

Behavioral Medicine for Migraine

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KEYWORDS

- Migraine • Headache • Biofeedback
- Behavioral medicine • Biobehavioral • Relaxation
- Cognitive behavioral therapy (CBT) • Biopsychosocial

“Behavioral Medicine is the interdisciplinary field concerned with the development and integration of behavioral, psychosocial, and biomedical science knowledge and techniques relevant to the understanding of health and illness, and the application of this knowledge and these techniques to prevention, diagnosis, treatment and rehabilitation.”¹ The discipline of behavioral medicine is based on the biopsychosocial model, which asserts that biologic, psychologic (including behaviors and cognitive experiences, such as thoughts and emotions), and social or environmental factors all play a significant role in human functioning.² This model maps particularly well onto the understanding of migraine and other primary headache disorders,³ in which data continue to amass demonstrating the complex interactions of biology, environment, behavior, cognitions, and emotions on the development, maintenance, progression, and remission of headache disorders.

Although the armamentarium of safe and effective acute and preventive pharmacologic treatments for migraine has grown significantly, nonpharmacologic treatments continue to play a very important role in providing the most comprehensive and effective treatment plan. Nonpharmacologic therapies may be offered individually or in conjunction with a medicine regimen. A combination of pharmacologic and nonpharmacologic approaches has been demonstrated to be more effective than either approach on its own^{4,5} to help maintain positive outcomes⁶ and to improve treatment adherence.^{7,8}

Nonpharmacologic treatments for migraine can be broadly divided into the categories of behavioral treatments (cognitive behavioral therapy [CBT] and biobehavioral training; [ie, biofeedback, relaxation training, and stress management]); physical

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therapies; and education including lifestyle modification. This article reviews empirically supported and efficacious behavioral approaches to the treatment and management of migraine. These include strategies for both patients and health care providers (HCPs) and are essential components of a comprehensive headache management plan. Once learned, patients can benefit from the strategies throughout their lives. Migraine commonly first occurs during adolescence or early adulthood. By encouraging patients to train their physiology through biofeedback and relaxation, adopt healthy lifestyle habits, and recognize and mediate the effects of stress in their lives the physician is giving patients a set of tools that can last a lifetime. Behavioral techniques also have demonstrated efficacy with children and adolescents.⁹⁻¹¹

Behavioral medicine researchers and practitioners have embraced the concept of empirically supported or evidence-based behavioral medicine, which is defined as “The conscientious, explicit and judicious use of current best evidence in making clinical decisions about the care of patients... thereby integrating individual clinical care with the best available clinical evidence.”¹² Behavioral treatments with demonstrated empiric efficacy for headache management have become standard components of specialty headache centers and multidisciplinary pain management programs. Several empirically validated biobehavioral approaches to headache management are endorsed by the American Medical Association, the World Health Organization, and the National Institutes of Health, and many other professional organizations.¹³

The United States Headache Consortium developed evidence-based guidelines for the treatment and management of migraine headache based on an extensive review of the medical literature and compilation of expert consensus. Published guidelines include data and recommendations on the use of nonpharmacologic (behavioral and physical) treatments, among other issues regarding migraine diagnosis and management.¹⁴ The United States Headache Consortium pointed out that nonpharmacologic treatments might be particularly well suited for patients who

1. Have a preference for nonpharmacologic interventions
2. Display a poor tolerance for specific pharmacologic treatments
3. Exhibit medical contraindications for specific pharmacologic treatments
4. Have insufficient or no response to pharmacologic treatment
5. Are pregnant, are planning to become pregnant, or are nursing
6. Have a history of long-term, frequent, or excessive use of analgesic or acute medications that can aggravate headache problems (or lead to decreased responsiveness to other pharmacotherapies)
7. Exhibit significant stress or deficient stress-coping skills

The United States Headache Consortium reported on the efficacy of behavioral interventions in the prevention of attacks, although some behavioral interventions may also provide relief once an attack has begun. They identified the following goals for behavioral interventions as preventive treatment for headache: (1) reduced frequency and severity of headache, (2) reduced headache-related disability, (3) reduced reliance on poorly tolerated or unwanted pharmacotherapies, (4) enhanced personal control of migraine, and (5) reduced headache-related distress and psychologic symptoms.

EVIDENCE ON EFFICACY OF BEHAVIORAL INTERVENTIONS FOR MIGRAINE

There is a large and constantly growing body of published evidence examining the use of behavioral therapies for migraine (and other forms of headache) including

meta-analytic studies and evidence-based reviews.^{15,16} These behavioral treatments have been found to be superior to various control conditions, and the benefits from these treatments are generally maintained over time. For example, a large meta-analysis of nonpharmacologic treatments for migraine sponsored by the US Agency for Healthcare Research and Quality¹³ identified 355 studies of behavioral and physical treatments. Few of these (70 of 355) were controlled trials of behavioral treatments and fewer yet (39 of 355) met the criteria for inclusion in the meta-analysis. **Fig. 1** combines findings from the US Agency for Healthcare Research and Quality analysis with three other large meta-analyses, which included various control conditions, and a sample of efficacy rates for two prophylactic medications for comparison (see¹⁶ for a more current review of the evidence).

