² Cognitive behavioral therapy can aid in headache management by making patients more aware of triggers, including the association between stress and headache, and identifying and challenging counterproductive or self-defeating beliefs and ideas. Cognitive behavioral therapy is also effective in managing depression, anxiety, panic disorder, obsessive-compulsive disorder, eating disorders, sleep disorders, and other common comorbidities in patients with headache. Patients should work with a licensed psychologist, psychiatrist, or social worker with experience in treating patients with headache or chronic medical conditions. More information about cognitive behavioral therapy can be found on the Association for Behavioral and Cognitive Therapies Web site (www.abct.org).

Biofeedback entails learning to increase awareness of involuntary physiologic functions and bring them under voluntary control, especially functions related to sympathetic arousal, including improving circulation (measured by increasing finger temperature) and reducing muscle tension.^{133,134} Members of the Association for Applied Psychophysiology and Biofeedback (www.aapb.org) are certified to conduct biofeedback training, but many qualified professionals practice biofeedback therapy without being certified or belonging to this organization. A list of practitioners can be found at the Web site of the Biofeedback Certification Institute of America (www.bcia.org/directory/membership.cfm). Alternatively, patients may work with a licensed psychologist, social worker, physical therapist, or occupational therapist with biofeedback expertise. A list of psychologists with their specialties and location may be obtained through the American Psychological Association.

Relaxation techniques are taught to help patients minimize their physiologic response to stress, decrease sympathetic arousal, and engage the parasympathetic nervous system. Relaxation training is typically conducted by psychologists or other mental health or allied pain professionals but can be self-taught by patients through training manuals or audio or visual relaxation aids. Relaxation training may include diaphragmatic breathing, visual imagery, meditation, prayer, yoga, self-hypnosis, guided relaxation CDs or audiocassettes, and other methods of calming the mind and body. These techniques require regular practice to become effective habitual responses.^{134,135}

Patient education is important for effective headache management. Patients should be well informed about the identification and avoidance of triggers and how to make healthy lifestyle choices. In general, the best advice for migraineurs is to maintain a regular and healthy lifestyle, especially during times when they are most vulnerable to an attack. Healthy lifestyle habits include a regular sleep-wake schedule, regular meals, a diet that avoids processed and

unhealthy food, regular exercise, avoidance of excessive caffeine or alcohol consumption, and smoking cessation. Regular practice of stress management and relaxation techniques and self-care should be encouraged. Migraine is also a unique condition in that patients make most of the therapeutic decisions on their own. After a physician prescribes the medication, the patient decides which attacks to treat, when to treat them, how to treat them, the level of adherence, whether to make healthy lifestyle changes, and many other decisions that are central to effective management. Trials of educational interventions have demonstrated significant reductions in pain frequency, intensity, and duration; improved functional status and quality of life; reduced depression; and decreased service utilization (in terms of patient visits to both primary care physicians and the emergency department).¹³⁶

CONCLUSION

Migraine headache remains an underrecognized and undertreated neurologic disorder despite the availability of effective treatment and management options. Care improves when health care professionals and patients communicate effectively about the burden of migraine, as recommended in treatment guidelines. Health care professionals should routinely evaluate the impact of migraine pain and related disability and reduced HRQoL to determine whether patients are receiving effective treatment and whether additional treatment strategies are warranted. Health care professionals can facilitate effective communication by using techniques such as active listening, open-ended questions, and the “ask-tell-ask” strategy. In addition, a variety of assessment tools and techniques are available for determining the burden of migraine, HRQoL, and common comorbidities. MIDAS, HIT-6, and MIBS-4 are useful tools for gathering data and generating discussion about ictal and interictal disability, and PHQ-9 and Generalized Anxiety Disorder 7 can assist in assessing depression and anxiety, 2 common migraine comorbidities. The MPQ-5 can be helpful in identifying appropriate candidates for preventive treatments. A number of effective medications and empirically validated biobehavioral interventions are available for treating acute attacks, preventing future attacks, and improving the HRQoL of patients with migraine. Accurately evaluating individual patients’ needs through the use of assessment tools and effective communication techniques will help create the optimal treatment strategy for each.

