

A MULTIDISCIPLINARY APPROACH TO ARM ILLNESS

ANA-MARIA VRANCEANU, PhD, MEIJUAN ZHAO, MD, LESLIE MORSE, DO, DAVID RING, MD PhD
MASSACHUSETTS GENERAL HOSPITAL

Systematic approaches to treating pain usually align with how pain is conceptualized. Over the past decades conceptualizations followed the biomedical model, and were thus based on the postulation that there is an identifiable physical basis for the pain, which once identified, can be eliminated or blocked by medical or surgical interventions. Pain in the absence of an identifiable physical basis was often labeled in this approach as “psychological” or “psychogenic”. This approach to understanding pain conditions has thus been characterized by a mind-body dichotomy, whereby pain conditions were classified as either physical or psychological.

Recently this dichotomous view of pain has been increasingly challenged as inadequate and incomplete. There has been a transition toward a biopsychosocial model of pain, which specifies an interrelation between physical and psychosocial factors in the etiology and maintenance of pain conditions, with an understanding that the relative importance of these factors vary across time and individuals. The biopsychosocial model also emphasizes evaluation of physical and psychosocial factors, and understanding of the role cultural, social, and familial factors may play in determining illness behavior with respect to pain.

The need to evaluate and address the psychosocial and behavioral aspects of illness in conjunction with physical factors in order to ensure treatment success has led to the development of multidisciplinary treatment teams. A large body of research underscores the pivotal role of behavioral medicine providers in these multidisciplinary treatment teams, in terms of both clinical effectiveness and cost-effectiveness of psychological treatments in combination with traditional methods. (1-3) In response to this body of research, government organi-

zations in the United States and abroad, private medical associations such as the Joint Commission on the Accreditation of Health Care (JCAHO) and the Commission on the Accreditation of Rehabilitation Facilities (CARF), and professional organizations (American Pain Society, American Academy of Neurology) have recognized the complexity of pain, and the need to integrate biopsychosocial factors when evaluating and treating pain conditions.

Multidisciplinary Pain Centers have been utilized primarily in the treatment of the most common idiopathic pain conditions, back pain and headache. In spite of the prevalence of other types of musculoskeletal pain that is either poorly understood or incompletely treatable, along with strong scientific support for a biopsychosocial approach, orthopaedic surgical practices have been slow to implement multidisciplinary teams, continuing to operate under the biomedical model of illness risks neglecting prominent and treatable psychosocial factors.

In this review, we describe the development of a multidisciplinary approach to arm illness at the Orthopaedic Hand and Upper Extremity Services at The Massachusetts General Hospital, with emphasis on the data that we and others have generated to encourage transition from a biomedical to a biopsychosocial approach. While relatively novel in the treatment of arm illness, these strategies have been used successfully for a variety of other nonspecific pain conditions, including headaches (4), back pain (5,6), irritable bowel syndrome (7-9), and fibromyalgia (10,11), as well as for more discrete pain conditions including cancer pain. (12)

Why a Multidisciplinary Hand and Arm Treatment Approach? Evidence from our Research Program

Interest in pursuing a biopsychosocial and multidisciplinary approach was a natural consequence of the substantial discrepancies between illness and disease and between disability and impairment that the health provider encounters, particularly in a modern medical practice in a resource rich setting. Add to this the shortcomings of medical knowledge, and current diagnostic and management techniques, and a healthy respect for the placebo/meaning effect and other explanations for improved well-being that occur in spite of, and not because of our treatments, and the biopsychosocial model seems appropriate.

The research program on psychosocial aspects of arm illness followed a logical, sequential approach, mirroring already established research on other pain conditions including back pain. One of our early studies identified that pain is the strongest predictor of measures of elbow functioning and health

Ana-Maria Vranceanu, PhD; Behavioral Medicine Specialist
Meijuan Zhao, MD; Instructor in Physical Medicine and Rehabilitation
Leslie Morse, DO; Instructor in Physical Medicine and Rehabilitation
David C. Ring, MD PhD; Assistant Professor of Orthopaedic Surgery

Address Correspondence to:

Department of Orthopedic Surgery
Massachusetts General Hospital
55 Fruit Street, Yawkey 2
Boston, MA 02115

status. (13) Our more recent study replicated these findings for wrist pain (14). This means that in many cases when orthopedic surgeons ascribe disability to objective physical dysfunction, they may actually be observing the effects of psychosocial dysfunction. As a group, orthopaedic surgeons intuitively ascribe greater complaints and disability to worse pathology and impairment, but these relationships are much more complex than we would prefer.

