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Counseling and Treatment Modalities for Pain Management

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Abstract

There is an increase in the age of our population and therefore an upsurge in the reporting of chronic pain, as older adults experience twice the incidences of their younger counterparts. Approaches to chronic pain management, then, must be on the rise and evaluated for their effect on the various types of pain. Quality of pharmacological and non-pharmacological treatments will determine quality of life for those stricken with spinal cord injury, neurological disorder, or emotional pain leading to physical ailments (Shovana, Scofield, & Rashmi, 2013).

Pain is an extremely complex aspect of human physiology, one that has important adaptive functions. It is important to distinguish between normal (nociceptive) pain, which is associated with peripheral changes produced by actual or incipient tissue damage, and neuropathic pain, which derives from damage to or dysfunction in the peripheral or central nervous system. Normal pain is an important signal that danger is at hand, prompting appropriate adaptive behavior and serving the welfare and survival of the individual. Neuropathic pain, by contrast, occurs when normal pain mechanisms are "hijacked" in such a way that the peripheral and central pain mechanisms of normal pain continue to fire in the absence of peripheral painful stimulation (Stahl, 2013). Neuropathic pain may derive from chronic painful stimulation

originating outside the nervous system, but for which the central basis of which is sustained after the stimulus has abated, or in greater intensity than the painful stimulation would ordinarily generate. In other words, and for reasons not entirely understood, the central nervous system (at either the spinal/segmental level or in the suprasegmental brainstem or cortex) produces painful experience that is greater than circumstances warrant.

Melzack and Wall (1965) noted that nociceptive or normal pain is transferred to the central nervous system by two different sets of nerve fibers: smaller diameter C fibers and larger diameter and faster conducting A fibers. Noting that when a higher proportion of the larger fibers transferred nociceptive information to the dorsal (sensory) horn of the spinal cord pain appeared to be lessened, they concluded that the A fibers inhibited transfer of information to the brain by "closing a gate" in the dorsal horn projection nuclei. The model has been very influential in emphasizing that central nervous system activity somewhat independent of peripheral nociceptive stimulation can modulate the central expression of pain. Moreover, it anticipated the way in which narcotic-analgesics and other drugs can be used to control pain.

In 1968, Melzack and Casey proposed that the neurological and psychological bases of pain were three-fold: sensory-discriminative, affective-emotional, and cognitive-evaluative (p.423). While their intent was in part to offer alternatives to pharmacological intervention to modify the experience of pain, their model nonetheless corresponds roughly to distinct CNS pathways associated with the sensory-discriminative and affective-emotional dimensions of pain experience (thalamocortical and more diverse spinobulbar/periventricular/limbic pathways respectively). These dimensions are also segregable pharmacologically. Opioid narcotic analgesics, for example, act at μ-opioid receptors in the spinal cord and the periaqueductal gray, where they dampen the affective-emotional component of pain more than the sensory-discriminative dimension of the experience.

Though it was incomplete in its nascent form, the Gate Control Theory offered useful insights, which have in turn been extended from the dorsal horn of spinal gray matter through multiple synaptic paths in more rostral regions of the brain. Though the spinal mechanisms are more completely understood, evidence suggests that pain can be blocked at multiple sites throughout the brain. In the pain projection nuclei of the dorsal horn, moreover, multiple receptor forms are evident, which can in turn open or close the gate to pain as a function of neurotransmitters released by other neurons, including those originating in the neocortex. In addition, presynaptic receptors on peripheral nociceptive neurons that terminate on the dorsal horn projection nuclei can also be influenced by CNS neurons to close (or open) the gate to pain (Melzak & Casey, 1968; Stahl, 2013).

Drugs Used to Treat Pain

Numerous pharmacological agents can influence these linkages and thus reduce pain. Most common, of course, are the narcotic-analgesics such as morphine, hydrocodone, and meperidine. These agents are capable of occupying μ-opioid receptors in both the spinal cord and periaqueductal gray (the latter intimately associated with integrating the nociceptive inputs and limbic functions), as well as sending terminals to the dorsal horn of gray in the spinal cord to inhibit pain. As is well known, these drugs are capable of producing powerful positive affective experiences, as well as physiological addiction. Before addressing those mechanisms; however,

it will perhaps be of value to provide a brief discussion of other pharmacological agents that have been shown to be helpful in the management of pain (Stahl, 2013).