Meta-analyses comparing behavioral and pharmacologic (prophylactic) treatments have shown similar efficacy between the two approaches (see **Fig. 1**).¹⁷ These meta-analytic findings of comparable outcomes for behavioral and medication treatments are consistent with the findings from the few direct comparisons that have been conducted for migraine headache.^{18,19}

In addition to meta-analyses of existing data, there are also consensus-based reviews conducted by expert panels. Evidence-based analyses for migraine and headache have been performed by the United States Headache Consortium (an expert panel composed of representative of the American Academy of Family Physicians, American Academy of Neurology, American Headache Society, American College of Emergency Physicians, American College of Physicians-American Society

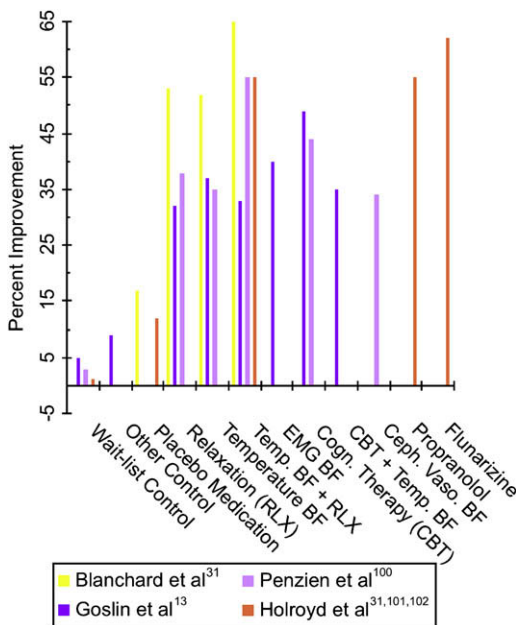


Fig. 1. Meta-analyses of behavioral and pharmacologic treatments for migraine. Percent improvement scores are reported by treatment condition. (Data from Andrasik F. What does the evidence show? Efficacy of behavioural treatment for recurrent headaches in adults. *Neurol Sci* 2007;28:570–7; Penzien DB, Rain JC, Andrasik F. Behavioral management of recurrent headache: three decades of experience and empiricism. *Appl Psychophysiol Biofeedback* 2002;27:163–81.)

of Internal Medicine, American Osteopathic Association and National Headache Foundation);¹⁴ the Cochrane collaboration;²⁰ the Division 12 Task Force of the American Psychological Association;²¹ the Canadian Headache Society;²² and the Association for Applied Psychophysiology and Biofeedback.²³

The United States Headache Consortium was convened with the goal of developing “scientifically sound, clinically relevant practice guidelines on chronic headache in the primary care setting,”¹⁴ and to “propose diagnostic and therapeutic recommendations to improve the care and satisfaction of migraine patients” based on a review of the current literature.¹³ The Consortium uses a grading system based on the quality of evidence.²⁴ Grade A is given to multiple well-designed randomized clinical trials, directly relevant to the recommendation, that yield a consistent pattern of findings. Grade B is given where some evidence from randomized clinical trials supports the recommendation, but the scientific support is not optimal. For instance, either few randomized trials existed, the trials that did exist were somewhat inconsistent, or the trials were not directly relevant to the recommendation. An example of the last point is the case where trials were conducted using a study group that differed from the target group for the recommendation. The United States Headache Consortium guidelines opine the following treatments have Grade A evidence for their use: relaxation training; thermal biofeedback combined with relaxation training; electromyographic biofeedback; and CBT (for prevention of migraine). Grade B evidence is given for behavioral therapy combined with preventive drug therapy to achieve added clinical improvement for migraine.

BIOFEEDBACK

Biofeedback is a procedure that involves monitoring physiologic processes of which the patient may not be consciously aware or does not believe that he or she has voluntary control. Biofeedback training is the process of increasing awareness of and bringing those physiologic functions under the patient’s voluntary control.^{24–26} Literally, biologic or physiologic information is converted into a signal that is then “fed back” to the patient, usually on a computer monitor and often with audio input. Patients are typically taught various relaxation skills, such as diaphragmatic breathing or visualization, to induce the relaxation response,²⁷ which includes relaxation of the sympathetic nervous system and activation of the parasympathetic nervous system. Recent literature on the neurophysiology of migraine and functional MRI studies of pain networks suggest that behavioral interventions may affect neuromodulation.²⁸

Early reviews demonstrated rates of improvement ranging from 40% to 65% using biofeedback for the treatment of migraine.^{29,30} Similar benefits were demonstrated when behavioral interventions were combined with pharmacotherapy.³¹ Several biofeedback modality options exist including peripheral skin temperature feedback or thermal biofeedback (or autogenic feedback when combined with another relaxation approach termed “autogenic training”); blood-volume-pulse feedback; electromyographic feedback; galvanic skin response training or skin conductance feedback; and electroencephalographic feedback or neuro or brain wave feedback. Grade A evidence was found for the efficacy of thermal biofeedback combined with relaxation training and electromyographic biofeedback in prevention of migraine.¹⁴

Thermal biofeedback involves monitoring finger temperature with a sensitive thermometer. During or preceding a headache the body may enter the “fight or flight” state (activation of the sympathetic nervous system). As sympathetic activity increases, circulation to the extremities decreases and finger temperature decreases. Conversely, as parasympathetic activity increases and the relaxation response is

activated, circulation and extremity temperature increase. Finger temperature is viewed as providing an indirect measure of autonomic arousal. Patients are taught that higher finger temperature corresponds to a more relaxed state and their goal is to raise their finger temperature. It was reported that relaxation training and thermal biofeedback can produce 33% to 37% improvement in headache activity.¹⁴

