Clinical Practice Guideline: **Chronic Pain Management: Resilience as a Clinical Tool**

Date of Implementation: **February 20, 2014**

Product: **Specialty**

GUIDELINES

The purpose of this American Specialty Health – Specialty (ASH) Clinical Practice Guideline (CPG) is to assist the practitioner with implementing plans to help patients manage chronic pain through resilience. Any chronic pain conditions and treatments outside of the scope of the practitioner should be referred to an appropriate health care professional.

INTRODUCTION

Chronic pain is a complex physiological phenomenon which has profound physical, emotional, and cognitive effects. Pain's severity, duration, response to treatment, and disabling consequences vary from person to person. Other health conditions that often occur as a consequence of chronic pain include depression, stress, pain catastrophizing, generalized anxiety, and disordered eating - all of which contribute to the complexity and severity of chronic pain management.

The American Pain Society reports that pain is often undertreated, which has the long-term effects of poorer health outcomes and increased costs for medical care. In order to improve health outcomes, the health care practitioner can incorporate appropriate measures into the patient assessment and management plan to more effectively prevent pain conditions from becoming chronic and manage chronic pain conditions when they do occur. Currently, focus is shifting from pain assessment to functional assessment and improvement. Functional abilities can be measured more objectively and often are more directly related to a patient's quality of life and satisfaction. Comprehensive treatment of chronic pain must address multiple aspects affecting a person experiencing pain, such as physical, psychological, spiritual and socioeconomic factors. Inter-disciplinary approaches to pain management which can more effectively address these issues include therapeutics from Western medicine, physical therapy, occupational therapy, chiropractic treatment including manual manipulative therapy, acupuncture, massage therapy, biofeedback, vocational and recreational therapy, and psychological counseling, among others. Collaboration amongst patients, caregivers, health professionals and other supportive resources is vital to effective pain management with functional improvements.

When helping patients manage their chronic pain, the practitioner can utilize psychological concepts which focus on building resilience in addition to physical and medicinal pain

management methods. Resilience is the process of positive adaptation when encountering adversity, trauma, tragedy, threats or significant sources of stress. Individuals with chronic pain, who develop resiliency, recognize the value of remaining positive, accepting help, and learning to cope with their pain. It is important to note that being resilient does not mean that a person doesn't experience difficulty or distress. In fact, the path to resilience is likely to involve considerable emotional distress because substantial emotional and physical disparities need to be addressed in this process. Being resilient means that a person doesn't allow difficulty or distress to keep them from moving forward. Everyone possesses the ability to be resilient - it involves behaviors, thoughts and actions that can be learned and developed in anyone.

OVERVIEW

Chronic pain affects more individuals than does cancer, heart disease, and diabetes combined. Yet, treatment options remain remarkably limited. Often, highly effective psychotherapeutic approaches are limited by many barriers such as access, reimbursement, and acceptability; however, according to Hassett and Finan (2016), resilience-based positive activity interventions could offer a promising alternative. These interventions are engaging, non-stigmatizing, and do not require a mental health professional for their provision. Pain care should be tailored to each patient's experience (e.g., patient history, current pain levels, functionality, psychosocial factors, etc.). When addressing pain in its early stages, practitioners can carefully craft pain management strategies that help prevent acute pain from becoming a chronic illness. For the patient with chronic pain, health care providers must foster care that is patient centered, comprehensive, and interdisciplinary. The practitioner can apply the concepts of neuroplasticity (the ability of the nervous system to reorganize and restructure its functions) by focusing on resilience as a positive adaptation for the patient in chronic pain management.

BACKGROUND

The acute pain process usually initiates with an injury to body tissues. Nociception refers to the process by which information about tissue damage is relayed to the central nervous system. Tissue injury causes cells to break down and release various byproducts and mediators of inflammation (e.g., prostaglandins, substance P, bradykinin, histamine, and cytokines). Some of these mediators activate nociceptors to send nerve impulses to the central nervous system. Most of these substances can also sensitize nociceptors over time, increasing their excitability and discharge frequency and contributing to the central hypersensitivity that characterizes the chronic pain state. Neuropathic pain of non-nociception origin can be caused by injury or dysfunction of the peripheral nervous system. With neuropathic pain, the nerve fibers themselves might be damaged, dysfunctional, or injured. These damaged nerve fibers send incorrect signals to other pain centers.

In some cases, however, chronic pain may exist with no apparent cause. Pain which exists without an apparent cause is known as idiopathic pain. Idiopathic pain, although of

unknown origin, is real. It is often more difficult to treat than nociceptive and neuropathic pain because its pathophysiology is uncertain.

Chronic pain is recognized as pain that extends beyond the period of healing, enduring for at least three months, with levels of identifiable tissue pathology that are often insufficient to explain the presence and/or extent of the pain. The pain disrupts sleep, social interactions, work, school and/or other usual activities of living. The pain ceases to serve a protective or adaptive function, but instead degrades health and functional capability. Although injury may often lead to chronic pain, factors other than the original cause may perpetuate pain. For instance, environmental and affective factors can exacerbate and perpetuate chronic pain, leading to disability and maladaptive behavior. The chronic pain state may originate from nociceptive pathways, neuropathic pathways, or both and can be caused by injury, malignant conditions, or a variety of chronic conditions such as back pain, migraine headaches, diabetic neuropathy, dental and orofacial pain, arthritic pain, musculoskeletal disorders, and fibromyalgia. Alternatively, it may be idiopathic with an unknown pathology.