Another of our studies established that trapeziometacarpal arthritis is a common, degenerative condition with an age-related prevalence approaching 100% as people live into their 80's and 90's. (15) This would suggest that among the multitude of people that have a given musculoskeletal disease such as trapeziometacarpal arthrosis, it is likely that only a fraction ever present to the doctor for advice about their malady, and an even smaller percentage ever request operative treatment. When a disease is as prevalent as arthritis, it seems safe to assume that the vast majority of humans address it with adaptation and resiliency and are able preserve their sense of well being on their own.

The large variability in reports of perceived hand and arm disability in patients with similar organic pathology begged the exploration of potential explanatory factors. We studied 5 common arm illnesses with limited variation in impairments, and found that depression explained a large proportion of the variance in self-reported disability (16).

Subsequent research concerned a large percentage of pain patients who present to orthopedics surgical practice with pain conditions that are vague, diffuse, with minimal or no organic pathology and complaints of pain over and above what is expected. Such conditions can be referred to as nonspecific, medically unexplained, or idiopathic. (17) Most headaches and backaches are also nonspecific or idiopathic, and more nuisance than danger—the term “arm ache” seems appropriate for many nonspecific arm pains. Most anatomical areas and medical specialties have a nonspecific, poorly understood diagnosis. Examples include atypical chest pain, irritable bowel syndrome, chronic pelvic pain, and fibromyalgia. (18) These idiopathic conditions represent a dilemma for physicians, and particularly for surgeons, because there is little or no objective pathology to work with. Such conditions are also particularly frustrating for patients, who tend to feel that their pain is not being taken seriously.

We reviewed a large consecutive series of patients presenting to one of three surgeons within the MGH Orthopedic Hand and Upper Extremity Service that had completed the Disability of Hand and Upper Extremity Questionnaire (DASH). Patients with nonspecific diagnoses were compared to patients with a discrete pain condition. Idiopathic arm pain was associated with disability comparable to discrete arm problems including fractures. Further, there was no correlation between objective signs of disease and subjective perception of disability, which is consistent with prior work in the back pain literature. This study confirmed that, just as is the case in other pain conditions (e.g., back pain), it is common for patients to present with

complaints of severe arm pain and disability in the absence of associated pathology or impairment.

A subsequent study evaluated potential psychological correlates of idiopathic arm pain. We prospectively compared patients with idiopathic and discrete pain on a variety of measures of psychological dysfunction. (19) Results showed that patients with idiopathic pain reported more severe pain both at rest and with movement, when compared to discrete pain patients. Further, with respect to psychological dysfunction, patients with idiopathic arm pain were found to have higher levels of cognitive anxiety, greater helplessness, pain magnification and overall catastrophic coping mechanisms when compared to patients with discrete pain. This catastrophic coping mechanism was found to be the most important predictor of idiopathic (versus discrete) pain complaints. These results have important implications for treatment strongly supporting the need to address psychosocial factors, ineffective coping mechanisms in particular, in patients with idiopathic arm pain.

Patients with nonspecific or idiopathic arm pain can be difficult to reassure, and resistant to suggestions that their problem may be as responsive or more responsive to changes in perception, as to changes in structure. This observation led to research on health anxiety and idiopathic arm pain. We found that health anxiety (similar to hypochondriasis or heightened illness concern) was a strong predictor of idiopathic compared to discrete arm pains. A related study (20) using a comprehensive structural equation model, found that somatic symptoms mediated the relationship between health concerns and pain type (idiopathic versus discrete) and health concerns and pain disability. This study showed that a model of health anxiety currently employed in the treatment of hypochondriasis, can be applied to hand and arm pain patients to help explain the development of disability.

In addition to heightened illness concern and ineffective coping skills, we found that psychiatric illness is more common in patients with idiopathic hand and arm pain, and predicts disability. Specifically, we found that diagnoses of depression, anxiety and somatoform disorder predicted disability when entered alone in the regression equation; these variables also predicted idiopathic (versus discrete) arm pain. (21) Somatoform disorder was the sole predictor of both disability and pain type when all diagnoses were entered in the regression equation, suggesting that idiopathic arm pain may be a form of somatoform disorder.

A key determinant of how people cope with stress and pain is the content of thoughts. (22) Depression and ineffective behavioral coping are triggered and maintained by how people appraise a particular situation (positive/adaptive versus negative/maladaptive). This contention led to the development of a valid, reliable, short and user-friendly measure of thoughts about pain and medical treatment in orthopedics practices, The Negative Pain Thoughts Questionnaire (NPTQ; 23). This measure was found, as expected, to be a significant predictor of perceived disability, and is now currently used in clinical care in our practice.