Nestoriuc and colleagues³² recently conducted a comprehensive efficacy (“white paper”) review of all existing investigations of biofeedback for migraine and tension-type headache. The authors provided efficacy recommendations, according to the guidelines jointly established by the Association for Applied Psychophysiology and Biofeedback and the International Society for Neurofeedback and Research.³³ They examined data from two recently published meta-analyses, which included 150 outcome studies.^{15,34} Ninety-four studies met rigid inclusion criteria and were analyzed for effect sizes for the treatment of the two headache types, of which only migraine is reported here. They reported medium-to-large mean effect sizes for biofeedback for the treatment of migraine in adults, and found that treatment effects were maintained over an average follow-up period of 14 months, both in completer and intention-to-treat analyses (Fig. 2). Nestoriuc and colleagues³² were also able to evaluate effects for secondary variable (this is the first meta-analysis to do so). Fig. 3 shows that biofeedback led to significant improvements in perceived self-efficacy, symptoms of depression and anxiety, and medication use (Fig. 3 also reports findings for various pain indices). Considering the evidence examined, the authors asserted that biofeedback can be supported as an efficacious treatment option for migraine with a confidence of Level 4 evidence (efficacious) according to the Association for Applied Psychophysiology and Biofeedback and the International Society for Neurofeedback and Research criteria.

Biofeedback training generally requires several office visits (8–12) spaced 1 to several weeks apart (although research suggests biofeedback and related treatments can be delivered effectively by a reduced-contact or home-based format).³⁵ Providers are often psychologists who also incorporate cognitive-behavioral techniques into sessions, but biofeedback may be successfully taught by a range of properly trained medical and mental health professionals. Patients are taught techniques in the office;

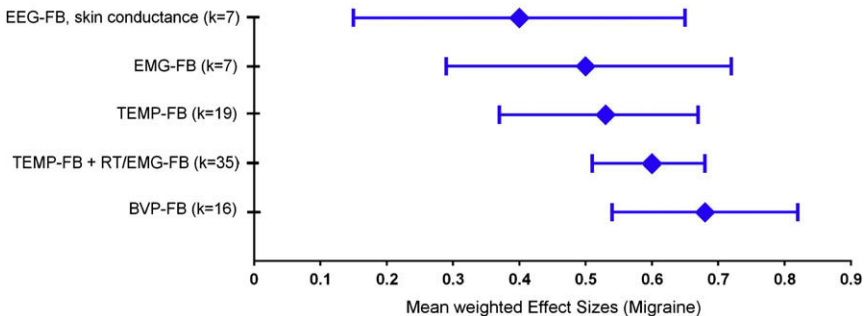


Fig. 2. Mean weighted effect sizes for the different feedback modalities in the treatment of migraine. Outcome is measured in headache pain. Mean effect sizes are displayed with their individual 95% confidence intervals (k = number of independent effect sizes). BVP-FB, blood-volume pulse feedback; EEG-FB, electroencephalographic feedback; EMG-FB, electromyographic feedback; RT, relaxation training; TEMP-FB, peripheral temperature feedback. (From Nestoriuc Y, Martin A, Rief W, et al. Biofeedback treatment for headache disorders: a comprehensive efficacy review. *Applied Psychophysiol Biofeedback* 2008;33:125–40; with permission.)

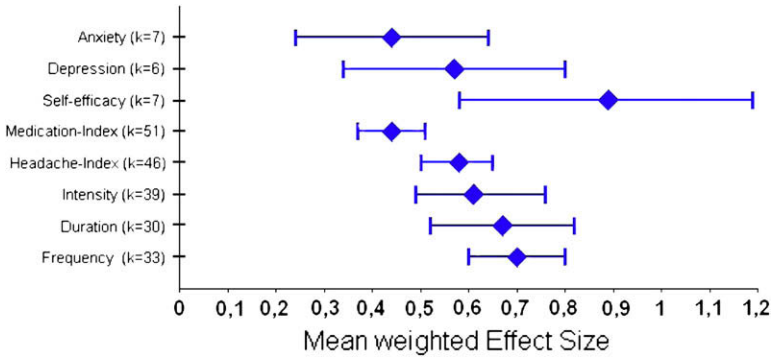


Fig. 3. Mean weighted effect sizes for the different outcome variables in the biofeedback treatment of migraine. Outcome is measured in headache pain over all biofeedback modalities. Mean effect sizes are displayed with their individual 95% confidence intervals (k = number of independent effect sizes). (From Nestoriuc Y, Martin A, Rief W, et al. Biofeedback treatment for headache disorders: a comprehensive efficacy review. *Applied Psychophysiol Biofeedback* 2008;33:125–40; with permission.)

however, home practice is also required between sessions. As the patient's ability to manipulate and control the targeted physiologic processes increases, the biofeedback device can be eliminated.

One of the biggest challenges for physicians and patients can often be locating a biofeedback practitioner.³⁶ The Association for Applied Psychophysiology and Biofeedback (www.aapb.org) is a professional organization of researchers and practitioners of biofeedback. The Biofeedback Certification Institute of America is an organization that certifies biofeedback providers, even though psychologists with proper training may practice biofeedback therapy without being certified or belonging to this organization. A list of certified biofeedback providers is available on their Web site (www.bcia.org/directory/membership.cfm). A list of psychologists with their specialties and location may be found at the Web sites of the American Psychological Association (www.apa.org [1-800-964-2000]) or the National Register of Health Service Providers in Psychology (www.nationalregister.org). Psychologist members of the American Headache Society can be found on their Web site: <http://www.americanheadachesociety.org>. To find practitioners, training, and meetings in Europe refer to the Biofeedback Foundation of Europe (www.bfe.org). Self-training and home training biofeedback kits and manuals are also available, although few have been field-tested specifically with headache patients (see the various products developed or marketed by such companies as Bio-Medical Instruments, HeartMath LLC, Helicor, InterCure, and Thought Technology).