As a part of pain management interventions, the practitioner can use the potential for neuroplasticity to serve as a positive adaptation process by building coping ability and improved functions through resilience, Clinical evidence has shown that neuronal function may be altered over time (Melzack, 2001). Neuroplasticity can be broadly defined as the ability of the nervous system to respond to intrinsic and extrinsic stimuli (i.e., injuries or other pathological events) by reorganizing its structure, function and connections. This reorganization of nervous system function influences perceptual experiences. Neuroplasticity which results in central or peripheral sensitization leads to chronic pain. However, if central reorganization and neuroplastic changes of the pain transmitting pathways and pain modulation centers impart a positive adaptation; this would be considered a positive neuroplasticity process. The recognition that such positive and negative neuroplastic adaptive changes can occur is essential to understanding the chronic pain syndromes that persist and often cause severe dysfunction. Evidence suggests that, as individuals learn to modify their cognitive representations and behavioral responses to distressing stimuli, widespread changes occur in frontal cognitive control systems and in limbic system activation (Cramer et al., 2011).

Cortical plasticity related to chronic pain can be modified by behavioral interventions that provide feedback to the regions of the brain which were altered by somatosensory pain memories to prevent or reverse maladaptive memory formation. Jensen et al. (2007) conducted a study on patients (*n*=18) with complex regional pain syndrome type I (CPRS-I) utilizing neurofeedback (EEG biofeedback) training as a mediator. The patients were administered numerical rating scale measures of pain intensity at their primary pain site, as well as pain at other sites and other symptoms, before and after a thirty (30) minute neurofeedback training session. There was a substantial and statistically significant pre- to

post-session decrease in pain intensity at the primary pain site on average, with 50% of the study participants reporting changes in pain intensity that were clinically meaningful. The findings suggest that many patients who receive neurofeedback training report significant and substantial short-term reductions in their experience of pain, as well as improvements in a number of other pain- and non-pain-specific symptoms. Additional research to further examine the long-term effects and mechanisms of neurofeedback training for patients with chronic pain is necessary to gain further insight into this process.

Moreover, appropriate early treatment of acute pain conditions can help to prevent the perpetuation of the condition to a chronic state. Magnetic resonance imaging (MRI) studies at Northwestern University (Apkarian, 2013) revealed abnormalities in the structure of the brain which predispose people to develop chronic pain after a lower back surgery. The research group determined that chronic pain does not necessarily stem from the origin of the injury; it may also be triggered following an injury by pre-existing central nervous system axon abnormalities. Based on this outcome, the research team recommends that patients receive all necessary treatment within the early stages of pain onset to help prevent the development of chronic pain syndromes.

Resiliency Evidence and Research

Resilience is governed by perceived self-efficacy: people's beliefs about their capabilities to produce effects. According to Bandura (2004), perceived self-efficacy acts as a central mediator of post-traumatic recovery. Bandura et al. (1997) carried out a randomized controlled trial to research opioid and non-opioid mechanisms in perceived self-efficacy and pain control. Subjects (*n*=72) were taught cognitive methods of pain control, were administered a placebo, or received no intervention. Their pain tolerance was then measured at periodic intervals after they were administered a saline solution or naloxone, an opioid antagonist that blocks the effects of endogenous opioids. Training in cognitive control strengthened perceived self-efficacy both to withstand and to reduce pain; whereas placebo medication enhanced perceived efficacy to withstand pain without reducing the level of pain. Perceived self-efficacy did not change in the absence of an intervention. Regardless of condition, the stronger the perceived self-efficacy to withstand pain, the longer subjects endured mounting pain stimulation. The findings provide evidence that attenuation of the impact of pain stimulation through cognitive control is mediated by both opioid and non-opioid mechanisms. Intervention subjects administered naloxone were less able to tolerate pain stimulation than were their saline counterparts. The stronger the perceived self-efficacy to reduce pain, the greater was the opioid activation. Intervention subjects were also able to achieve some increase in pain tolerance even when opioid mechanisms were blocked by naloxone, which is indicative of a non-opioid component in cognitive pain control.

Examination of the impact of interpersonal variables on pain catastrophizing has shown that psychological resilience has a positive impact on pain catastrophizing and pain

willingness (a measure of the degree to which one focuses on the pain – either avoiding or attempting to control it). Richardson, et al. (2010) carried out an observational study to investigate the effects of both catastrophizing and the pain willingness component of acceptance on interference for patients (*n*=67) experiencing chronic low back pain in daily activities while completing a Stroop-like task during experimentally induced ischemic pain. The Stroop-like task, which is essentially the Stroop procedure (an established measure of concentration and attention), required the test subjects to state the ink color of printed words that spell a dissonant color. The Pain Catastrophizing Scale was used to assess the degree of pain catastrophizing, and acceptance was measured using the 20-item Chronic Pain Acceptance Questionnaire. This study concluded that pain willingness factor of acceptance and catastrophizing both appear to be strong predictors for self-reported pain interference; however, pain willingness shows a stronger effect and attenuates the negative impact of catastrophizing on task functioning. This study demonstrated that the positive adaptation process associated with psychological resilience has a direct effect on improvement of self-reported pain levels.