The dorsal horn cells receiving nociceptive inputs from the periphery carry a wide range of receptor forms. In addition to the μ-opioid receptors, they have several forms of serotonin receptors, as well as α_2 norepinephrine receptors, A and B receptors for GABA, and glutamate receptors, all of which potentially influence the transfer of nociceptive information to the brain (Stahl, 2013). Of these, the drugs that block the reuptake of serotonin and norepinephrine in these sites have been most often exploited, and most frequently in cases of chronic, neuropathic pain. Serotonin reuptake inhibitors are not always as effective because the dorsal horn projection nuclei carry several forms of serotonin receptors, some of which can actually open the gate and worsen the pain. Drugs that enhance both serotonergic and adrenergic action at dorsal horn synapses are usually most effective. These agents, according to Marks et al. (2009) and Watson, Gilron, Sawynok, and Lynch (2011), include venlafaxine (Effexor™), desvenlafaxine (Pristiq™), and duloxetine (Cymbalta™).

Drugs that have a direct inhibitory effect on voltage-sensitive calcium channels have also been used successfully to manage chronic and neuropathic pain. These agents include gabapentin (Neurontin™) and pregabalin (Lyrica™). Drugs that inhibit voltage-sensitive sodium channels (including some mood stabilizers) have also been used to moderate pain, with mixed success (Gilron & Flatters, 2006).

Although these drugs are useful in the treatment of chronic and neuropathic pain, they are rarely used for intense and acute nociceptive pain, such as that associated with trauma, surgery, and orthopedic injuries. In these situations, narcotic analgesics are far more common, particularly of course because they work quickly and well to eliminate at least the strong affective component of pain. And therein lies the problem. Narcotic analgesics reduce pain in part by occupying μ-opioid receptors in the periaqueductal gray and dorsal horn projection nuclei, with the periaqueductal gray projecting both to the dorsal horn projection nuclei and the nucleus accumbens, a structure in the forebrain associated with, among other things, the production of pleasure. When opioid analgesics occupy the μ-opioid receptors in the nucleus accumbens, they facilitate a pulsatile release of dopamine in that region, which in turn can produce the intense pleasure and other affectively positive aspects of opioid intoxication. Projections from the periaqueductal gray produce the same nucleus accumbens effects directly (Stahl, 2013). Moreover, such intense activity apparently changes the form of many of the opioid receptors from that of an agonistic receptor to an antagonistic one, perhaps through alteration in or interference with G protein structures that normally mediate the synaptic action of opioids (Harrison, Kastin, & Zadina, 1998). Over time, this structural change in the proteins making up the opioid receptors requires that more of the drug be taken in order to produce a comparable effect, resulting thus in the development of tolerance. Further, since the brain's endogenous opiates (e.g., endorphins) are no longer sufficient to produce their analgesic and pleasurable actions, both physiological dependence and withdrawal effects when the drug is no longer available to make up the difference will follow. Since the opioid receptors necessary to produce analgesia are substantially the same protein structures as those producing pleasure, addiction, tolerance, and withdrawal, it is plain that their use is inherently capable of facilitating opioid dependence and abuse.

Exploration of ways to combat the effect of G protein structural breakdown of the opioid receptors may lend to a multi-faceted wellness protocol. Beyond this pharmacological approach

lies the area of non-pharmacological treatments, consisting of, but not limited to, acupuncture, massage therapy, heat therapy, education, exercise, distraction, ultrasound, and transcutaneous electrical nerve stimulation- better known as TENS. The *British Medical Journal* contained an article in August 1978 regarding the "Gate Control Theory" as the motivational factor to expand this research into a clinical setting (Mazzullo, 1978). Clinics, whose sole purpose was to grow and train in the area of pain management, became increasingly more attractive both in theory and practice, utilizing methods of treatment such as acupuncture and TENS. Evaluating these varied methods and their respective efficacies, coupled with the patient's prescribed medication, would be worthwhile if indeed it limited dependency on analgesics (Budh & Lundeberg, 2004).

Research of Treatments for Pain Management

Several studies in the recent past have had a broad scope for basing a comparison of treatments both pharmacological and non-pharmacological, or a combination of the two. For the most part the data has come from self-report methods, which are not very reliable for a number of reasons. Depending on the wording of questionnaires, how thorough the questions may be, or whether opportunity was afforded to explain some answers, communication could vary with each individual. Additionally, participation and/or response were only at a level of about half of those polled returning a response (Heutink, Post, Wollaars, & Van Asbeck, 2011). Nociceptive pain, the type felt upon accidental injuries like sprains or burns, happens to be temporary and more manageable. Neuropathic pain, on the other hand, occurs when the nervous system fails to function properly or halts altogether due to direct injury to the central nervous system (CNS), such as spinal cord injury (SCI), or disease, such as multiple sclerosis or poliomyelitis. Of the two types of chronic pain, the former type responds well to medications, while the latter typically reacts to neuro-stimulation, either by TENS or surgical implant (Brannagan, 2013).