RELAXATION TRAINING

Relaxation techniques are taught to minimize physiologic responses to stress and decrease sympathetic arousal. The United States Headache Consortium gave Grade A status to relaxation training and thermal biofeedback combined with relaxation training as treatment options for prevention of migraine.¹⁴ Relaxation training may include a variety of techniques.^{26,37} The classic procedure, progressive muscle relaxation training,³⁸ which was first reviewed in a publication in 1938, involves tensing and relaxing various muscle groups while taking note of

the contrasting sensations. Because it is impossible to experience tension and relaxation at the same time, Wolpe³⁹ used progressive muscle relaxation training as part of the desensitizing procedure for treatment of phobias. Soon afterward, progressive muscle relaxation training became an essential tool in the treatment of anxiety, phobias, and other related disorders. Other traditional clinical relaxation techniques include visual or guided imagery; cue-controlled relaxation; diaphragmatic breathing; and hypnosis (therapist- or self-applied).^{40,41} Patients may use any techniques or tools that quiet the mind and calm the body, however, including meditation, prayer, yoga, pleasant music, guided relaxation CDs or tapes, and any other method that a patient finds effective. Relaxation training is usually taught by clinical professionals, such as psychologists or other mental health professionals, but it can also be self-taught by patients with print or audio support materials (see the previously mentioned Web sites to locate providers). Although techniques can be learned during sessions in the office, they require regular practice to become effective automatic responses.

COGNITIVE BEHAVIORAL THERAPY

The United States Headache Consortium also found Grade A evidence for CBT for preventive treatment of migraine.¹⁴ CBT is an empirically validated psychotherapeutic treatment comprised of cognitive and behavioral strategies. Cognitive strategies focus on identifying and challenging maladaptive or dysfunctional thoughts, beliefs, and responses to stress.^{42–44} Behavioral strategies help patients identify behaviors that may precipitate, increase, or maintain headaches (including modifying triggers and promoting healthy lifestyle habits). CBT is also used to manage and reduce feelings of depression, anxiety, panic attacks, obsessive-compulsive disorder, eating disorders, sleep disorders, and common comorbidities for headache sufferers. CBT can be conducted by a licensed psychologist or other mental health provider, and patients should seek a provider with some understanding of issues related to pain. For more information about CBT refer to the Association for Behavioral and Cognitive Therapies Web site (www.abct.org). Refer to the resources listed previously to locate providers.

Specific cognitive goals of CBT for headache management include enhancing self-efficacy⁴⁵ (ie, the patient's belief in his or her ability to succeed or accomplish a certain task), and helping patients gain an internal locus of control (ie, a belief that the mechanism for change lies within oneself) as opposed to an external locus of control (ie, the belief that only the physician, medication, or medical procedures have the power for change).⁴⁶ Research has demonstrated that both poor self-efficacy and external locus of control predict poorer outcomes.⁴⁷ Cognitive therapy may also focus on changing "catastrophizing," a hopeless and overwhelming thinking pattern, which has been shown to predict poor outcome and reduced quality of life. Holroyd and colleagues⁴⁸ examined catastrophizing, comorbid anxiety, depression, quality of life, and headache characteristics among 232 migraine sufferers and found that catastrophizing and severity of associated symptoms (photophobia, phonophobia, nausea) independently predicted quality of life, demonstrating that it is not just headache severity and frequency that predict quality of life, but that patient perception is directly related to quality of life. Other targets of CBT include assertiveness training, increased coping and problem-solving skills, and cognitive restructuring.

CBT places a special emphasis on education, using headache diaries to aid in identification and avoidance of triggers and lifestyle modification. Migraineurs should be advised to maintain a regular and healthy lifestyle, especially during times when they are most vulnerable to an attack (eg, premenstrually). That includes maintaining

a regular sleep-wake schedule; a regular and healthy diet; engaging in regular exercise; avoiding excessive caffeine or alcohol consumption; stopping smoking; and engaging in regular practice of stress management, relaxation techniques, and self care.

PATIENT EDUCATION

Patient education is essential to effective headache management because the patient makes most of the therapeutic decisions on his or her own and outside of the HCP's office. The patient decides which attacks to treat, when to treat them, with what to treat them, to what extent to follow medical advice, 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; improvements in functional status and quality of life; reduced depression; and decreased service use (in terms of patient visits to both primary care providers and the emergency department).^{49–52} One trial of a brief patient education procedure focusing on the proper use of abortive headache medication demonstrated improved adherence and efficacy.⁵³

Education may be provided by physicians, nurses,⁵⁴ psychologists, or other team members, and may take the format of individual consultation, formal group classes, or patient self-guided learning. One such example is “ACHE,” an online forum sponsored by the American Headache Society that contains useful information prepared specifically for patients. Patients must be taught the importance of their behaviors and lifestyle choices in their headache management, which helps to build self-efficacy, promote an internal locus of control, and solidify the provider-patient collaborative relationship.