Ramirez-Maestre (2012) carried out a cross-sectional study to analyze the relationship between resilience, acceptance, coping, and adjustment to spinal chronic pain. The sample was composed of 299 patients (138 men and 161 women) suffering from chronic spinal pain. The findings indicated that higher levels of resilience were associated with higher levels of pain acceptance and active coping strategies. Additionally, active coping and acceptance were found to be associated with higher levels of adjustment to pain. It was concluded that positive personality characteristics could play a crucial role in patient adjustment. Therefore, health care practitioners should take into account the positive path to improved capacity in order to better understand the chronic pain experience.

A literature review to describe the evidence regarding the roles of beliefs, expectations, pain coping, and depression in Whiplash-Associated Disorders (WAD) was conducted by Carroll et al. (2011). There was good support from two large (*n* = 6,015 and 1,032) population-based longitudinal cohorts that expectation to recover is an independent predictor of actual WAD recovery. Virtually all studies (with several being large cohort studies) that examined depression and subsequent WAD recovery provided support for this relationship. One large population-based study (*n* = 2,320) showed that frequent use of "passive" pain coping strategies (utilized within the first 6 weeks post-injury) has an independent association (after controlling for relevant confounders) with slowed recovery, especially when the injured individuals also had depressed mood. In another study (*n* = 130 presentations to emergency departments), those endorsing "adaptive coping" strategies to deal with their pain within one (1) month of their injury (e.g., high levels of activity, receiving support from significant others) had a better WAD prognosis. It should be noted, however, that only 14 of the participants reported no pain at follow-up; given that the two multivariable regression analyses included six and nine (respectively) variables in the

models, using the minimum of 10 outcome events per variable rule, those estimates of effect may be unstable and should be viewed with caution.

There is also evidence from one large population-based study (*n* = 2,280, with appropriate multivariable analysis) and one smaller study (*n* = 82, with only 27 outcome "events") of patients presenting to emergency departments that feelings of helplessness, which suggests passive coping, predict slowed WAD recovery. The sample size of the latter study did not permit thorough assessment of aggregate confounding and findings should be interpreted cautiously. Given the limited number of large studies, one cannot draw conclusions with a high degree of certainty. However, this systematic review concluded that the current best evidence suggests that coping appears to be important in Whiplash-Associated Disorders prognosis.

Assessment of Chronic Pain

The pain a patient feels is a subjective experience and is difficult to quantify objectively in clinical practice. When assessing a patient with chronic pain, appropriate screening questionnaires may be used to evaluate pain levels and other patient parameters such as depression, catastrophizing, functional capacities and quality of life. It is important to screen for and identify comorbid medical or psychosocial conditions (e.g., depression, substance use disorder, alcohol use disorder) that may affect the pain or its management. Comprehensive pain assessment includes (but is not limited to) pain location and quality, aggravating and alleviating factors, and previous treatments and their effectiveness. This is necessary to establish a diagnosis, determine the impact of pain on physical and emotional function, and to formulate an appropriate treatment plan. Examples of pain assessment, functional assessment, and psychological assessment tools include, but are not limited to (ICSI, 2011):

- Brief Pain Inventory (BPI)
- McGill Pain Questionnaire
- Physical Functional Ability Questionnaire (FAQ5)
- Oswestry Low Back Disability Index
- PHQ-9
- The Pain Catastrophizing Scale (PCS)

After the chronic pain assessment, the healthcare practitioner will establish a pain management plan that can include strategies for treating the patient and any needed referrals to other practitioners or resources.

Recognition of Chronic Illness Behaviors

All chronic illnesses have the potential to limit the functional status, productivity, and quality of life of people who live with these conditions. The chronic illness may be more effectively treated by taking an integrated approach to treatment: addressing the physical, social, and psychological toll of the illness. Thus, the practitioner should examine the

behaviors which the patient is exhibiting in conjunction with the primary physical symptoms. A chronic illness behavior may be identified as helpful if it contributes to (and does not worsen, delay, or impede progress toward) improvement or maintenance of a patient's physical, mental, or social well-being. Conversely, a behavior can be construed as unhealthy if it worsens or delays/impedes progress toward improvement or maintenance of a person's physical, mental, or social well-being. Based on the evidence, healthy/unhealthy chronic illness behaviors include, but are not limited to the behaviors outlined in Table 1 and Table 2.

TABLE 1: HEALTHY CHRONIC ILLNESS BEHAVIORS
Healthy ways of dealing with grief, sadness and sense of loss, such as seeking support from friends, family members, or a support group.
Resilience
Self-efficacy competency
Healthy use of life skills
Healthy self-image
Healthy resource acquisition
Medication and treatment adherence
Sense of well-being
Optimal quality of life
Social support seeking (practical or emotional)
Empowerment
Healthy adaptation to a change in health status
Transformative change
Healthy adaptation to end of life

TABLE 2: UNHEALTHY CHRONIC ILLNESS BEHAVIORS
Sadness, low mood
Denial and lack of ability to adapt
Resistance

TABLE 2: UNHEALTHY CHRONIC ILLNESS BEHAVIORS
Poor demonstration of life skills
Self-efficacy incompetency
Powerlessness
Stigma of diagnosis
Social isolation
Poor self-image
Poor body image
Guilt/self-blame
Self-destructive behavior
Deficits in adherence and transformation
Unhealthy adaptation
Poor sense of well-being
Sub-optimal quality of life
Secondary gain (special rights and privileges achieved from the perpetuation of the chronic condition. The patient willingly accepts this role, although is not entirely conscious of his/her actions.)
Sub-optimal work/occupation performance
Maladaptive family and other interpersonal relationships
Suboptimal adaptation to end of life

The severity of a health condition from a medical perspective does not solely determine whether or not a patient will display unhelpful chronic illness behaviors. Upon receiving a diagnosis of a chronic illness, one patient may fall into maladaptive behaviors, such as social isolation, and low self-image, while another patient, diagnosed with the same condition may exhibit positive coping behaviors. The circumstances are unique to each patient and the pain management plan should be based upon the individual patient scenario.