Editorial support was provided by Kakuri Omari, PhD (Phase Five Communications Inc, New York, NY), with funding from Ortho-McNeil Neurologics.

REFERENCES

1. World Health Organization. The World Health Report 2001: *Mental Health: New Understanding, New Hope*. <http://www.who.int/whr/2001/en/index.html>. Accessed January 12, 2009.
2. Lipton RB, Stewart WF, Diamond S, Diamond ML, Reed M. Prevalence and burden of migraine in the United States: data from the American Migraine Study II. *Headache*. 2001;41(7):646-657.
3. Haut SR, Bigal ME, Lipton RB. Chronic disorders with episodic manifestations: focus on epilepsy and migraine. *Lancet Neurol*. 2006;5(2):148-157.
4. Bigal ME, Lipton RB. When migraine progresses: transformed or chronic migraine. *Expert Rev Neurother*. 2006;6(3):297-306.
5. Leonardi M, Steiner TJ, Scher AT, Lipton RB. The global burden of migraine: measuring disability in headache disorders with WHO's Classification of Functioning, Disability and Health (ICF). *J Headache Pain*. 2005 Dec;6(6):429-440. Epub 2005 Dec 15.
6. Clarke CE, MacMillan L, Sondhi S, Wells NE. Economic and social impact of migraine. *QJM*. 1996;89(1):77-84.
7. Dowson A, Jagger S. The UK Migraine Patient Survey: quality of life and treatment. *Curr Med Res Opin*. 1999;15(4):241-253.
8. Linde M, Dahlöf C. Attitudes and burden of disease among self-considered migraineurs: a nation-wide population-based survey in Sweden. *Cephalalgia*. 2004;24(6):455-465.
9. Dahlöf CG, Dimenäs E. Migraine patients experience poorer subjective well-being/quality of life even between attacks. *Cephalalgia*. 1995;15(1):31-36.
10. Dueland AN, Leira R, Cabelli ST. The impact of migraine on psychological well-being of young women and their communication with physicians about migraine: a multinational study. *Curr Med Res Opin*. 2005;21(8):1297-1305.
11. New survey reveals worrying between attacks can extend suffering for migraineurs [press release]. Titusville, NJ: Ortho-McNeil; June 8, 2006.
12. Holmes WF, MacGregor EA, Sawyer JP, Lipton RB. Information about migraine disability influences physicians' perceptions of illness severity and treatment needs. *Headache*. 2001;41(4):343-350.
13. Lipton RB, Hahn SR, Cady RK, et al. In-office discussions of migraine: results from the American Migraine Communication Study. *J Gen Intern Med*. 2008 Aug;23(8):1145-1151. Epub 2008 May 6.
14. Hahn SR, Lipton RB, Sheftell FD, Cady RK, Eagan CA, Simons SE, Nelson MR. Healthcare provider-patient communication and migraine assessment: results of the American Migraine Communication Study (AMCS) Phase II. *Curr Med Res Opin*. 2008 Jun;24(6):1711-1718. Epub 2008 May 7.
15. Brandes JL. Global trends in migraine care: results from the MAZE survey. *CNS Drugs*. 2002;16(suppl 1):13-18.
16. Stang PE, Osterhaus JT. Impact of migraine in the United States: data from the National Health Interview Survey. *Headache*. 1993;33(1):29-35.
17. Stewart WF, Ricci JA, Chee E, Morganstein D, Lipton R. Lost productive time and cost due to common pain conditions in the US workforce. *JAMA*. 2003;290(18):2443-2454.
18. Hawkins K, Wang S, Rupnow MF. Indirect cost burden of migraine in the United States. *J Occup Environ Med*. 2007;49(4):368-374.
