

How best to prevent acute pain from becoming chronic?

The best approach is to find the individual risk factors and known predictors and manage them early on.

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Researchers struggle to understand the etiology, pathogenesis, and pathophysiology of chronic pain and continue to look for rational therapies that can alleviate this common problem. Perhaps the most important issue in chronic pain management is how to avoid having to treat it in the first place through prevention.

Where does chronic pain come from? The obvious answer is not very scientific: from acute pain. Yet acute pain is often defined as a separate entity from chronic pain, and treatment focuses on alleviating it to prevent suffering in the moment, with little discussion about how acute pain may affect the patient's future course.

Preventing chronic pain requires a more patient-centered approach. Clinicians need to formulate a plan for each patient taking into account individual risk factors and known pre-

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TABLE 1
Risk factors for developing chronic pain

Type of risk factor	Demographic variables	Acute pain characteristics	Psychological factors	Contextual details
Specific risk factors	Age	High pain intensity	Negative emotion	Injured at work
	Gender	Long pain duration	Depression	Work safety
	Education	Radiation of pain	Anxiety	Work satisfaction
	Employment	Prior episodes of pain	Anger	Compensation
	Health status	Multiple sites of pain Multiple somatic symptoms	Fear	Litigation
			Stress	Social support
			Distress	External attributions of responsibility
			Catastrophizing	
			Hypervigilance	
			Self-efficacy	
Neuroticism				
Pain sensitivity				
Somatization				
Critical risk factors	Poor health status	Severe pain intensity	Depression	Litigation

dictors for the development of chronic pain. These risk factors and predictors will help create a picture of a patient who may be on the path to chronic pain. Physicians can reduce the likelihood of the patient developing chronic pain if a rational recipe of therapies are prescribed and implemented in a coherent and coordinated fashion.

What is chronic pain and who develops it?

The existing definitions are unsatisfying. They usually include criteria that detail severity (>6-7 on a 10-point scale), duration (>3-6 months), and impairment (decreased function or quality of life). These definitions are arbitrary attempts to create a pathologic category distinct from normal functioning.¹

If the focus begins with acute pain, tissue injury has usually occurred. There is a cascade of physiologic events that begins with local inflammation, sensitization of peripheral nociceptors, alterations in transduction, increased conduction, and sensitization of dorsal horn nociceptors.² The overall system, which warns

and protects from noxious stimuli, is modulated by descending efferent pathways and mediated by a host of components and processes such as the *N*-methyl-D-aspartate (NMDA) receptor, neurotransmitters, neuromodulators, wind-up, decreased inhibition, and increased synaptic efficacy. This acute sensitization increases awareness of pain, limits damage, promotes healing, and is reversible.

In contrast, the pathophysiology of chronic pain suggests that in the presence of severe nociceptive activation, persistent inflammation, and neuronal damage, central sensitization emerges and causes nerve cell remodeling.³ In this situation, reversible modulation begins to deteriorate into irreversible modification.

The literature is extensive with studies describing risk factors for developing chronic pain.^{2,4-6} These factors are summarized in **TABLE 1**.

How should physicians estimate the risk of chronic pain?

In the vast majority of cases, the cause of acute pain will be obvious. The problem occurs,

however, when the acute pain cannot be alleviated and its cause remains elusive. When attempting to determine your patient's risk for developing chronic pain, 4 perspectives will help to group possible causes and separate them into classes with distinct mechanisms (see TABLE 2).⁷⁻⁹

- **The disease perspective.** Refractory acute pain may be caused by an *undiagnosed disease*.
- **The behavioral perspective.** The patient may be engaged in *unproductive behaviors* that contribute to the acute pain or interfere with its treatment.
- **The dimensional perspective.** *Intrinsic traits* may inhibit his or her response to therapies or evoke more severe pain.
- **The life story perspective.** *Life stressors* (eg, unemployment, marital strain) may be present that distract and demoralize the patient, such that the focus on treating acute pain is lost in a sea of other problems.