Chronic Pain Treatments

Pharmacologic

Pharmacologic administration is the most frequently prescribed treatment for pain. Almost half of the patients suffering from pain choose non-prescription analgesics for their initial

pain relief. Pharmacologic pain treatments typically include non-opioid analgesics (e.g., acetaminophen, and non-steroidal anti-inflammatory medications like diclofenac or celecoxib), opioid analgesics (e.g., morphine, hydromorphone, fentanyl, tramadol), and adjuvant medications including corticosteroids, beta-blockers, muscle relaxers, anti-convulsants, alpha-lipoic acids, NMDA (N-methyl-D-aspartate) antagonists and antidepressants.

Non-pharmacologic

Non-pharmacologic methods are often used in addition to pharmacologic treatment. Non-pharmacologic modalities may also be the primary treatments depending on the patient's circumstances. Treatment regimens generally involve a multidisciplinary approach, utilizing modalities such as education, nutrition, exercise, and physical, occupational and behavioral therapy. Physical therapy usually focuses on reconditioning, stretching exercises and pain reducing physical modalities (such as heat, ice, transcutaneous electrical nerve stimulation [TENS], and oscillatory movements). Occupational therapists work on proper body mechanics, and helping the patients improve their levels of activity in household chores, work and leisure. Other non-pharmacologic therapies include chiropractic treatments, acupuncture, massage therapy, and some treatments in naturopathy. Psychological modalities include cognitive/behavioral techniques to help patients improve their pain coping abilities, stress management education, and methods to reduce symptoms of depression and anxiety that often accompany chronic pain.

Resilience- Based Treatment Focus

Resilience based cognitive techniques may be applied as a psychological coping strategy. Studies have identified a range of psychosocial factors that promote successful adaptations to a stressful condition, which include coping strategies, positive emotionality, cognitive reappraisal (re-evaluation of adverse experiences in a more positive light), the presence of social supports, and a sense of purpose in life, among others (Reich, 2010).

Resilience is an important life skill. The practitioner can help the patient to develop the ability to think in a healthy manner through developing positive life skills. Life skills can make it easier to cope with life's challenges and can help the patient make the most out of his/her life and health. More specifically, life skills help make stress manageable, improve functioning in important areas of life, and restore confidence and sense of self-efficacy. Listed in Table 3 are some life skills that evidence shows are fundamental to a healthy life.

TABLE 3: LIFE SKILLS

Skill	Description
Resilience	**Resilience is the ability to overcome a challenge.** It is an inner strength, a power to overcome obstacles. It allows people to push forward and adapt when things do not go as planned.

TABLE 3: LIFE SKILLS	
Skill	**Description**
	Resiliency does not lessen the number of challenges people may face, but it can equip them to better cope with challenges as they arise.
Self-efficacy	**Self-efficacy is the belief that people are capable of doing something.** It helps people to believe they can use their skills and knowledge to perform a task. They are sure that they can do what they need or want to do. Self-efficacy can affect how motivated people are and what they choose to do. When people have strong self-efficacy, they are more likely to take action, work hard, and stay committed - even in the face of a challenge or temporary setback.
Value Identification	**Identifying values means identifying what matters most to people**. These are the things people care deeply about; the things they would not want to live without. Values are a critical part of an individual's identity. When people know their core values, core values can drive everything they do.
Goal Setting	**Goal setting allows people to choose what they want in life and how they plan to achieve it**. It includes creating a step-by-step plan to reach those goals. Goal setting can guide day-to-day actions and help change habits. It can help people control and change their thoughts, actions, and responses. Goal setting can also help to overcome obstacles which impede the patient from reaching goals.
Organizing	**Being organized is taking account of all that is going on in a patient's life and developing a method that helps that patient manage the load.** Being organized can make it easier to do what needs to be done. It can help to manage an individual's time and energy. Organization can help empower people to reach their goals. It can also help to avoid obstacles created by disordered habits or lifestyles.
Problem Solving	**Problem solving is a skill that lets people find a way to move forward in areas where they may be stagnating.** This could be a decision that needs to be made, a situation that is uncomfortable, or a question without an answer. When people

TABLE 3: LIFE SKILLS	
Skill	**Description**
	work to solve problems, they take a critical look at what can be done and then devise a plan to do it. Problem solving can help people assess a situation, identify what can be changed and empower them to take control. It can help people create plans, overcome barriers, and reach their goals.
Time Management	**Time management is the ability to prioritize, plan, and act on what needs to be done.** People can choose to spend their time in a way that helps them get the most out of each day. Time management can help the patient take control of his/her time. It can help to balance the tasks that need to be done with the tasks that the patient would like to do.
Resource Acquisition	**Resource acquisition is knowing how and where to find the tools, information, and support to meet peoples' needs.** This helps people to assess what they have relative to what is lacking and enables them to take action to acquire what they need. Finding the right resources can help them solve problems, make informed decisions, and work toward accomplishing their goals. It helps to free up time and energy to work on what needs to be done.
Transformative Change	**Transformative change is a shift which aligns ones thoughts and actions with what matters most.** It is a new way of thinking that happens once people become aware of and are guided by their core values and beliefs. Over time, people can start to see the results of this shift in their daily life. Transformative change can help people get the most out of their lives, relationships, and experiences.