19. Lipton RB, Bigal ME, Kolodner K, Stewart WF, Liberman JN, Steiner TJ. The family impact of migraine: population-based studies in the USA and UK. *Cephalalgia*. 2003;23(6):429-440.
20. Peters M, Huijter Abu-Saad H, Vydellingum V, Dowson A, Murphy M. The patients' perceptions of migraine and chronic daily headache: a qualitative study. *J Headache Pain*. 2005 Feb;6(1):40-47. Epub 2005 Jan 25.
21. Peres MF, Mercante JP, Guendler VZ, et al. Cephalalgia phobia: a possible specific phobia of illness. *J Headache Pain*. 2007 Feb;8(1):56-59. Epub 2007 Feb 19.
22. Cupini LM, Calabresi P. Medication-overuse headache: pathophysiological insights. *J Headache Pain*. 2005;6(4):199-202.
23. Diener HC, Limmroth V. Medication-overuse headache: a worldwide problem. *Lancet Neurol*. 2004;3(8):475-483.
24. Silberstein SD, Olesen J, Boussier M-G, et al; International Headache Society. The International Classification of Headache Disorders, 2nd Edition (ICHD-II): revision of criteria for 8.2 medication-overuse headache [published correction appears in *Cephalalgia*. 2006;26(3):360]. *Cephalalgia*. 2005;25(6):460-465.
25. Stewart WF, Lipton RB, Kolodner K, Liberman J, Sawyer J. Reliability of the migraine disability assessment score in a population-based sample of headache sufferers. *Cephalalgia*. 1999;19(2):107-114.
26. Ware JE Jr, Bjorner JB, Kosinski M. Practical implications of item response theory and computerized adaptive testing: a brief summary of ongoing studies of widely used headache impact scales. *Med Care*. 2000;38(9)(suppl):II73-II82.
27. Dowson AJ. Assessing the impact of migraine. *Curr Med Res Opin*. 2001;17(4):298-309.
28. Lipton RB, Bigal ME, Stewart WF. Clinical trials of acute treatments for migraine including multiple attack studies of pain, disability, and health-related quality of life. *Neurology*. 2005;65(12)(suppl 4):S50-S58.

29. Headache Impact Test-6 Web site. <http://www.headachetest.com/HIT6/PDFS/English.pdf>. Accessed January 13, 2009.
30. Pryse-Phillips W. Evaluating migraine disability: the headache impact test instrument in context. *Can J Neurol Sci*. 2002;29(suppl 2):S11-S15.
31. Jacobson GP, Ramadan NM, Aggarwal SK, Newman CW. The Henry Ford Hospital Headache Disability Inventory (HDI). *Neurology*. 1994;44(5):837-842.
32. Stewart WF, Lipton RB, Simon D, Von Korff M, Liberman J. Reliability of an illness severity measure for headache in a population sample of migraine sufferers. *Cephalalgia*. 1998;18(1):44-51.
33. Lipton RB, Stewart WF, Sawyer J, Edmeads JG. Clinical utility of an instrument assessing migraine disability: the Migraine Disability Assessment (MIDAS) questionnaire. *Headache*. 2001;41(9):854-861.
34. World Health Organization. International Classification of Functioning, Disability and Health. Agenda item 13.9, 54th World Health Assembly, 9th plenary meeting, May 22, 2001. <http://www.who.int/classification/icf/site/whares/wha-en.pdf>. Accessed November 2007.
35. Buse DC, Bigal MB, Rupnow M, Reed M, Serrano D, Lipton RB. Development and validation of the Migraine Interictal Burden Scale (MIBS): a self-administered instrument for measuring the burden of migraine between attacks [abstract S05.003]. *Neurology*. 2007;68(suppl 1):A89.
36. Buse D, Bigal M, Rupnow M, et al. The Migraine Interictal Burden Scale (MIBS): results of a population-based validation study [abstract F64]. *Headache*. 2007;47(5):778.