Some of the most important areas to include in patient education are discussed next. The first is a basic understanding of the pathology of migraine. A patient should be informed of the expected course of this chronic disease, which is characterized by episodic manifestations, and also be reassured that the pain of migraine and primary headaches is relatively benign (once other causes have been ruled out). Patients should be made aware of potential prodromal symptoms and triggers and asked to keep a headache diary to learn their personal prodromal symptoms and triggers. Patients should be taught how migraine medications need to be used (both acute and preventative) and the reasons for these guidelines including the importance of timing and other factors. Optimal timing and maximum use of abortive and analgesic medications need addressing. Studies with other medical disorders have shown that patients who understand the therapeutic mechanism of their prescription and how it fits into their treatment plan are twice as likely to fill the prescription.⁵⁵ Patients should be educated about the potential for medication-overuse headache, potential adverse effects of medications, and possible drug interactions. Because many patients also use over-the-counter and herbal treatments, their potential effects and interactions should also be discussed. Finally, patients can be reassured that there are many effective treatment options available and new possibilities on the horizon.

The degree to which information has been understood by the patient and whether the patient agrees with his or her treatment plan should be assessed by asking the patient for feedback and using communication strategies (discussed later). Rains and colleagues⁸ provided the following additional recommendations for effective education: (1) limit instructions to three or four major points during each discussion; (2) use simple, everyday language, especially when explaining diagnoses and treatment instructions (model or demonstrate, when possible); (3) supplement oral

instructions with written materials; (4) involve the patient's family members or significant others; (5) ask patients to restate recommendations back to you; and (6) repeat and reinforce the concepts that were discussed.

SUPPORT GROUPS

Social support, whether obtained through informal conversation in the doctor's waiting room, the Internet, or organized support groups, can be valuable to patients.^{56,57} Patients often appreciate talking with someone else who "truly understands" and having the opportunity to speak with others outside of their family and regular social circle about how headaches affect their lives. Many countries and states have national headache associations that sponsor support groups. These organizations can provide useful advice on how to cope with headache and put patients in contact with other headache sufferers in their area.

MIGRAINE AND PSYCHOLOGIC COMORBIDITIES, HEALTH-RELATED QUALITY OF LIFE, AND PRODUCTIVITY

Migraine is associated with an increase in comorbid psychiatric conditions, functional impairment across all aspects of life, and reduced health-related quality of life (HRQoL). Migraine sufferers have been demonstrated to experience increased rates of comorbidity for depression, anxiety, panic disorder, obsessive-compulsive disorder, and suicide attempts than controls.^{58,59} Migraine and depression are bidirectional and place those who experience one at a higher risk for the other.⁵⁸ Anxiety and depression are correlated with greater impairment in functional ability and HRQoL in migraineurs and lowered HRQoL is associated with increased migraine-related-disability.⁶⁰

In a cross-sectional analysis, the gender-adjusted odds ratios for migraineurs for these disorders ranged from 2.6 for phobia to 6.6 for panic disorder. In a longitudinal, follow-up study, researchers found that migraineurs were more likely to experience future depressive and anxiety disorders.⁵⁸ Similar results of increased comorbidity rates between migraine and certain psychiatric disorders were found in the 2002 Canadian Community Health Survey.⁵⁹ Major depressive disorder, bipolar disorder, panic disorder, and social phobia were more than twice as common in migraineurs as in controls. Health-related outcomes, such as HRQoL, restriction of activities, and mental health care use, were poorest in those subjects who had both migraine and a psychiatric disorder.

Screening, assessment, referral, and education about common psychiatric comorbidities should be included in routine headache care. Brief screening instruments can be used to assess depression and anxiety.⁶¹ The PHQ-2 is a two-item screening instrument that has been empirically shown to detect the presence of depression with two questions.⁶² The PHQ-9 can be used to conduct a more thorough depression assessment and assign a diagnosis based on *Diagnostic and Statistical Manual of Mental Disorders-IV* criteria.⁶³ Anxiety that is clinically significant can be evaluated using the Generalized Anxiety Disorder-7, a seven-item, self-administered questionnaire.⁶⁴ Once these 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, which may include a multidisciplinary and multimodal approach.⁴⁹ Questionnaires may also be used at every visit to track progress or changes over time.

Migraine also negatively impacts HRQoL and many aspects of sufferers' lives. Lip-ton and colleagues⁶⁵ examined HRQoL between 200 migraineurs and 200 controls in

a population-based, case-control study in England and found that migraineurs scored significantly lower (ie, worse) in eight of the nine HRQoL domains and the two summary scores of the SF-36. They also found that migraine-related disability was inversely correlated with HRQoL. Dueland and colleagues⁶⁶ used a telephone survey to study the impact of migraine on work, family, and leisure activities among 1810 women aged 18 to 35 years living in Israel and eight European countries. Most respondents reported an inability to function fully at work or school during the prior 6 months because of migraine (74%); one or more instances of being unable to spend time with family or friends because of migraine (62%); and one or more instances of being unable to enjoy recreational or leisure activities because of migraine (67%).