This body of research clearly supports the importance of assessing and testing psychological factors and coping in hand and arm patients. The cumulative findings from the research on psychosocial aspects of hand and arm pain showed that hand and arm pain is no different than back pain, in that psychosocial factors are as important or more important than objective pathology in reports of pain intensity and disability. Across all arm pain types our research identified that pain catastrophizing, negative thoughts about pain and medical treatments, heightened illness concerns and depression are the most salient predictors of pain intensity and disability. This finding is concordant with research on back pain (24, 25), arthritis (26), fibromyalgia (18, 27), and irritable bowel syndrome (28), to name just a few.

Practical and Scientific Application of the Multidisciplinary Approach

Given that psychological factors account for a large proportion of the variance in arm-specific disability and pain intensity, it seems logical to incorporate established, scientifically efficacious techniques such as Cognitive Behavioral Therapy (CBT) into the treatment of arm illness in an attempt to decrease pain intensity and disability. In other words, we would like to establish that CBT as part of a multidisciplinary arm pain program can be as effective in treating arm illnesses as it has been in the treatment of other specific and nonspecific pain conditions. (4, 29) With help from several grants and agencies, including Unrestricted Industry Grants, the MGH Orthopedic Department's Academic Enrichment Fund (AEF), and American Foundation for Hand Surgery (AFSH), we have taken up this challenge. Our ultimate goal is the execution of clinical trials to determine if CBT delivered along with standard medical care is more efficacious than standard medical care alone, for both discrete and idiopathic hand and arm pain conditions.

Cognitive Behavioral Therapy is a well-researched, scientific treatment approach that specifies how thoughts (beliefs, attitudes), behaviors, feelings and sensations are interrelated. As identified through research, in many cases pain triggers negative thoughts such as catastrophizing (rumination, magnification, helplessness), heightened illness concern (intense worry about pain and health, that is resistant to reassurance), fear avoidance (avoidance of activities that cause pain for fear of reinjury or causing more damage), and affective reactions that include frustration, irritability, anger, depression and anxiety. These interactions can become self-maintaining such that distress and disability, as well as physiological arousal may continue in spite of absence of original sensory input; patients thus can transition into chronic pain syndromes. (30, 31) A key element in CBT treatments is identifying patient's thoughts when experiencing the pain sensation. As depicted above, these thoughts are nonadaptive and associated with behavioral avoidance and emotional distress. Identifying specific negative automatic thoughts about pain and medical treatments appears thus as a crux of successful CBT for pain.

Vranceanu, Ring, Kulich, Zhao & Safren (32), showed that 10 sessions of Cognitive Behavioral Therapy delivered as part of a Multidisciplinary Program produced a significant reduction in pain intensity, disability, and important coping factors such as catastrophizing and pain anxiety, and increase in pain acceptance and willingness to engage in activity in spite of pain. We are currently funded to conduct a preliminary pilot study of the feasibility of a manualized, short term (4 sessions) Cognitive Behavioral Therapy for idiopathic arm pain conditions. This has shown preliminary success evidenced by reduction in perceived disability and pain intensity and will serve as a prerequisite for a subsequent randomized controlled trial.

In addition, we are currently testing a manualized, short term CBT intervention for trapeziometacarpal arthritis by comparing it with standard treatment alone. This intervention will be delivered by a multidisciplinary team along with standard medical treatment. We hypothesize that an approach that optimizes mood, positive illness concepts, and effective coping skills will do as much or more to enhance ability (decrease disability) as medical and surgical treatments. If found effective, we intend to adapt and subsequently test this CBT intervention for other hand and arm pain conditions. Our hope is that these cost effective, short term CBT interventions will be incorporated within routine care in orthopedic practices, to improve patient care, alleviate suffering, and decreased health care costs.

This approach is likely to benefit even those patients who elect or require surgery. Indeed, preliminary data from a recent prospective study (33) found that presurgery depression was a strong predictor of both pre and post-operative perceived disability; and that presurgery pain catastrophizing was a strong predictor of post surgery pain intensity ratings. This suggests that many "failed surgeries" or "difficult recoveries" may be due to untreated depression and ineffective coping skills. It is our opinion that, particularly among hand surgeons, many of these patients are mislabeled as having chronic regional pain syndrome or reflex sympathetic dystrophy. Identification and treatment of these factors prior to elective surgical intervention seems likely to improve health, ability, and outcomes.