37. Solomon GD, Skobieranda FG, Gragg LA. Quality of life and well-being of headache patients: measurement by the Medical Outcomes Study instrument. *Headache*. 1993;33(7):351-358.
38. Ware JE Jr, Sherbourne CD. The MOS 36-Item Short-Form Health Survey (SF-36), I: conceptual framework and item selection. *Med Care*. 1992;30(6):473-483.
39. Osterhaus JT, Townsend RJ, Gandek B, Ware JE Jr. Measuring the functional status and well-being of patients with migraine headache. *Headache*. 1994;34(6):337-343.
40. Bussone G, Usai S, Grazzi L, Rigamonti A, Solari A, D'Amico D. Disability and quality of life in different primary headaches: results from Italian studies. *Neurol Sci*. 2004;25(suppl 3):S105-S107.
41. Martin BC, Pathak DS, Sharfman MI, et al. Validity and reliability of the Migraine-Specific Quality of Life Questionnaire (MSQ Version 2.1). *Headache*. 2000;40(3):204-215.
42. Breslau N, Davis GC. Migraine, physical health and psychiatric disorder: a prospective epidemiologic study in young adults. *J Psychiatr Res*. 1993;27(2):211-221.
43. Jette N, Patten S, Williams J, Becker W, Wiebe S. Comorbidity of migraine and psychiatric disorders: a national population-based study. *Headache*. 2008 Apr;48(4):501-516. Epub 2007 Dec 7.
44. Lipton RB, Liberman JN, Kolodner KB, Bigal ME, Dowson A, Stewart WF. Migraine headache disability and health-related quality-of-life: a population-based case-control study from England. *Cephalalgia*. 2003;23(6):441-450.
45. Dueland AN, Leira R, Burke TA, Hillyer EV, Bolge S. The impact of migraine on work, family, and leisure among young women: a multinational study. *Curr Med Res Opin*. 2004;20(10):1595-1604.
46. Lantéri-Minet M, Radat F, Chautard MH, Lucas C. Anxiety and depression associated with migraine: influence on migraine subjects' disability and quality of life, and acute migraine management. *Pain*. 2005 Dec;118(3):319-326. Epub 2005 Nov 14.
47. Ware J Jr, Kosinski M, Keller SD. A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care*. 1996;34(3):220-233.
48. Headache Classification Subcommittee of the International Headache Society. The International Classification of Headache Disorders, 2nd ed. *Cephalalgia*. 2004;24(suppl 1):1-160.
49. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606-613.
50. Spitzer RL, Kroenke K, Williams JB; Patient Health Questionnaire Primary Care Study Group. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *JAMA*. 1999;282(18):1737-1744.
51. Lipton RB, Kolodner K, Bigal M, et al. Validity and reliability of the Migraine Treatment Optimization Questionnaire (M-TOQ) in the treatment of migraine [abstract P06.033]. *Neurology*. 2007;68(suppl 1):A263.
52. Lipton R, Kolodner K, Bigal M, et al. Validity and reliability of the Migraine-Treatment Optimization Questionnaire. *Cephalalgia*. 2009 Feb 23 [Epub ahead of print].
53. Stewart WF, Ricci JA, Leotta C, Chee E. Validation of the work and health interview. *Pharmacoeconomics*. 2004;22(17):1127-1140.
54. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Text Rev. Washington, DC: American Psychiatric Press; 2000.
55. Simpson M, Buckman R, Stewart M, et al. Doctor-patient communication: the Toronto consensus statement. *BMJ*. 1991;303(6814):1385-1387.
56. Lansky D. Measuring what matters to the public. *Health Aff (Millwood)*. 1998;17(4):40-41.
57. The Medical School Objectives Writing Group. Learning objectives for medical student education: guidelines for medical schools: report I of the Medical School Objectives Project. *Acad Med*. 1999;74(1):13-18.
58. Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Acad Med*. 2001;76(4):390-393.