When a patient with persistent acute pain does not respond to treatment in a timely fashion, the physician should expand the evaluation to include these 4 domains.^{10,11}

For instance, when examining a patient's life story, expand the history to learn more details about the patient. Try to understand what suffering from pain means to the patient. As the relationship between you and the patient grows, help him or her find an answer to the question, "What good does life hold for me?"

In contrast, when exploring the behavioral perspective, focus on what the patient is doing.

Often, an individual is engaging in unproductive behaviors that make the acute pain worse. Point out these problematic behaviors when they occur. Then shift the patient's emphasis to thinking about his choices and what goals he is trying to accomplish. As more productive behaviors emerge, reinforce them with positive feedback. Gradually, the patient will become more capable and the distress and disability will be extinguished.

The other 2 perspectives emphasize aspects of the patient rather than the things he or she is doing and encountering. The dimensional perspective, for instance, concerns individual traits. If the patient's constitution is not capable of handling acute pain, his ability to cope will be overwhelmed. To determine if this is the case, you need to gain an understanding of who the patient is and quantify specific traits, including intelligence, introversion, and openness. Formal neuropsychiatric testing is not required, but informal descriptions provided by the patient and family members will illuminate relative strengths and weaknesses.

To help the patient, guide him toward his strengths and provide the education needed to meet the demands of the situation. For example, a patient who is shy and detail oriented will need help asking for more information about his pain and its treatment before feeling less anxious about a mysterious process that is causing his suffering. Lay out careful and specific treatment plans instead of simply offering reassurance that the situation will improve.

Finally, regarding the disease perspective:

TABLE 2
Perspectives of acute pain evaluation⁷⁻⁹

	Perspective			
	Disease	Dimensional	Behavioral	Life story
Distinction	What the patient has	Who the patient is	What the patient does	What the patient encounters
Logic	Categorical	Quantitative	Goal and purpose	Narrative
Concept	Cause and effect	Composition and context	Choice and outcome	Event and meaning
Treatable risk factors for chronic pain	Major depressive disorder	Somatosensory amplification	Fear and avoidance	Posttraumatic stress disorder
	Neuropathic pain	Multiple somatic symptoms	Substance abuse	Catastrophizing
Treatments	Antidepressants	Relaxation training	Physical therapy	Interpersonal psychotherapy
	Anticonvulsants	Cognitive-behavioral psychotherapy	Substance abuse counseling	Patient support groups

Using the 4 perspectives provides a patient-centered approach that will allow clinicians to make rational treatment decisions.

While the disease process causing acute pain is likely known and the “broken part” is being addressed, the patient may have another disease that’s interfering with pain treatment. You should always be thinking about comorbidities and their specific etiologies. Fixing these problems will minimize the total pathologic burden and improve the likelihood of being able to control acute pain.

Using these 4 perspectives to organize risk factors for the development of chronic pain provides a logical patient-centered approach that will allow clinicians to make rational treatment decisions.^{12,13} For example, new-onset chronic pain is more likely to occur in the presence of diseases such as pain sensitization and major depressive disorder. Individual variations in one’s propensity to experience distressing somatic symptoms or one’s ability to modulate nociceptive processes are dimensional traits linked to developing chronic pain.

Similarly, if a patient in acute pain abuses medications or avoids healthy behavior out of fear that it will cause more damage and increase pain, he or she may create a vicious cycle of continued pain and deteriorating function. And finally, the meaning a patient in pain attaches to this experience and how he or she links it to other life encounters may produce catastrophic interpretations and posttraumatic stress reactions, which in turn will undermine recovery.

Using the 4 perspectives to guide treatment

A closer look at the 4 perspectives will shed light on how each can inform treatment decisions.