The American Psychological Association (see *Additional Resources*) recommends several tips for coping with chronic pain. The practitioner may use the following patient information as a guideline for discussion, education, and home use in the clinical scenario in order to help the patient attain a resilient outlook:

Stress Management: Emotional and physical pains are closely related, and persistent pain can lead to increased levels of stress. Educate the patient that learning to deal with stress in healthy ways can position him/her to cope more effectively with their chronic

pain. Eating well, getting plenty of sleep and engaging in approved physical activity are all positive ways for the patient to handle stress and pain.

Constructive Thoughts: Positive thinking is a powerful tool. Educate the patient that by focusing on the improvements that he/she is making (i.e., the pain is less today than yesterday or feeling better than he/she did a week ago) can make a difference in perceived comfort level. For example, have the patient imagining a scenario in which he/she reminds oneself that he/she is comfortable instead of considering him/herself powerless and thinking that he/she absolutely cannot deal with the pain, so that the patient may work toward finding a healthy way to deal with it and living a productive and fulfilling life.

Becoming Active and Engaged: Encourage the patient to distract him/herself from the pain by engaging in enjoyable activities which highlight the positive aspects of life. Educate the patient that self-isolation fosters a negative attitude and may increase the perception of pain. Recommend that the patient consider finding a hobby or a pastime that makes him/her feel good and to connect with family, friends or other people via his/her local community groups or the internet.

Finding Support: Encourage the patient to reach out to other people who are in the same position and who can share and understand the patient's difficulties. Educate the patient to search the internet or local community for support groups, which can reduce the burden by helping the patient understand that he/she is not alone.

Consult a Professional: If the patient continues to feel overwhelmed by chronic pain at a level that prevents him/her from performing the daily routine, it may be necessary to talk with a mental health professional, such as a psychologist, who can help the patient handle the physical and psychological repercussions of his/her condition.

The patient should be referred to an appropriate health care professional for the management of any conditions outside of the scope of specialization and expertise of the practitioner.

Pain Management Algorithm

A pain management assessment is outlined in Figure 1. The practitioner may use this as a guide to determine the appropriate, timely implementation of possible intervention responses with specific steps and redirects.