59. Hulsman RL, Ros WJ, Winnubst JA, Bensing JM. Teaching clinically experienced physicians communication skills: a review of evaluation studies. *Med Educ*. 1999;33(9):655-668.
60. Hall JA, Irish JT, Roter DL, Ehrlich CM, Miller LH. Satisfaction, gender, and communication in medical visits. *Med Care*. 1994;32(12):1216-1231.
61. Frederikson LG. Exploring information-exchange in consultation: the patients' view of performance and outcomes. *Patient Educ Couns*. 1995;25(3):237-246.
62. Hall JA, Roter DL, Katz NR. Meta-analysis of correlates of provider behavior in medical encounters. *Med Care*. 1988;26(7):657-675.
63. Cox K, Stevenson F, Britten N, Dundar Y. A systematic review of two-way communication between patients and healthcare professionals about medicines. National Prescribing Centre Web site. http://www.npc.co.uk/med_partnership/resource/major-reviews/systematic-review.html. Published May 2004. Accessed January 13, 2009.
64. Stewart M, Meredith L, Brown JB, Galajda J. The influence of older patient-physician communication on health and health-related outcomes. *Clin Geriatr Med*. 2000;16(1):25-36.
65. Stewart MA. Effective physician-patient communication and health outcomes: a review. *CMAJ*. 1995;152(9):1423-1433.
66. Cole SA. Reducing malpractice risk through more effective communication. *Am J Manag Care*. 1997;3(4):649-653.
67. Bensing JM, Roter DL, Hulsman RL. Communication patterns of primary care physicians in the United States and the Netherlands. *J Gen Intern Med*. 2003;18(5):335-342.
68. Roter DL, Hall JA, Kern DE, Barker LR, Cole KA, Roca RP. Improving physicians' interviewing skills and reducing patients' emotional distress: a randomized clinical trial. *Arch Intern Med*. 1995;155(17):1877-1884.
69. Mueller PS, Barrier PA, Call TG, et al. Views of new internal medicine faculty of their preparedness and competence in physician-patient communication. *BMC Med Educ*. 2006;6(May 26):30.
70. Davis D, O'Brien MA, Freemantle N, Wolf FM, Mazmanian P, Taylor-Vaisey A. Impact of formal continuing medical education: do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or healthcare outcomes? *JAMA*. 1999;282(9):867-874.
71. Fellowes D, Wilkinson S, Moore P. Communication skills training for healthcare professionals working with cancer patients, their families and/or carers. *Cochrane Database Syst Rev*. 2004;2:CD003751.
72. Roter DL, Hall JA, eds. Improving talk through interventions. In: *Doctors Talking With Patients/Patients Talking With Doctors: Improving Communication in Medical Visits*. 2nd ed. Westport, CT: Praeger; 2006:163-181.
73. Back AL, Arnold RM, Baile WF, Tulsky JA, Fryer-Edwards K. Approaching difficult communication tasks in oncology. *CA Cancer J Clin*. 2005;55(3):164-177.
74. Boyle D, Dwinell B, Platt F. Invite, listen, and summarize: a patient-centered communication technique. *Acad Med*. 2005;80(1):29-32.
75. Martin LR, Jahng KH, Golin CE, DiMatteo MR. Physician facilitation of patient involvement in care: correspondence between patient and observer reports. *Behav Med*. 2003;28(4):159-164.
76. Abdel-Tawab N, Roter D. The relevance of client-centered communication to family planning settings in developing countries: lessons from the Egyptian experience. *Soc Sci Med*. 2002;54(9):1357-1368.
77. Ishikawa H, Takayama T, Yamazaki Y, Deki Y, Katsumata N. Physician-patient communication and patient satisfaction in Japanese cancer consultations. *Soc Sci Med*. 2002;55(2):301-311.
78. Roter DL, Larson S, Shinitzky H, et al. Use of an innovative video feedback technique to enhance communication skills training [published correction appears in *Med Educ*. 2005;39(6):645]. *Med Educ*. 2004;38(2):145-157.