Migraine can place a significant burden on sufferers' lives, both during attacks and also interictally. Buse and colleagues⁶⁷ found that migraine sufferers with high levels of interictal-headache-related burden experienced higher rates of psychologic disorders than those with lower levels of interictal burden. Of those respondents who experienced "severe" levels of interictal burden, 44% met criteria for an anxiety disorder, 47% for panic disorder, and 46% for a depressive disorder, compared with 20%, 23%, and 25%, respectively, of those individuals who had headaches with low or no interictal disability, and 3% (anxiety), 2% (panic), and 7% of women and 3% of men (depression) in the general population. Moderate negative correlations were noted between the level of interictal burden and HRQoL and moderate positive correlations were noted between interictal burden and measures of workplace productivity.

In addition to completing a thorough medical and headache history, the practitioner also needs to obtain a thorough qualitative understanding of the patient's experience and beliefs, headache-related disability and impairment in all areas of life, quality of life, level of self-efficacy, and information about related comorbidities. When information is gathered about headache-related disability, this leads to a more accurate recognition of the severity of the effect of migraine on the patient's life, which in turn tends to result in treatment plans that are more aggressive and comprehensive.⁶⁸

RISK FACTORS FOR PROGRESSION

Biobehavioral techniques can be used to reduce the risk of progression of migraine from episodic to chronic or transformed migraine. Migraine can be conceptualized as a chronic disorder with episodic manifestations.⁶⁹ Patients with migraine may spontaneously remit for unknown reasons, they may continue to have intermittent attacks for many decades, or they may develop a clinically progressive disorder characterized by attacks of increasing frequency at times leading to headaches on more days than not. As defined by the second edition of the International Classification of Headache Disorders,⁷⁰ chronic migraine is a diagnosis given for 15 or more headache days per month over the past 3 months, of which at least 8 headache days per month meet criteria for migraine without aura or respond to migraine-specific treatment.

Recent research has identified risk factors for progression,⁷¹ of which some are nonremediable (gender, age, race) and some can be modified including frequency of migraine attacks, obesity, acute medication overuse, caffeine overuse, stressful life events, depression, and sleep disorders. These modifiable risk factors are important targets for behavioral intervention.

COMPLIANCE AND ADHERENCE

Compliance refers to the degree to which patients follow medical recommendations of their HCPs.^{7,72} Adherence refers to an active and collaborative involvement by the patient in the implementation of a therapeutic regimen. These terms are often used

interchangeably. The term “adherence” is used here to emphasize the importance of the patient’s participation in effective treatment. Nonadherence can pose a significant barrier to effective headache management in many ways. Common adherence problem areas in headache treatment include misuse of medication (including unfilled, overused, underused, incorrectly used, and nonadvised discontinuation of prescribed medications or treatments); appointment keeping; record keeping (diaries); and unwillingness or inability to follow clinical suggestions. Improper medication use may not only limit relief but may also aggravate the primary headache condition (eg, lead to medication overuse or rebound headache).⁷

Adherence declines with more frequent and complex dosing regimens,⁷³ increased side effects,⁷⁴ and increased costs,⁷⁵ and is worse in chronic conditions compared with acute conditions.⁷⁶ Most of these conditions apply to headache care. In addition, rates of adherence with behavioral recommendations, such as dietary modifications, weight loss, exercise, smoking cessation, and treatment for alcohol or substance use (some of the primary components of behavioral headache management), are even lower than rates of adherence with prescribed medication regimens.⁷⁴ Further, socio-demographic factors play a role in predicting adherence, but even more important is a patient’s perceived level of self-efficacy.

One study of 1160 severe headache sufferers found that 11% chose not to fill a prescription for headache medication and 71% had delayed or avoided taking a prescription medication for headache.⁷⁷ Commonly cited reasons for not filling a prescription were high cost (33%) and concerns about tolerability and side effects (30%). Several studies have also reported problems with appointment keeping, with approximately 40% of patients not keeping follow-up appointments after the initial consultation and 24% not keeping subsequent appointments.^{78,79} The reasons for not keeping appointments included administrative issues, dissatisfaction with clinician and clinical care, change in headache or medical status, and problems associated with the treatment regimen.

ENHANCING ADHERENCE AND MOTIVATION

Bandura⁸⁰ developed social learning theory to help explain human behavior and change. The theory posits that two components predict and mediate behavior: self-efficacy, or confidence in one’s ability to perform an action; and outcome efficacy, or the belief that a behavior or set of behaviors will have a desirable result.⁴⁵ Several other models have been developed to explain and influence health-related behaviors.^{81,82} In general they share the hypothesis that health-related behavior change and motivation are based on three basic components: (1) the patient’s readiness for change, (2) self-efficacy, and (3) outcome efficacy.⁸³ Following this line of reasoning, skills or knowledge alone are not sufficient to ensure behavior change. Rather, the patient must want to change, believe that he or she can change, and believe that the necessary actions will accomplish the desired goals.

To operationalize these concepts, Miller and colleagues^{83,84} developed the technique of Motivational Interviewing (MI) to assess and enhance patients’ motivation for change. MI was based upon Prochaska’s transtheoretical model which was originally developed for the treatment of substance abuse.⁸⁵ The transtheoretical model proposes that patients’ readiness and motivation for change can be categorized into one of five stages: (1) precontemplation (the patient is not thinking about changing behavior and does not recognize the need or a problem); (2) contemplation (the patient recognizes a need or problem and begins to think about changing behavior and may be developing a plan, but has not taken any action); (3) preparation (the patient has done

research, developed a plan, and may begin making minor changes or actions); (4) action (the patient is actively engaged in the behavior change or new actions); and (5) maintenance (the patient is continuing behaviors necessary to maintain changes). When the patient reaches the maintenance stage, behaviors and actions may be performed habitually and automatically. Relapse may occur at any point in the process, and should be considered a challenge from which the patient needs to return to the steps of a previous stage and move through the sequence again. Relapse is not considered a failure or a permanent state, and it is understood that patients may move forward and backward or even jump from one stage to another over time. Indeed, the model prefers the term “lapse” when referring to slips as opposed to “relapse.”