An assessment of a number of articles concerning the elderly and their chronic pain issues was recently published with the aspiration to shed light on the lack of devotion to the research of non-pharmacological approaches to their unique population (Shovana et al., 2013). The findings of this significant literature review showed that among these people "use [of] cost effective, readily available and convenient non-pharmacological approaches for managing pain such as exercise, rest, heat/cold application, massage, distraction, relaxation, support groups and bracing/splinting/bandaging" tended to be incorporated (Shovana et al., 2013, p. 135). Furthermore, this population favored using a variety of these treatments. However, lacking were the indicators for this methodology, explaining whether cost, ease of access, or convenience played a part in predilection. Among the various opportunities, "exercise and rest were two of the preferred approaches in pain management" when kept in balance (Shovana et al., 2013, p. 155). Interestingly, too, even in situations where measurements of effectiveness were discovered to be higher, people did not naturally opt for these devices. Therefore, the field of investigation appears wide open to determine if health care professionals influence outcomes, with roughly 60% reporting prescription use, or if results may lie in the participants *perception* of relief with surprisingly little or no follow-through on "recommended or self-initiated" protocols (Widerström-Noga & Turk, 2003, pp. 603-604).

When it comes to pain there is more to think about than the typical musculoskeletal and neurological types that are more readily acknowledged. Some research has been done to

determine the result of emotional pain and the consequence of physical harm when left unaddressed. A report of one such "qualitative mixed-methods design, based on written narratives and image narratives, was used to explore phenomena related to grief and pain" (Dysvik, Natvig, & Furnes, 2013, p. 752). The two types of study explored the discourse of participants, their education concerning their chronic pain and physical activity. Improved consciousness and acknowledgement of their pain and its physiological and long-term effect on physical well-being, made the contributors more hopeful (Dysvik et al., 2013). This breakthrough reveals that cognitions that are re-trained could bring some relief. "Here, a meaningful life does not necessarily mean the elimination of pain, but rather a refusal to let the pain dominate, and the repossession of life, moving step by step from victim to survivor" (Dysvik et al., 2013, p. 758).

Wellness Plan

Beyond researching the non-pharmacological management of pain, additional findings about human physiology should be implemented into a wellness plan. For example, realizing steps toward recovering the body's natural excretion of the feel-good hormones can be attainable through diet, supplementation, exercise, and sleep hygiene (Breuning, 2012). That is why SAMHSA's Wellness Initiative encourages you to incorporate the *Eight Dimensions of Wellness* in your life:

> **Emotional**—Coping effectively with life and creating satisfying relationships
>
> **Environmental**—Good health by occupying pleasant, stimulating environments that support well-being
>
> **Financial**–Satisfaction with current and future financial situations
>
> **Intellectual**—Recognizing creative abilities and finding ways to expand knowledge and skills
>
> **Occupational**—Personal satisfaction and enrichment from one's work
>
> **Physical**—Recognizing the need for physical activity, healthy foods and sleep
>
> **Social**—Developing a sense of connection, belonging, and a well-developed support system
>
> **Spiritual**—Expanding our sense of purpose and meaning in life. (SAMHSA, 2013, p. 7)

A multi-faceted approach to wellness can help regulate emotional responses, increase Dopamine, Serotonin, Oxytocin, Endorphins, and decrease Cortisol. Achievement of this is boosted by eating antioxidant rich foods, maintaining a clean diet by eliminating caffeine and junk food, exercising to raise blood calcium, which stimulates these neurochemicals' production and their absorption in the brain (Breuning, 2012). Practicing a good sleep routine and supplementing with B-vitamins are shown to improve this wellness model. Education and

implementation of these modalities are being researched currently and the help of medical professionals will extend the investigation of their value in pain management.

Conclusion

Two-thirds of subjects in several studies indicated they had tried non-pharmacological treatments. "Acupuncture, massage and TENS were the most commonly tried. Massage and heat were scored as giving best pain relief" (Budh & Lundeberg, 2004, p. 196). Because medications only relieve about one-third of patient's pain and never do they abolish pain completely, the expected outcomes of other treatment need to be further researched. "The evidence of effectiveness of the non-pharmacologic approaches to chronic pain helps to develop a disease management strategy to treating pain" (Turk, & McCarberg, 2005, p. 23). Indications of preference for empowerment over their own pain management, individuals reveal that awareness and education programs are called for. Results suggest that most people would like to avoid the medical model over the long-term.

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