79. Hahn SR. Communication in the care of the headache patient. In: Silberstein SD, Lipton RB, Dodick DW, eds. *Wolff's Headache and Other Head Pain*. 8th ed. New York, NY: Oxford University Press; 2008:805-824.
80. Lake AE III, Rains JC, Penzien DB, Lipchik GL. Headache and psychiatric comorbidity: historical context, clinical implications, and research relevance. *Headache*. 2005;45(5):493-506.
81. McWilliams LA, Goodwin RD, Cox BJ. Depression and anxiety associated with three pain conditions: results from a nationally representative sample. *Pain*. 2004;111(1-2):77-83.

82. DiMatteo MR, Hays RD, Prince LM. Relationship of physicians' non-verbal communication skill to patient satisfaction, appointment noncompliance, and physician workload. *Health Psychol.* 1986;5(6):581-594.
83. Buller MK, Buller DB. Physicians' communication style and patient satisfaction. *J Health Soc Behav.* 1987;28(4):375-388.
84. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. *Med Care.* 2003;41(11):1284-1292.
85. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med.* 2006;166(10):1092-1097.
86. Lipton RB, Silberstein SD. The role of headache-related disability in migraine management: implications for headache treatment guidelines. *Neurology.* 2001;56(6, suppl 1):S35-S42.
87. Buse DC, Lipton RB. Facilitating communication with patients for improved migraine outcomes. *Curr Pain Headache Rep.* 2008;12(3):230-236.
88. Rains JC, Penzien DB, Lipchik GL. Behavioral facilitation of medical treatment for headache. Part II: theoretical models and behavioral strategies for improving adherence. *Headache.* 2006;46(9):1395-1403.
89. Miller WR, Rollnick S. *Motivational Interviewing: Preparing People for Change.* 2nd ed. New York, NY: Guilford Press; 2002.
90. Silberstein SD; US Headache Consortium. Practice parameter: evidence-based guidelines for migraine headache (an evidence based review): report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology.* 2000;55:754-762. <http://www.neurology.org/cgi/reprint/55/6/754.pdf>. Accessed January 13, 2009.
91. Dowson AJ, Lipscombe S, Sender J, Rees T, Watson D; MIPCA Migraine Guidelines Development Group; Migraine In Primary Care Advisors. New guidelines for the management of migraine in primary care. *Curr Med Res Opin.* 2002;18(7):414-439.
92. Goadsby PJ, Lipton RB, Ferrari MD. Migraine: current understanding and treatment. *N Engl J Med.* 2002;346(4):257-270.
93. Bigal ME, Lipton RB. Acute treatment of migraine headache. *Curr Treat Options Neurol.* 2003;5(6):423-430.
94. Bigal ME, Lipton RB. The preventive treatment of migraine. *Neurologist.* 2006;12(4):204-213.
95. Kaniecki, R. Neuromodulators for migraine prevention. *Headache.* 2008 Apr;48(4):586-600. Epub 2008 Jan 18.
96. Lipton RB. Disability assessment as a basis for stratified care. *Cephalalgia.* 1998;18(suppl 22):40-43.
97. Lake AE III. Medication overuse headache: biobehavioral issues and solutions. *Headache.* 2006;46(suppl 3):S88-S97.
98. Ramadan NM, Silberstein SD, Freitag FG, Gilbert TT, Frishberg BM; US Headache Consortium. Evidence-based guidelines for migraine headache in the primary care setting: pharmacological management for prevention of migraine. <http://www.aan.com/professionals/practice/pdfs/gl0090.pdf>. Accessed January 13, 2009.
99. Ramadan NM. Migraine headache prophylaxis: current options and advances on the horizon. *Curr Neurol Neurosci Rep.* 2006;6(2):95-99.