HCPs should consider a patient’s stage of readiness for change and tailor their interventions, clinical advice, and education accordingly. For example, in the case of weight loss or smoking cessation, a patient in the precontemplation stage should be educated about the general health risks and negative consequences on the patient’s headache condition. A patient in an action stage of readiness already knows and believes the consequences and benefits from concrete advice and solutions (eg, a prescription for a nicotine patch or referral to a weight loss and exercise program).

Motivational interviewing focuses on the patient’s stage of readiness and explores the patients’ beliefs, concerns, perspective, and ambivalence about behavior change. The goal of the HCP is to help the patient realize the importance of change while maintaining an empathic, supportive, and nonjudgmental approach. Motivation for change is increased when patients examine the pros and cons of change and make decisions themselves rather than being passive recipients of instructions from their HCPs. HCPs can encourage patients to explore their ambivalence toward changing the identified behavior. According to behavior theory,⁸⁶ humans perform behaviors for which they are rewarded; to facilitate change the existing reward must be identified and recognized and then replaced with a more appropriate reward. Identifying conflicting rewards helps give the patient and the health care provider a better understanding of the challenges that must be met to identify effective solutions. Rains and colleagues⁷ recommend several behavioral strategies to enhance patient adherence and maximize efficacy of treatment in headache care based on a review of the adherence literature (**Box 1**).

COMMUNICATION

Effective communication is essential for effective medical care. Communication between HCPs and patients is the basis of the therapeutic relationship, and is directly related to patient satisfaction,^{87–90} medication adherence and treatment adherence,⁹¹ and medical outcomes.^{92,93} Improved communication also decreases the risk of malpractice,⁹⁴ HCP burnout, and HCP work-related stress.⁹⁵ Effective communication is especially important in managing headache disorders, a condition where diagnosis is based almost entirely on a patient’s report of symptoms and degree of impairment, and where treatment success is largely dependent on a patient’s level of adherence to medication and behavioral recommendations.^{96,97} The degree to which communication is successful depends, in large part, on the communication strategies and interpersonal skills of the HCP. Models of effective communication emphasize the importance of both the physical and psychologic well-being of the patient, involve and empower the patient in decision making, and place attention and value on the relationship and interactions between the HCP and patient. These models incorporate the elements of effective communication to convey a sense of partnership and caring toward the patient.

Box 1**Empirically based compliance-enhancing strategies***I. Administrative*

- Scheduling regular contacts of sufficient duration for complete assessment and rapport-building
- Recalling missed appointments
- Clinic orientation
- Verbal and written recommendations
- Screen for psychiatric comorbidities
- Assess and track compliance (multimodal assessment preferred, such as interview, patient monitoring, pill counts, pharmacy records)
- Encourage participation of key significant others
- Assess and treat psychiatric comorbidities (eg, depression, anxiety)

II. Psychoeducational

- Patient education by provider, staff, computer (prophylactic versus acute, abortive, overuse consequences)
- Printed materials for increased retention
- Involve patient in treatment planning (elicit discussion of barriers [eg, cost, side effects])
- Education on adherence and health behavior change

III. Behavioral

- Simplify regimen
- Self-monitor compliance
- Stimulus control (medication reminder systems, cue-dose training)
- Medication contracts
- Enhance self-efficacy
- Reinforcement for successful adherence

IV. Social support

- Provider communication and rapport skills (conducive environment, active listening, empathy, adjust language, nonverbal behavior, cultural sensitivity)
- Collaborative therapeutic alliance (negotiated rather than dictated plan)
- Spouse and family support

From Rains JC, Lipchik GL, Penzien DB. Behavioral facilitation of medical treatment for headache – Part I: Review of headache treatment compliance. Headache 2006;46:1387–94; with permission.

The American Migraine Communication Studies I and II (AMCS) evaluated HCP-patient communication in headache care and tested a simple educational intervention. The AMCS-I⁹⁸ was an observational study of actual discussions and diagnoses of migraine in clinical practice. Analyses of patient visits in AMCS-I revealed several key problematic issues. The average migraine discussion lasted 12 minutes, during which HCPs asked an average of 13 questions, of which 91% 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 infrequent. Researchers interviewed the health care professionals and their patients immediately following the visit to assess understanding and found high levels of disagreement on migraine frequency and impairment. Fifty-five percent of health care professional and patient pairs did not report matching information regarding frequency, and 51% did not agree on impairment. Researchers noted that asking about migraine attacks versus migraine days led HCPs to underestimate the number of headache days per month and relying almost exclusively on closed-ended questions limited patients to “yes or no” responses or short answers, which impaired their ability to communicate the effect of migraine on their lives.

