

Pathophysiology of Pain: Implications for Perioperative Nursing



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ABSTRACT

The pathophysiology of pain is a complex process that varies according to duration (eg, acute, chronic) or type (eg, nociceptive, neuropathic, psychogenic). Perioperative nurses should understand the pathways that lead to pain to better assist in managing patients' pain symptoms. Approaching pain from a patient-centered stance includes acknowledging that pain is defined entirely by the subjective experience of the patient, which may not be proportional with the level of tissue damage. This article provides a brief description of the pathophysiology of pain and the components of nociceptive and neuropathic pain pathways to aid the perioperative nurse in pain management. *AORN J* 101 (March 2015) 338-344. © AORN, Inc, 2015. <http://dx.doi.org/10.1016/j.aorn.2014.12.008>

Key words: pain pathway, nociceptive pain, neuropathic pain, psychogenic pain, acute pain, chronic pain.

Pain is both a health care issue and a pervasive physical disorder that has been poorly understood until recently.¹ Philosophical, political, and religious implications of pain have paralleled the distress of human beings for much of human history. During the 1600s, French philosopher, writer, and mathematician Rene Descartes (1596–1650) first described detailed somatosensory pathways, or a link between peripheral sensation and the brain. He hypothesized that pain traveled through only one pathway, believing this same pathway was also used by other sensations. His published manuscript *Treatise of Man* described pain perception existing in the brain, where it creates differences between neural occurrences of sensory transduction and the perceived understanding of pain.^{2,3} Simply put, sensations stimulated in the body are sent directly to the brain, where they are actually perceived. Although appearing overly simplistic in its description, Descartes was a visionary in his insightful realization that sensory perception is a function of the brain. His view of the pain processes set the foundation for a robust understanding of the pain process that enables us today to manage patients' pain much more effectively.

DEFINITIONS OF PAIN

In pain literature, two definitions are considered to be highly descriptive of the duality of pain. The first broadly accepted definition originates from the International Association for the Study of Pain (IASP). The IASP defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”^{4(p5)} This definition refers to pain as a sensation with numerous mechanisms that affect a person's psychosocial and physical functioning. It acknowledges the complexity of the pain experience and the awareness that pain is not caused by tissue and organ damage alone. There is no predictable relationship between identifiable tissue injury and the sensation of pain.⁵ At times, a patient's description of the level of pain may be inconsistent with the actual evidence of tissue damage. This presentation is sometimes seen in the trauma patient who may be severely injured but remains awake, alert, and oriented and does not complain of much pain. In some instances, pain may be caused by abnormalities in the neural processing of stimuli; therefore, a lack of tissue damage may not correlate with an absence of pain.⁵

Pain clinician and expert Margo McCaffrey, MS, RN, FAAN, developed a more clinically useful definition of pain, which acknowledges that pain is an individual and subjective

experience. She describes pain as “whatever the experiencing person says it is, existing whenever he says it does.”^{5(p5)} This definition places the patient at the center of the experience and establishes the patient's self-report as a reliable indicator of the level of pain.

CATEGORIES OF PAIN

Pain may be categorized by duration (eg, acute, chronic), type (eg, nociceptive [awareness], neuropathic, psychogenic), site (ie, muscle, joint, visceral), or etiology (eg, trauma, disease). Patients may experience more than one type of pain simultaneously. For the purposes of this article, duration and type of pain are discussed.

Duration of Pain

Acute pain is a time-limited unpleasant experience with emotional, cognitive, and sensory features, resulting from tissue trauma or damage. This type of pain is usually associated with significant observable tissue pathology and routinely resolves with healing. However, acute pain that is inadequately treated can lead to long-term changes in the nervous system, chronic pain, and psychological distress.^{6,7} Acute pain also involves biological functions that protect against further injury. For example, pain produces protective reflexes, including an unconscious withdrawal from the noxious stimulus, muscle spasms, and other autonomic reactions such as flight. Acute pain is usually categorized as pain lasting up to six months' duration.⁸

Chronic pain persists beyond the expected recovery period after the trauma or injury (eg, surgery for diseased tissue), usually lasting more than six months.⁸ Often, the identifiable pathology creating this type of pain is insufficient to explain the persistent pain. Chronic pain is disruptive to sleep patterns and activities of daily living and as a pain syndrome, it serves no protective or adaptive function.

Type of Pain

The process of pain awareness is *nociception*. Nociceptive pain results from tissue destruction (ie, direct invasion), inflammation, or injury. Nociceptive pain occurs when noxious stimuli activate the afferent neurons (ie, nerves that transmit impulses by receptors to the central nervous system). Nociceptors are highly specialized sensory neurons that detect injury and tissue damage. Some examples of nociceptive pain include a paper cut on the skin, a femoral fracture, discomfort in the course of a cancerous tumor, or chest pain during a myocardial infarction. The process of nociception occurs

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