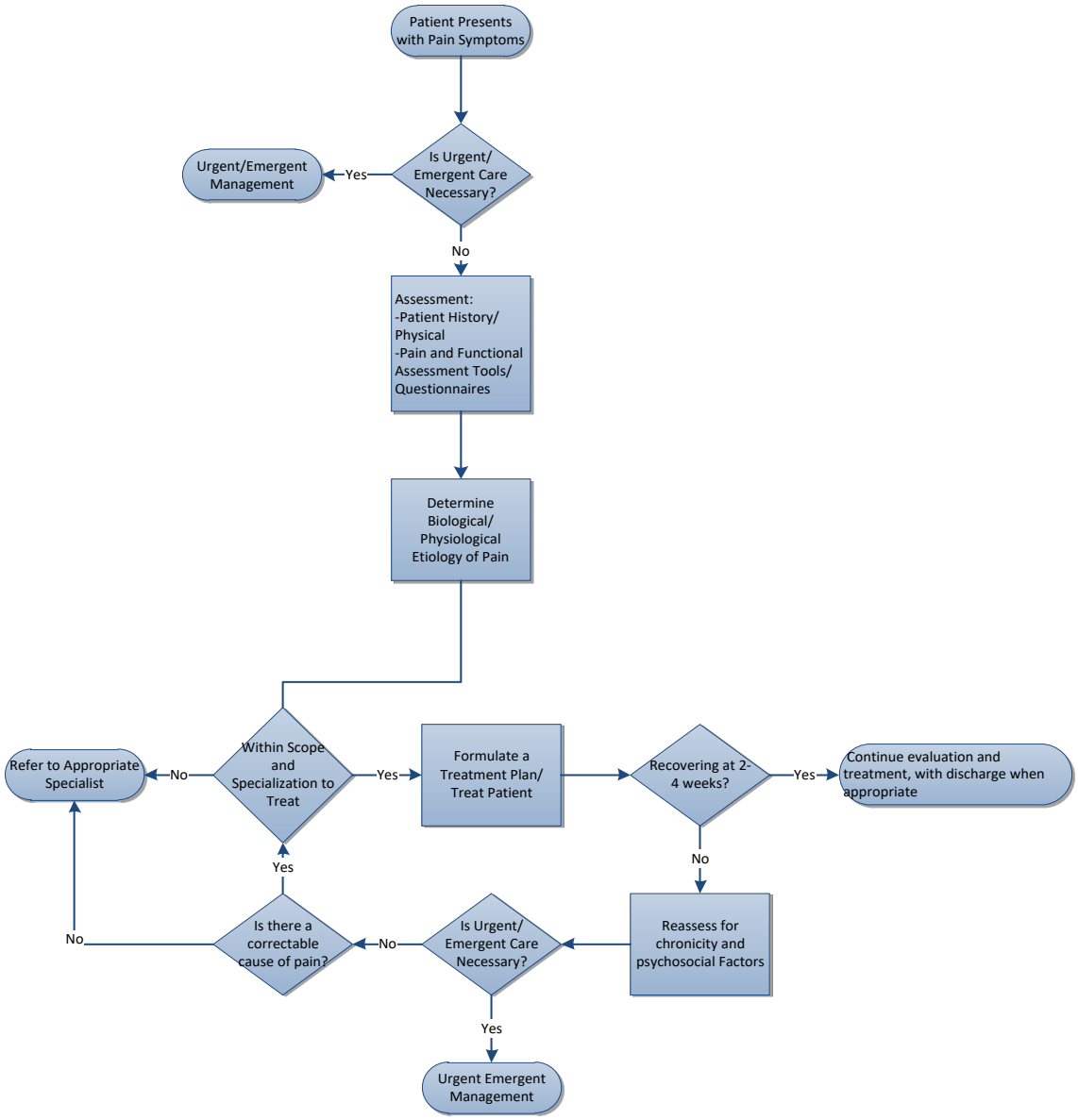

Figure 1: Pain Management Algorithm
(Adapted from ICSI, 2011; Kendall et al., 2004; American Specialty Health CPG 169)

Additional Resources

Educating patients about pain management options and available resources can assist the patient. Publicly available resources can be found at:

American Chronic Pain Association: http://theacpa.org/

American Psychological Association, Coping with Chronic Pain: https://www.apa.org/helpcenter/chronic-pain.aspx

References

APS. (2000). Pain: Current Understanding of Assessment, Management and Treatments.

Bandura, A. (2010). Self-Efficacy *The Corsini Encyclopedia of Psychology*: John Wiley & Sons, Inc.

Bandura, A., O'Leary, A., Taylor, C. B., Gauthier, J., & Gossard, D. (1987). Perceived self-efficacy and pain control: opioid and nonopioid mechanisms. J Pers Soc Psychol, 53(3), 563-571.

Benight, C. C., & Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: the role of perceived self-efficacy. Behaviour Research and Therapy, 42(10), 1129-1148.

Bernardy, N. C., Hamblen, J. L., Friedman, M. J., Ruzek, J. I., & McFall, M. E. (2011). Implementation of a posttraumatic stress disorder mentoring program to improve treatment services. Psychological Trauma: Theory, Research, Practice, and Policy, 3(3), 292-299. doi: 10.1037/a0024847

Brox, J. I., Storheim, K., Grotle, M., Tveito, T. H., Indahl, A., & Eriksen, H. R. (2008). Evidence-informed management of chronic low back pain with back schools, brief education, and fear-avoidance training. Spine J, 8(1), 28-39. doi: 10.1016/j.spinee.2007.10.008

Bruflat, A. K., Balter, J. E., McGuire, D., Fethke, N. B., & Maluf, K. S. (2012). Stress Management as an Adjunct to Physical Therapy for Chronic Neck Pain. Physical Therapy, 92(10), 1348-1359. doi: 10.2522/ptj. 20110489

Büssing, A., Ostermann, T., Neugebauer, E. A., & Heusser, P. (2010). Adaptive coping strategies in patients with chronic pain conditions and their interpretation of disease. BMC public health, 10(1), 507.

Carroll, L. J. (2011). Beliefs and Expectations for Recovery, Coping, and Depression in Whiplash-Associated Disorders: Lessening the Transition to Chronicity. Spine, 36, S250-S256 210.1097/BRS.1090b1013e31823881a31823884.

Coderre, T. J., Katz, J., Vaccarino, A. L., & Melzack, R. (1993). Contribution of central neuroplasticity to pathological pain: review of clinical and experimental evidence. Pain, 52(3), 259-285.

Cramer, S. C., Sur, M., Dobkin, B. H., O'Brien, C., Sanger, T. D., Trojanowski, J. Q., . . . Vinogradov, S. (2011). Harnessing neuroplasticity for clinical applications. Brain, 134(6), 1591-1609. doi: 10.1093/brain/awr039

Elkins, G., Jensen, M. P., & Patterson, D. R. (2007). Hypnotherapy for the Management of Chronic Pain. The International journal of clinical and experimental hypnosis, 55(3), 275.

Erpelding, N., & Davis, K. D. (2013). Neural underpinnings of behavioural strategies that prioritize either cognitive task performance or pain. Pain, 154(10), 2060-2071.

Farb, N. A., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Minding one's emotions: Mindfulness training alters the neural expression of sadness. Emotion, 10(1), 25.

Fregni, F., & Pascual-Leone, A. (2007). Technology insight: noninvasive brain stimulation in neurology-perspectives on the therapeutic potential of rTMS and tDCS. Nature clinical practice. Neurology, 3(7), 383.