Our research program is not only concerned with psychosocial factors and pain and their role in bettering patient care. Numerous ongoing studies comparatively address several types of surgical interventions or palliative methods of treatment, so that recommendations to patients are informed by scientific, rather than purely clinical, outdated or intuitive methods. For instance, one ongoing study (34) is building upon retrospective data showing that surgeon confidence and puzzling patient presentations correlate with electrophysiological abnormalities consistent with carpal tunnel syndrome on electrodiagnostic testing. We will now look prospectively at predictors of negative electrodiagnostic testing, as well as changes in electrodiagnostics greater than 1 year after carpal tunnel release.

How is the Multidisciplinary Team operating? Our clinical approach to treating hand and arm pain.

Our team comprises one surgeon (David Ring, MD PhD),

2 physiatrists (Meijuan Zhao, MD and Leslie Morse, DO), a Behavioral Medicine Specialist (Ana-Maria Vranceanu, PhD), and MGH's large staff of Certified Hand Therapists. Problems that are chronic or uncommonly and unlikely to be surgical are best evaluated by the non-surgical team members first. We are devoted to using the least invasive and most cost-effective methods of treatment and to avoiding unnecessary surgery. The majority of patients who are scheduled for nonsurgical management also meet with Dr. Vranceanu for an initial evaluation of pain coping and mood. These simultaneous appointments not only save the patient time and effort, they facilitate introduction of the cognitive/behavioral aspects of illness and treatment, which in our current culture are often off-putting or even offensive.

After this initial evaluation the physiatrist and behavioral medicine specialist briefly communicate about patient diagnosis, treatment plan, and schedule future visits. When good surgical targets are identified, Dr. Ring gets involved. Many patients benefit from certified hand therapy for increased comfort and function. When patients have clinical depression or anxiety or they have ineffective coping skills, negative illness misconceptions, or heightened illness concerns, Dr. Vranceanu

schedules regular visits for Cognitive Behavioral Therapy.

There are many advantages to delivering CBT in an orthopedic practice. First, addressing psychosocial factors and providing educational information early on in the experience of pain may prevent transition toward chronic pain syndromes, while improving quality of life while the pain condition takes its course. Many orthopedic pain conditions have a normal recovery course that ebbs and flows over the course of a year or more, and it is important that patients are aware of this course and learn how to cope with the pain so that they maintain quality of life and conditioning, and do not develop complications such as stiffness or depression and anxiety. Second, CBT is delivered along with medical treatments, and appointments are scheduled at the same time, when possible, which saves patient resources and time, and also allows communication and planning on the part of the providers. Patients also feel "cared for" and do not feel that their physical complaints are being ignored. Third, in many cases patients with clinical depression or anxiety, who are in need of psychological interventions often neglect to follow up with referrals to psychiatric departments, or face long wait times. Lastly, CBT delivered in orthopedics department can improve efficacy of medical and surgical interventions.