100. Lipton RB, Bigal ME, Diamond M, Freitag F, Reed ML, Stewart WF; American Migraine Prevalence and Prevention (AMPP) Advisory Group. Migraine prevalence, disease burden, and the need for preventive therapy. *Neurology.* 2007;68(5):343-349.
101. Lipton R, Serrano D, Buse D, Rupnow M, Reed M, Bigal M. The Migraine Prevention Questionnaire (MPQ): development and validation [abstract F48]. *Headache.* 2007;47(5):770-771.
102. Blocadren (timolol meleate) [package insert]. Whitehouse Station, NJ: Merck & Co; 2002.
103. Depakote ER (divalproex sodium extended-release) [package insert]. North Chicago, IL: Abbot Laboratories; 2006.
104. Topamax (topiramate) [package insert]. Raritan, NJ: Ortho-McNeil Pharmaceutical; 2004.
105. Inderal LA (propranolol hydrochloride) long-acting Capsules. [package insert]. Philadelphia, PA: Wyeth Pharmaceuticals; 2007.
106. Snow V, Weiss K, Wall EM, Mottur-Pilson C; American Academy of Family Physicians; American College of Physicians-American Society of Internal Medicine. Pharmacologic management of acute attacks of migraine and prevention of migraine headache. *Ann Intern Med.* 2002;137(10):840-849.
107. Modi S, Lowder DM. Medications for migraine prophylaxis [published correction appears in *Am Fam Physician.* 2006;74(10):1685]. *Am Fam Physician.* 2006;73(1):72-78.
108. Mendizabal JE. Extended-release divalproex sodium improves the quality of life of adolescent migraineurs [letter]. *Headache.* 2002;42(4):327-328.
109. Garcia-Monco JC, Foncea N, Bilbao A, Ruiz de Velasco I, Gomez-Beldarrain M. Impact of preventive therapy with nadolol and topiramate on the quality of life of migraine patients. *Cephalalgia.* 2007 Aug;27(8):920-928. Epub 2007 Jul 23.
110. Brandes JL, Saper JR, Diamond M, et al. Topiramate for migraine prevention: a randomized controlled trial. *JAMA.* 2004;291(8):965-973.
111. Diener HC, Tfelt-Hansen P, Dahlöf C, et al; MIGR-003 Study Group. Topiramate in migraine prophylaxis: results from a placebo-controlled trial with propranolol as an active control. *J Neurol.* 2004;251(8):943-950.
112. Silberstein SD, Neto W, Schmitt J, Jacobs D; MIGR-001 Study Group. Topiramate in migraine prevention: results of a large controlled trial. *Arch Neurol.* 2004;61(4):490-495.
113. Diener HC, Bussone G, Van Oene JC, Lahaye M, Schwalen S, Goadsby PJ; TOPMAT-MIG-201 (TOP-CHROME) Study Group. Topiramate reduces headache days in chronic migraine: a randomized, double-blind, placebo-controlled study [published correction appears in *Cephalalgia.* 2007;27(8):962]. *Cephalalgia.* 2007 Jul;27(7):814-823. Epub 2007 Apr 18.
114. Silberstein SD, Lipton RB, Dodick DW, et al; Topiramate Chronic Migraine Study Group. Efficacy and safety of topiramate for the treatment of chronic migraine: a randomized, double-blind, placebo-controlled trial. *Headache.* 2007;47(2):170-180.
115. Diamond M, Dahlöf C, Papadopoulos G, Neto W, Wu SC. Topiramate improves health-related quality of life when used to prevent migraine. *Headache.* 2005;45(8):1023-1030.
116. Silberstein SD, Loder E, Forde G, Papadopoulos G, Fairclough D, Greenberg S. The impact of migraine on daily activities: effect of topiramate compared with placebo. *Curr Med Res Opin.* 2006;22(6):1021-1029.
117. Brandes JL, Kudrow DB, Rothrock JF, Rupnow MF, Fairclough DL, Greenberg SJ. Assessing the ability of topiramate to improve the daily activities of patients with migraine. *Mayo Clin Proc.* 2006;81(10):1311-1319.