Gao, Y., Chen, S., Xu, Q., Yu, K., Wang, J., Qiao, L., . . . Liu, J. (2013). Proteomic analysis of differential proteins related to anti-nociceptive effect of electroacupuncture in the hypothalamus following neuropathic pain in rats. Neurochem Res, 38(7), 1467-1478. doi: 10.1007/s11064-013-1047-7

Gao, Y. H., Chen, S. P., Wang, J. Y., Qiao, L. N., Meng, F. Y., Xu, Q. L., & Liu, J. L. (2012). Differential proteomics analysis of the analgesic effect of electroacupuncture intervention in the hippocampus following neuropathic pain in rats. BMC Complement Altern Med, 12, 241. doi: 10.1186/1472-6882-12-241

Gordon, D. B., Dahl, J. L., Miaskowski, C., & et al. (2005). American pain society recommendations for improving the quality of acute and cancer pain management: American pain society quality of care task force. Archives of Internal Medicine, 165(14), 1574-1580. doi: 10.1001/archinte.165.14.1574

Hassett AL, Finan PH. The Role of Resilience in the Clinical Management of Chronic Pain. Curr Pain Headache Rep. 2016 Jun;20(6):39. doi: 10.1007/s11916-016-0567-7.

Heymans, M. W., van Tulder, M. W., Esmail, R., Bombardier, C., & Koes, B. W. (2005). Back Schools for Nonspecific Low Back Pain: A Systematic Review Within the Framework of the Cochrane Collaboration Back Review Group. Spine, 30(19), 2153-2163.

How the body responds to pain: Groundbreaking research. (2013). Medical News Today. Retrieved from http://www.medicalnewstoday.com/releases/266421.php

ICSI. (2017). Pain: Assessment, Non-Opioid Treatment Approaches and Opioid Management. Retrieved November 22, 2022 from https://www.icsi.org/guidelines__more/catalog_guidelines_and_more/catalog_guidelines/catalog_neurological_guidelines/pain/

IOM. (2011). Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research: The National Academies Press.

Jensen, M. P., Grierson, C., Tracy-Smith, V., Bacigalupi, S. C., & Othmer, S. (2007). Neurofeedback treatment for pain associated with complex regional pain syndrome type I. Journal of Neurotherapy, 11(1), 45-53.

Karoly, P., & Ruehlman, L. S. (2006). Psychological "resilience" and its correlates in chronic pain: findings from a national community sample. Pain, 123(1-2), 90-97. doi: 10.1016/j.pain.2006.02.014

Katon, W. J., Russo, J. E., Heckbert, S. R., Lin, E. H., Ciechanowski, P., Ludman, E., . . . Von Korff, M. (2010). The relationship between changes in depression symptoms and changes in health risk behaviors in patients with diabetes. International journal of geriatric psychiatry, 25(5), 466-475.

Kehlet, H., Jensen, T. S., & Woolf, C. J. (2006) Persistent postsurgical pain: risk factors and prevention. The Lancet, 367(9522), 1618-1625.

Kendall, NAS, Linton,SJ, Main,CJ. (2004 ed.). New Zealand Acute Low Back Pain Guide:Incorporating the Guide to Assessing Psychosocial Yellow Flags in Acute Low Back Pain. Accident Compensation Corporation and the New Zealand Guidelines Group.Wellington,New Zealand.

Kent, D., Haas, L., Randal, D., Lin, E., Thorpe, C. T., Boren, S. A., . . . Nelson, J. (2010). Healthy coping: issues and implications in diabetes education and care. Population health management, 13(5), 227-233.

Kindermans, H. P. J., Roelofs, J., Goossens, M. E. J. B., Huijnen, I. P. J., Verbunt, J. A., & Vlaeyen, J. W. S. (2011). Activity Patterns in Chronic Pain: Underlying Dimensions and Associations With Disability and Depressed Mood. The journal of pain : official journal of the American Pain Society, 12(10), 1049-1058.

Kowal, J., Wilson, K. G., Geck, C. M., Henderson, P. R., & D'Eon, J. L. (2011). Changes in perceived pain severity during interdisciplinary treatment for chronic pain. Pain Research & Management: The Journal of the Canadian Pain Society, 16(6), 451.

Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. Psychiatr Ann, 32(9), 1-7.

Lucas, T. H., & Fetz, E. E. (2013). Myo-Cortical Crossed Feedback Reorganizes Primate Motor Cortex Output. The Journal of Neuroscience, 33(12), 5261-5274. doi: 10.1523/jneurosci.4683-12.2013

Luszczynska, A., & Sutton, S. (2006). Physical activity after cardiac rehabilitation: Evidence that different types of self-efficacy are important in maintainers and relapsers. Rehabilitation Psychology, 51(4), 314.

Mansour, A. R., Baliki, M. N., Huang, L., Torbey, S., Herrmann, K. M., Schnitzer, T. J., & Apkarian, A. V. (2013). Brain white matter structural properties predict transition to chronic pain. Pain, 154(10), 2160-2168.

McEwen, B. S. (2001). Plasticity of the hippocampus: adaptation to chronic stress and allostatic load. Ann N Y Acad Sci, 933, 265-277.

McEwen, B. S., & Kalia, M. (2010). The role of corticosteroids and stress in chronic pain conditions. Metabolism: clinical and experimental, 59, S9-S15.

Melzack, R., Coderre, T. J., Katz, J., & Vaccarino, A. L. (2001). Central neuroplasticity and pathological pain. Ann N Y Acad Sci, 933, 157-174.

Melzack, R., & Wall, P. D. (1965). Pain Mechanisms: A New Theory. Science, 150(3699), 971-979.