References

- Jensen MP, Romano, JM, Turner JA, Good AB, Wald LH. Patient beliefs predict patient functioning: Further support for a cognitive-behavioral model of pain. *Pain*. 1999; 81: 95-104.
- Turner JA, Clancy S. Strategies for coping with low back pain: Relationship to pain and disability. *Pain*. 1986; 24: 355-63.
- Turner JA, Clancy S. Comparison of operant behavioral and cognitive behavioral group treatment for chronic back pain. *J Cons Clin Psychology*. 1988; 56: 261-66.
- Lipchik GL, Holroyd KA, Nash JM. Cognitive Behavioral Management of Recurrent Headache Disorders: A minimal therapist-contact approach. In *Psychological Approaches to Pain Management. A Practitioner's Handbook*. Second Edition. Turk & Gatchell, eds. 2002
- Flor H, Fydrich T, Turk D. Efficacy of multidisciplinary pain treatment centers: A meta-analytic review. *Pain*. 1992; 49: 221-30.
- Hoffman B M, Papas RK, Chatkoff DK, Kerns RD. Meta-analysis of psychological interventions for chronic low back pain. *Health Psych*.
- Droosman DA. Diagnosing and treating patients with refractory functional gastrointestinal disorders. *Annals of Int Med*. 1995; 123: 688-697.
- Blanchard EN. Irritable bowel syndrome. Psychosocial aspects and treatment. Washington, DC: American Psychological Association, 2001.
- Mayou M. Treating Patients with Noncardiac Chest Pain and Functional Gastrointestinal Pain Syndromes. In *Psychological Approaches to Pain Management. A Practitioner's Handbook*. Second Edition. Turk & Gatchell, eds. 2002
- Bennett R. Multidisciplinary Group Programs to treat fibromyalgia patients. *Rheumatic Disease Clinics of North America*. 2001; 22: 351-67
- Turk DC, Sherman JJ. Treatment of patients with fibromyalgia syndrome. In *Psychological Approaches to Pain Management. A Practitioner's Handbook*. Second Edition. Turk & Gatchell, eds. 2002
- Crichton P, Moorey S. In *Psychological Approaches to Pain Management. A Practitioner's Handbook*. Second Edition. Turk & Gatchell, eds., 2002
- Doornberg JN, Ring D, Malhotra L, Zurakovski D, Jupiter JB. Pain dominates measurements of elbow functioning and health status. *J Bone Joint Surg Am*. 2005; 87:1725-31
- Souer JS, Lozano-Calderon SA, Ring D. Predictors of wrist function and health status after operative treatment of fractures of the distal radius. *J Hand Surg*. 2008; 33:157e1-e8.
- Sodha S, Ring D, Zurakovski D, Jupiter JB. The prevalence of osteoarthritis of the trapeziometacarpal joint. *J Bone Joint Surg Am*. 2005; 87:2614-18
- Ring D., Kadzielski J, Fabian L, Zurakovski D, Malhotra L, Jupiter. Self reported upper extremity status correlates with depression. *J Bone Joint Surg*. 2006; 88: 1983-88.
- Ring D, Guss D, Malhotra L, Jupiter JB. Idiopathic arm pain. *J Bone Joint Surg* 2004; 86:1387-1391.
- Barsky AJ, Borus JE. Functional somatic syndromes. *Annals of Internal Med*. 1999; 130: 910-20
- Ring D, Kadzielski J, Malhotra L, Lee SG, Jupiter JB. Psychological factors in idiopathic arm pain. *J Bone Joint Surg Am*. 2005; 87:374-80
- Vranceanu, Safren, Cowan & Ring, 2008a. Health concerns and somatic symptoms explain perceived disability and idiopathic hand and arm pain in an orthopedics surgical practice: A path analysis model. *J Behav Med*. 2008a. Manuscript accepted upon revisions.
- Vranceanu, Safren, Cowan & Ring, 2008b. Psychiatric illness predicts disability and idiopathic arm pain. *CORR*. 2008b. Manuscript submitted.
- Turk DC, Gatchel R. *Psychological Approaches to Pain Management. A practitioner's Handbook*. Second edition, The Guilford Press, 560pgs.
- Vranceanu, Safren, & Ring, 2008c. The Negative Pain Thoughts Questionnaire (NPTQ). Development and initial validation. *Pain Practice*. 2008c. Manuscript submitted.
- Boer N, Linto SJ. Fear-avoidance beliefs and catastrophizing: occurrence and risk factors in back pain and ADL in the general population. *Pain* 2002; 99: 485-91
- Hadjistavropoulos HD, Hadjistavropoulos T. The relevance of health anxiety to chronic pain: Research Findings and recommendations for assessment and treatment. *Current Pain and Headache Reports* 2003; 7: 98-104.
- Keefe FJ, Caldwell DS, Williams DA, Gil KM. Pain coping skills training in the management of osteoarthritic knee pain: A comparative study. *Behavior Therapy*. 1990; 21: 49-62.
- Walker EA, Keegan D, Gardner G, Sullivan M, Katon WJ, Bernstein D. Psychosocial factors in fibromyalgia compared with rheumatoid arthritis: Psychiatric diagnoses and functional disability. *Psychosom Med*. 1997; 59: 565-571.
- Lydiard RB. Irritable bowel syndrome, depression and anxiety; What are the links? *J of Clin Psychiatry*. 2001; 62: 38-45.
- Turk DC, Okifuji A, Sinclair JD, Starz TW. Interdisciplinary treatment for fibromyalgia: Clinical and statistical significance. *Arthritis Care and Research*. 1988; 11:186-95.
- Singh M K, Patel J, Galagher RM. Chronic Pain Syndrome. *Physical Medicine and Rehabilitation*. 2005; WebMD.
- Sharp T J. Chronic pain: a reformulation of the cognitive-behavioral model. *Behav Research Therapy*. 2001; 39: 787-800.
- Vranceanu AM, Ring D, Kulich R, Zhao M, Safren S. Treating idiopathic arm pain within a multidisciplinary arm pain program. *Cognitive & Behav Practice*. 2008d. Manuscript in press.
- Vranceanu AM, Golden K, Khoshnevisan M, Ring D. Presurgery depression and catastrophizing predict postsurgery pain intensity and disability. Manuscript in preparation.
- Zhao M, Krivickas LS, Ring D. Quantitative measure of postoperative improvement in nerve conduction studies and its clinical correlation to carpal tunnel syndrome. Manuscript in preparation.