118. Lofland JH, Gagne JJ, Pizzi LT, Rupnow M, Silberstein SD. Impact of topiramate migraine prophylaxis on workplace productivity: results from two US randomized, double-blind, placebo-controlled, multicenter trials. *J Occup Environ Med.* 2007;49(3):252-257.
119. Dahlöf C, Loder E, Diamond M, Rupnow M, Papadopoulos G, Mao L. The impact of migraine prevention on daily activities: a longitudinal and responder analysis from three topiramate placebo-controlled clinical trials. *Health Qual Life Outcomes.* 2007;5(Oct 4):56.
120. Dodick DW, Silberstein S, Saper J, et al. The impact of topiramate on health-related quality of life indicators in chronic migraine. *Headache.* 2007;47(10):1398-1408.
121. Campbell JK, Penzien DB, Wall EM; US Headache Consortium. Evidence-based guidelines for migraine headache: behavioral and physical treatments. American Academy of Neurology. 2000:1-29. <http://www.aan.com/professionals/practice/pdfs/gl0089.pdf>. Accessed January 13, 2009.
122. Goslin RE, Gray RN, McCrory DC, et al. Behavioral and physical treatments for migraine headache. Technical review 2.2 February 1999. Prepared for the Agency for Healthcare Policy and Research under Contract No. 290-94-2025. <http://www.clinpol.mc.duke.edu>. Accessed November 2007.
123. Scharff L, Marcus DA, Turk DC. Maintenance of effects in the nonmedical treatment of headaches during pregnancy. *Headache.* 1996;36(5):285-290.
124. Penzien DB, Rains JC, Andrasik F. Behavioral management of recurrent headache: three decades of experience and empiricism. *Applied Psychophysiol Biofeedback.* 2002;27(2):163-181.
125. Bigal ME, Lipton RB. Modifiable risk factors for migraine progression. *Headache.* 2006;46(9):1334-1343.
126. Scher AI, Midgett LA, Lipton RB. Risk factors for headache chronification. *Headache.* 2008;48(1):16-25.
127. Lemstra M, Stewart B, Olszynski WP. Effectiveness of multidisciplinary intervention in the treatment of migraine: a randomized clinical trial. *Headache.* 2002;42:845-854.
128. Harpole LH, Samsa GP, Jurgelski AE, Shipley JL, Bernstein A, Matchar DB. Headache management program improves outcome for chronic headache. *Headache.* 2003;43(7):715-724.
129. Blumenfeld A, Tischio M. Center of excellence for headache care: group model at Kaiser Permanente. *Headache.* 2003;43(5):431-440.
130. Buse DC, Andrasik F. Behavioral medicine for migraine. *Neurol Clin.* 2009;27(2):445-465.
131. Rains JC, Pension DB, McCrory DC, Gray RN. Behavioral headache treatment: history, review of the empirical literature, and methodological critique. *Headache.* 2005;45(suppl 2):S92-S109.
132. Beck AT, Rush AJ, Shaw BF, Emery G, eds. Cognitive techniques: In *Cognitive Therapy of Depression.* New York, NY: Guilford Press; 1979:142-166.
133. Schwartz MS, Andrasik F, eds. *Biofeedback: A Practitioner's Guide.* 3rd ed. New York, NY: Guilford Press; 2003.
134. Penzien DB, Holroyd KA. Psychosocial interventions in the management of recurrent headache disorders, II: description of treatment techniques. *Behav Med.* 1994;20(2):64-73.
135. Hammond DC, ed. *Handbook of Hypnotic Suggestions and Metaphors.* New York, NY: Norton and Company; 1990.
136. Rothrock JF, Parada VA, Sims C, Key K, Walters NS, Zweifler RM. The impact of intensive patient education on clinical outcome in a clinic-based migraine population [published correction appears in *Headache.* 2006;46(7):1227]. *Headache.* 2006;46(5):726-731.