The disease perspective rests on a logic in which an etiology induces pathology, which in turn produces signs and symptoms that characterize a clinical syndrome. One example of a disease increasing the risk of acute pain becoming refractory to treatment and becoming chronic pain is the sensitization that occurs in the nociceptive system.¹⁴ Multiple mechanisms, such as peripheral sensitization, ectopic hyperactivity, and altered response mechanics of nociceptive neurons, intensify acute pain and its resistance to traditional analgesics. However, these pathophysiologic mechanisms define pharmacologic targets, such as sodium channel blockers and serotonin-norepinephrine reuptake inhibitors (SNRIs), to desensitize nociceptive processing.

Another disease to consider in this context is major depressive disorder.¹⁵ While patients

in pain become demoralized and depleted over time spent suffering, major depression is a bodily disorder of neurotransmitter function. Longitudinal studies demonstrate how the presence of a major depressive disorder increases the risk of new-onset chronic pain.¹⁶

The behavioral perspective incorporates a logic in which drive leads to choice and learning results from the outcome. The fear and avoidance model of pain shows how injury and pain can be confronted and result in recovery and return to function.^{17,18} The problem occurs when pain is met with fear and avoidance behaviors that result in disuse, disability, and more pain. This vicious cycle prevents the patient from responding to pain treatment, which increases the probability of a chronic pain syndrome taking hold.

Addiction is another example of a behavioral disorder that increases the risk for chronic pain. If medication abuse precedes or occurs in conjunction with acute pain, achieving intoxication replaces the goal of pain relief.¹⁹ Pain now drives the patient to consume the addictive substance in excess. Disorder ensues and the behavior spirals out of control. The prevention of chronic pain is more likely if these forms of behavior are stopped and the goals of a patient’s choices are aligned with the practitioner’s desire for alleviating pain and restoring health.

The dimensional perspective contributes to persistent acute pain by presenting a situation to the patient that provokes a vulnerability rather than providing an opportunity to meet the demand. In other words, the patient is not equipped to deal with acute pain because of who he is and the capabilities at his disposal. For example, every individual has an endogenous analgesic system. This system has the capability of modulating pain so that, when confronted with acute pain, the system can potentially decrease nociceptive processing in such a way that the person experiences less pain with the same stimulus.^{20,21} Individuals with a less efficient system are not able to suppress nociception when exposed to painful stimuli and are at increased risk for the development of chronic pain.²²

Similarly, all individuals have the ability to detect somatic sensations. Some are more aware of these sensations than others. People with greater somatization or somatosensory amplification are more likely to seek health care and experience distress about their symptoms.²³⁻²⁶

The life story perspective acknowledges

that patients are living a narrative, one that includes a setting, a sequence of encounters, and an outcome. Some life events are interpreted as traumatic by the individual and can progress to reexperiencing that event, avoiding reminders, and being hyperaroused by potential threats. Studies that look at the outcome of motor vehicle accidents and whiplash have found great variation across countries and a decrease in claims if victims receive fewer financial benefits for the condition. More sophisticated research finds no dose effect between the intensity of trauma and the probability of developing chronic whiplash pain. The meaningful elements, not the physical ones, of the context of the accident are the major predictors.

Catastrophizing is a more multifaceted condition that refers to an exaggerated response to a painful experience.²⁷ Magnification, rumination, and helplessness cause the patient to worry about or expect major negative consequences from his acute pain. Catastrophizing is predictive of the development of chronic pain, disability, and poor quality of life. But this problem can be modified with a variety of psychological therapies ranging from illness education to cognitive-behavioral therapy.^{28,29}

A case report illustrates the value of preventive therapy

Mr. H, age 44, presented to his family physician with acute low back pain after playing softball with his friends. He has had intermittent mild low back pain for the past 15 years but never sought treatment before. His medical history includes hypertension, hyperlipidemia, and being overweight. He takes a statin and low-dose beta-blocker, has had no surgeries, and does not use illicit drugs or abuse alcohol. He works as an accountant and is under tremendous pressure at work to be more productive and less obsessed about making mistakes. He is married and worries about the health of his 2 children, although neither has had any serious medical problems.