Merkes, M. (2010). Mindfulness-based stress reduction for people with chronic diseases. Aust J Prim Health, 16(3), 200-210. doi: 10.1071/py09063

Moffett, J. A. K., Chase, S. M., Portek, I., & Ennis, J. R. (1986). A Controlled, Prospective Study to Evaluate the Effectiveness of a Back School in the Relief of Chronic Low Back Pain. Spine, 11(2), 120-122.

Mutso, A. A., Radzicki, D., Baliki, M. N., Huang, L., Banisadr, G., Centeno, M. V., . . . Apkarian, A. V. (2012). Abnormalities in hippocampal functioning with persistent pain. J Neurosci, 32(17), 5747-5756. doi: 10.1523/jneurosci.0587-12.2012

Neitzer, A., Sun, S., Doss, S., Moran, J., & Schiller, B. (2012). Beck Depression Inventory-Fast Screen (BDI-FS): an efficient tool for depression screening in patients with end-stage renal disease. Hemodial Int, 16(2), 207-213.

Nevedal, C. D., Wang, C., Oberleitner, L., Schwartz, S., & Williams, M. A. (2013). Effects of an Individually Tailored Web-Based Chronic Pain Management Program on Pain Severity, Psychological Health, and Functioning. J Med Internet Res, 15(9), e201.

Ong, A. D., Zautra, A. J., & Reid, M. C. (2010). Psychological resilience predicts decreases in pain catastrophizing through positive emotions. Psychol Aging, 25(3), 516-523. doi: 10.1037/a0019384

Paul, M. (2013). Predicting Who Will Have Chronic Pain: Abnormalities in brain axons predispose people to chronic back pain after injury Retrieved from Northwestern University website: http://www.northwestern.edu/newscenter/stories/2013/09/predicting-who-will-have-chronic-pain.html

Petersen-Felix, S., & Curatolo, M. (2002). Neuroplasticity--an important factor in acute and chronic pain. Swiss Med Wkly, 132(21-22), 273-278. doi: 2002/21/smw-09913

Pietromonaco, P. R., Uchino, B., & Dunkel Schetter, C. (2013). Close relationship processes and health: Implications of attachment theory for health and disease. Health Psychology, 32(5), 499-513. doi: 10.1037/a0029349

Pincus, T., & Morley, S. (2001). Cognitive-processing bias in chronic pain: A review and integration. Psychological Bulletin, 127(5), 599-617. doi: 10.1037/0033-2909.127.5.599

Ramírez-Maestre, C., Esteve, R., & López, A. E. (2012). The path to capacity: resilience and spinal chronic pain. Spine, 37(4), E251-258.

Rasche, D., Rinaldi, P. C., Young, R. F., & Tronnier, V. M. (2006). Deep brain stimulation for the treatment of various chronic pain syndromes. Neurosurg. Focus, 21(6), E8.

Reich, J. W., Zautra, A. J., & Hall, J. S. (2010). Handbook of adult resilience: Guilford Press.

Richardson, E. J., Ness, T. J., Doleys, D. M., Banos, J. H., Cianfrini, L., & Richards, J. S. (2010). Catastrophizing, acceptance, and interference: laboratory findings, subjective report, and pain willingness as a moderator. Health Psychol, 29(3), 299-306. doi: 10.1037/a0018834

Ruscheweyh, R., Kreusch, A., Albers, C., Sommer, J., & Marziniak, M. (2011). The effect of distraction strategies on pain perception and the nociceptive flexor reflex (RIII reflex). Pain, 152(11), 2662-2671.

Sol, B. G., van der Graaf, Y., van Petersen, R., & Visseren, F. L. (2011). The effect of self-efficacy on cardiovascular lifestyle. Eur J Cardiovasc Nurs, 10(3), 180-186. doi: 10.1016/j.ejcnurse.2010.06.005

Sturgeon, J., & Zautra, A. (2010). Resilience: A New Paradigm for Adaptation to Chronic Pain. Current Pain and Headache Reports, 14(2), 105-112. doi: 10.1007/s11916-010-0095-9

van Middelkoop, M., Rubinstein, S. M., Kuijpers, T., Verhagen, A. P., Ostelo, R., Koes, B. W., & van Tulder, M. W. (2011). A systematic review on the effectiveness of physical and rehabilitation interventions for chronic non-specific low back pain. Eur Spine J, 20(1), 19-39. doi: 10.1007/s00586-010-1518-3

West, C., Stewart, L., Foster, K., & Usher, K. (2012). The meaning of resilience to persons living with chronic pain: an interpretive qualitative inquiry. J Clin Nurs, 21(9-10), 1284-1292. doi: 10.1111/j.1365-2702.2011.04005.x

Wolf, S. L., Winstein, C. J., Miller, J. P., Taub, E., Uswatte, G., Morris, D., Nichols-Larsen, D. (2006). Effect of constraint-induced movement therapy on upper extremity function 3 to 9 months after stroke. JAMA: the journal of the American Medical Association, 296(17), 2095-2104.

Younger, J. W., Shen, Y. F., Goddard, G., & Mackey, S. C. (2010). Chronic myofascial temporomandibular pain is associated with neural abnormalities in the trigeminal and limbic systems. Pain, 149(2), 222-228. doi: 10.1016/j.pain.2010.01.006

Zhuo, M. (2011). Cortical plasticity as a new endpoint measurement for chronic pain. Mol Pain, 7, 54. doi: 10.1186/1744-8069-7-54