In response to these findings, researchers developed and tested a brief educational intervention designed to address the identified problem areas. In the AMCS-II,⁹⁹ 15 HCPs 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 two communication strategies: the patient-centered “ask-tell-ask” strategy to assess headache frequency and the use of open-ended questions to assess migraine-related impairment.^{31,96,100–102} The “ask-tell-ask” strategy is based on the theory that effective education requires assessing what the patient already knows and believes, then building on (or correcting when necessary) that understanding. The “ask-tell-ask” strategy can be used for any medical communication, but in this study it was used primarily to ensure optimal communication about migraine frequency in headache days. This strategy is based on three simple steps. (1) Step 1: “ask” the patient to explain or restate the issue, problem, or treatment in his or her own words. This step, which allows the HCP to assess the patient’s personal beliefs, emotional responses, and understanding of the situation, helps guide the HCP in furthering effective communication. (2) Step 2: “tell” the patient the relevant facts, diagnosis, or treatment plan, using language at a level that he or she understands. This provides opportunities to correct any misunderstanding or incorrect information communicated by the patient in response to the first question and to reinforce and validate the correct information that the patient shared. (3) Step 3: again “ask” the patient to rephrase the information given in Step 2 (“tell”) in his or her own words. This allows the HCP to reassess the patient’s level of understanding and gives the patient an opportunity to ask questions and express concerns (for more detailed information and a vignette using this strategy, see).¹⁰³

Such strategies as the use of open-ended questions, the “ask-tell-ask” technique, active listening, and “being fully present” with the patient can significantly improve the quality of the medical relationship, with positive and more satisfying outcomes for both patient and health care provider. Use of the “ask-tell-ask” strategy led to a more accurate picture of the patients’ migraine frequency and impairment during and between attacks, more frequent discussion and prescription of preventive therapy, greater satisfaction with office visits on the part of the health care professionals and their patients, and more frequent discussion and prescription of appropriate migraine therapies. Although 79% of HCP participants expressed a concern that using the “ask-tell-ask” strategy would significantly increase the length of the interview, the average visit length was actually 90 seconds shorter than visits without the intervention (AMCS-I).

SUMMARY

Behavioral medicine is based on the biopsychosocial model, which points out that biologic, psychologic, and social or environmental factors all play a significant role

in human functioning. This is especially evident in the care of patients with primary headache disorders, where factors of biology, environment, behaviors, and beliefs are interwoven with the development, maintenance, progression, and remission of headache disorders. The application of behavioral medicine to the management of migraine calls for increased reliance on evidence-based nonpharmacologic treatments, which can be broadly divided into the categories of behavioral treatments (CBT and biobehavioral training [biofeedback, relaxation training, and stress management]), physical therapies, and education including and lifestyle modification, techniques that have demonstrated clinical efficacy when practiced correctly. They may be used individually or in conjunction with pharmacologic and other interventions and may augment the effectiveness of other treatments, or minimize the need for their use. A combination of pharmacologic and nonpharmacologic approaches has been demonstrated to be superior to either approach on its own, to help maintain positive outcomes and to improve treatment adherence.

Biobehavioral tools should be used prophylactically and practiced on a regular basis to maintain homeostasis and manage stress so that the patient does not trigger a headache attack in the first place. Patients should be educated about times and situations in which they may be most vulnerable to an attack. During this time period they need to be especially aware of potential triggers and need to avoid stress, engage in relaxing and nurturing activities, and maintain a very regular and healthy lifestyle. Some patients have the benefit of fairly predictable migraine attacks. For these patients, particular triggers, time periods, and prodromal symptoms provide windows of opportunity in which to use behavioral tools as a way to stop or slow the process of migraine early, even before headache onset. It is important for patients to use a diary to note associations. Some triggers cannot be changed or avoided, such as the menstrual cycle, in which case patients should be aware of their vulnerability to headache during this time and protect themselves by following a very healthy lifestyle. By doing so they may reduce the number of headache attacks, although it is unlikely that they will disappear altogether. Patients also may be able to modify or eliminate other triggers.

Patients can be taught ways to modify thoughts, feelings, and behavior with CBT. CBT interventions aid in headache management by making patients more aware of triggers including the relationship between stress and headache, and by identifying and challenging counterproductive or self-defeating beliefs and ideas. They can be taught to manage the physiologic effects of stress with biofeedback and relaxation training.

Stress, depression, anxiety, and other psychologic and emotional factors are all related to migraine and many psychologic conditions have elevated rates of comorbidity with migraine. Patients should be routinely assessed and appropriately treated or referred for psychologic comorbidities. Improvements in psychologic comorbidities may translate into improvements in headache status, and vice versa.

Effective communication is essential for effective medical care. Communication between HCPs and patients is the basis of the therapeutic relationship, and can help or hinder medication and treatment adherence, outcomes, and both patient and provider satisfaction. Strategies for enhancing communication include active listening, such as the “ask-tell-ask” model; demonstration of empathy; and attention given to headache-related impairment, mood, and quality of life.

Some behavioral techniques can be incorporated by HCPs during an appointment (eg, communication strategies, education, diaphragmatic breathing, and guided imagery); some can be self-taught and practiced by the patient (eg, relaxation practice and stress management); and some require a referral to an appropriately trained professional (eg, biofeedback training, CBT). HCPs can use these

strategies with their patients on a daily basis, whether by helping a patient gain a more realistic understanding of their illness; helping a patient recognize the effort and contribution that they themselves must make in their treatment (ie, enhancing self-efficacy and encouraging an internal locus of control); or instructing a patient to maintain a headache diary to facilitate assessment and treatment planning. The patient should be encouraged to adopt an internal locus of control and consider his or her treatment a collaborative process. The strategies reviewed in this article can help build feelings of self-efficacy and encourage patients actively to participate in the management of their migraines.

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