Mr. H's physical examination was normal except for some bilateral tenderness in the paraspinal and oblique muscles. His pain increased with movement, but his straight leg raising test was negative. His gait was mildly antalgic, and he sat in a chair with discomfort but exhibited full range of motion. He was initially treated with anti-inflammatory medications and muscle relaxants and was given instructions to

gradually increase his physical activity and avoid strenuous exercise, but not to spend daytime hours in bed.

On follow-up over the next 6 months, the patient had not returned to his baseline level of function, and he said the medications provided only partial relief. He continued to complain of low back pain, rated as a 5 on a 10-point scale. He was becoming increasingly worried about his symptoms and was concerned that he might need more detailed examinations; he feared he might need surgery. He said his performance at work deteriorated and he was not socializing with his family at night or on the weekends.

Mr. H had been referred for supervised physical therapy, but that seemed to have done little good. After 6 months of persistent pain and accompanying symptoms, the physician made the diagnosis of a major depressive disorder in the context of anxious, obsessional, and introverted traits. The patient was overwhelmed by his pain and demands at work with resultant loss of functioning, including avoidance behaviors leading to further physical deactivation and weakness.

A new treatment approach. The patient was started on an SNRI and encouraged to remain in physical therapy and to increase the frequency of sessions to 3 times per week. In addition, he was referred to a behavioral psychologist for training in relaxation therapy and coping skills training for stress management.

Within a month, Mr. H reported an improved mood, decreased anxiety, and a sense that he was making progress. He was more engaged with physical therapy and was practicing self-directed relaxation techniques. His pain was improved and he had decreased his use of analgesics and muscle relaxants. The patient was back at work full-time and had negotiated a decreased workload for several weeks so he could catch up on his backlog of accounts.

Mr. H's case illustrates the value of early intervention to prevent chronic pain in patients with acute pain. As mentioned earlier, such interventions rely on evaluation for any potentially dangerous outcomes related to acute pain, screening for risk factors for chronic pain, providing guidance and advice for returning to previous levels of function, using medication conservatively, and having frequent follow-up visits to assess progress. However, if the patient is at higher risk for the development of chronic pain, a more comprehensive and evidence-based approach should be instituted. Consultants who can play an integral role on the pain

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management team include a physical therapist, psychologist, psychiatrist, substance abuse counselor, and physiatrist.

This case highlights several risk factors for developing chronic pain if acute pain is not addressed early and aggressively. It shows how several potential etiologies of chronic pain can be assessed and managed before chronic pain becomes an independent problem. This patient had persistent acute pain that was poorly controlled with traditional analgesics, and his situation was notable for temperamental vulnerabilities, fear and avoidance behaviors, and significant life stressors.

Ultimately, coexisting major depressive disorder had amplified the patient's symptoms and further overwhelmed his ability to manage his acute pain. Targeted treatment for reducing his pain—but also increasing his function and alleviating his depression—allowed him to feel capable of being successful and returning to healthy activities. This potentially overwhelming case for the physician was successfully organized around the 4 perspectives of disease, behavioral, dimensional, and life story described earlier.

Applying basic principles

In summary, the best way to treat chronic pain is to prevent it. The perspectives outlined in this article provide a framework for targeting modifiable risk factors that can decrease the likelihood of acute pain becoming chronic.

The basic principles are sound: Repair and cure a disease; guide and strengthen an inherent vulnerability; extinguish unproductive behaviors and expose the patient to productive habits; and rescript the patient's interpretations of failure to remoralize and instill a sense of mastery of life's burdens.

Rational treatment includes:

- pharmacologic agents for common diseases that predispose to chronic pain
- the use of body awareness techniques and biofeedback to reduce somatosensory amplification
- confrontation of abnormal illness behaviors with group-based psychotherapies and active physical therapies
- patient support groups and interpersonal psychotherapies to show the patient how others have overcome stressful life events, as well as to keep him or her engaged with life in general.

The risk factors for chronic pain in the

patient with acute pain are recognizable. Identifying them will help you prevent this unwelcome transition and address the barriers to restoring health and function.

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