

EDITORIAL

Multimodal Approach to Prevent Chronic Pain Development

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The concept of pain constitutes one of the most fascinating chapters in the history of medicine. Aristotle and other ancient Greek philosophers proposed that pain was a passion of the soul, which remained widely accepted for some centuries. Consequently, pain treatment remained somewhat empirical and ineffective¹. In the last two decades, significant advances have been made in our knowledge of basic mechanisms and various groundbreaking innovations have been introduced to manage acute and chronic pain. In 1965, the revolutionizing concept of gate control theory of pain was published by Melzack and Wall which proposed that the signal of pain could be gated or modulated².

Although pain is an adaptive sensory experience, the transition from acute to chronic pain is not adaptive and results in the development of a chronic clinical condition³. There is ample evidence from preclinical and clinical studies that excessive afferent discharges consequential to tissue injury evoke peripheral and central sensitization that leads to the development of chronic pain⁴. A new conceptual model of biopsychosocial mechanisms of transition from acute to chronic postsurgical pain was proposed by Rabbitts et al.⁵ The changes that contribute to chronification of pain include alterations in sensory pain processing and psychosocial processes (psychological, behavioral, and social components). Patient-related premorbid factors (demographic factors, genetic profile, and clinical factors such as premorbid pain) may further modulate these changes. Factors related to acute injury and recovery (surgical and treatment factors) and biological response to surgery (epigenetic, inflammatory, and endocrine factors) may also influence this process^{4,5}.

The balance between the risk and protective factors drives the progression from acute to chronic pain. Pain conditions begin with initiating factors, such as acute physical injury of the muscles, and resolve without complication or persistence in most cases. However, if sufficient numbers of risk factors are present, even if small, it can shift the balance from healing to delayed recovery and chronic pain. The presence of protective factors and early intervention in the cycle will have the greatest impact on normal healing and resolving the condition⁶. A combination of robust self-management training with evidence-based pain treatments through a multimodal approach is the key to preventing chronic pain.

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Multimodal pain control is the use of multiple analgesic medications, opioids, and non-opioid and non-pharmacologic interventions to decrease pain at varying locations in the pain pathway. This allows the patient to benefit from sever-

al different medicines that may potentiate one another, mitigate the side effects of certain drug classes, and decrease the amount of use of opiates post-operatively⁷. Multimodal analgesia regimens are both patient- and procedure-specific and utilize varying combinations of local and/or regional analgesic techniques and non-opioid analgesics (acetaminophen, nonsteroidal anti-inflammatory drugs [NSAIDs], cyclooxygenase [COX]-2-specific inhibitors) and analgesic adjuncts (dexamethasone, gabapentinoids). It is directed toward 4 goals: (1) improvement in the patient experience through better pain control, (2) reduction in postoperative morbidity and mortality, (3) reduction in healthcare costs, and (4) decreased physician contribution to the global opioid epidemic⁸.

With the introduction of the neuromatrix theory for dealing with acute and chronic pain, multimodal approaches for pain management should be considered according to 1) the pain intensity, 2) the physiopathology of pain, 3) the complexity of symptoms, 4) the presence of comorbidity, and 5) the physiopathological factors and the social context⁹. Implementation of multimodal pain management includes early pain management by addressing acute pain promptly to prevent chronic post-surgical pain, engaging in physical exercise, following healthy lifestyles by quality sleep, nutritious diet, and quitting smoking and alcohol. Psychological interventions help to reframe negative thoughts and reduce pain intensity and emotional burden. Pain education and awareness are vital in a multimodal pain management approach. Ergonomic practices, social supports, and regular medical follow-ups need to be established for the successful implementation of multimodal pain treatments.

Several challenges for patients and providers exist in the pain management process that should be identified to prevent chronic pain. Patient barriers to multimodal chronic pain management include cost, transportation, the perception that nonpharmacological treatments are less effective, and low motivation. Providers face several barriers to multimodal chronic pain treatment, including patient skepticism about the efficacy of nonpharmacological modalities and reluctance to change the treatment modality after initiation of opioid therapy¹⁰. Organizational barriers include a lack of trained staff, poor funding and resources,

limited modalities, and inadequate political goodwill. Efforts to improve chronic pain management should address both organizational and patient-level challenges, including primary care provider panel sizes, accessibility of additional training for primary care teams, leadership support for multimodal pain care, and availability of multidisciplinary pain management teams.

To prevent chronic pain, we need to focus more efforts on prevention and use interdisciplinary approaches, particularly for the most persistent pain problems. Digital health tools, telemedicine, AI-based personalized pain management plans, expanding insurance coverage, and standard clinical guidelines will significantly prevent chronic pain escalation.

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