

# The Overview of Pain in Cancer Patients

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**Abstract**— Pain is a major problem in cancer patients. The experience of pain is a multi-factorial phenomenon including sensory, cognitive, physiologic, affective, motivational, and behavioral dimensions. Hence, comprehensive assessment of pain is important in order to (provide) pain relieve intervention strategies. Pharmacological and non-pharmacological approaches knowledge on cancer pain management is of extreme importance for healthcare providers dealing with cancer patients. Step-by-step pharmacological approaches in managing cancer pain based on pain intensity is important. Non-pharmacological approaches such as acupuncture, hypnosis, and imagery as complement of pharmacologies therapy provide beneficial effects for pain cancer relieve. However, future research on non-pharmacological approaches with rigorous trials is needed.

**Keywords**— pain, cancer, nursing

## I. INTRODUCTION

Pain defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, classified as acute or chronic and nociceptive or neuropathic pain [1] [2]. The characteristics of pain can be described according to specific characteristics such as; body area, body system, affected; duration, frequency, intensity, type of sensations (e.g., stabbing, throbbing) and also temporal pattern (sub-domains such as acute/chronic pain, continuous/intermittent pain), pain mechanism (included nociceptive, somatic, visceral, neuropathic and idiopathic or psychogenic as well as mixed pain), and etiology: pain caused by direct cancer involvement (e.g., nerve root compression), treatment-related pain (e.g., chemotherapy-induced paresthesia) and pain unrelated to cancer (e.g. arthritis) [3]

Pain as a multidimensional; The experience of pain is a multifactorial phenomenon involving not only sensory but also cognitive, physiologic, affective, motivational, and behavioral dimension [4][5]. The sensory aspect of pain refers to sensations of pain such as its intensity, location, and quality (eg, sharp, throbbing). The physiologic dimension is concerned primarily with the organic etiology of the pain, other components include location, onset, duration, and type of pain. The cognitive dimension of pain refers to beliefs about pain, meanings ascribed to pain, and other thoughts related to pain. The affective dimension, which is related to how the pain makes the sufferer feel. The socio-cultural dimension of pain is comprised of a broad range of ethno-cultural, demographic, spiritual, social, and other factors related to an individual's perception of and response to pain.

Behaviors dimension of pain are actually indicators of the presence of pain, such behaviors will increase as the severity of pain increases and decrease when it lessens behaviors [4] [6]. Meaning of pain in cancer; Meaning of cancer pain as what a person experiences that can be a chronic, acute, malignant or nonmalignant pain. Pain cancer is marked as uniquely, terrible consequences of cancer and seen as hurting, and unfortunate misery, the fear of pain is unwanted and perceived as a suffering behavior [7][8].

## II. CANCER PAIN PREVALENCE

Pain is one of the most feared, burdensome symptoms and still a major problem in cancer patients [9, 10]. Prevalent pain in cancer patients is estimated at 25% for those newly diagnosed, 64% in patients with advanced stage, 59% in patients on anticancer treatment, and survivors who have completed treatment is estimated to be approximately 33% [10]. Another studies reported from 62% to 86% in patients with advanced cancer and between 24% and 60% in patients on active anticancer treatment have pain problems [11][13]. The prevalence of pain in cancer patients is to consider the following categories pain related to the cancer, treatment and unrelated causes [3][10].

Pain related to the cancer: tumors can impinge upon adjacent tissues, leading to pain. Although reports vary widely, the range of reported prevalence of pain is highest for the following tumors: Head and neck (67–91%), Prostate (56-94%), Uterine (30–90%), Genitourinary (58–90%), Breast (40–89%), Pancreatic (72–85%) [2]. Another study showed the prevalence of pain was >50% in all cancer types with the highest prevalence in head/neck cancer patients (70%; 95% CI 51% to 88%) [10].

Treatment: After surgery, patients will have pain in the part of the body that was operated on. Surgery produces painful persistent post-surgical syndromes, such as post-mastectomy pain and phantom limb pain [14-16], (87% incidence of phantom pain at 3-6 months [17]. Therapeutic irradiation cause significant injury to any part of the central or peripheral nervous systems [18][19], 50.8% neuropathic pain (NP) at radiotherapy oncology units [20] and the most common pain syndrome resulting from chemotherapy is chemotherapy-induced peripheral neuropathy (CIPN) [21] [22]. CIPN prevalence was 68.1% (57.7–78.4) when measured in the first month after chemotherapy, 60.0% (36.4–81.6) at 3 months and 30.0% (6.4–53.5) at 6 months or more [23].

Unrelated causes: pain unrelated to cancer or its treatment people with cancer may develop pain that is not related to cancer, such as peripheral neuropathy from diabetes, pain after surgery and arthritis for unrelated conditions [3].

#### *A. Mechanism cancer pain.*

Cancer pain is a complex pathologic process and a formidable clinical problem. Pain in the cancer patient caused primarily by the development of the disease process such as a consequence of cellular, tissue, and systemic changes that occur during proliferation, invasion, metastasis, and responding immune system also has a clear role in cancer pain [24][25]. The cancer cell produces mediators that affect other cells within the cancer micro-environment, such as immune cells. Nociception almost certainly involves dynamic interactions and crosstalk between cancer and the primary afferent nociceptor [24]

Nociceptor stimulation by tumors; A tumor is made up of many cell types other than cancer cells, including immune-system cells such as macrophages, neutrophils and T cells. These secrete various factors that sensitize or directly excite primary afferent neurons, and include prostaglandins, tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), endothelins, interleukin-1 and -6, epidermal growth factor, transforming growth factor- $\beta$ , and platelet derived growth factor. Receptors for many of these factors are expressed by primary afferent neurons [24, 26].

In addition to cancer cells, tumors consist of inflammatory cells and blood vessels, and are often adjacent to primary afferent nociceptors. Cancer cells and inflammatory cells release a variety of products, such as ATP, bradykinin, H<sup>+</sup>, nerve growth factor, prostaglandins and vascular endothelial growth factor (VEGF), that either excite or sensitize the nociceptor. Painful stimuli are detected by the nociceptors, the cell bodies of which lie in the dorsal root ganglion (DRG), and are transmitted to neurons in the spinal cord. The signal is then transmitted to higher centres of the brain. Cancer-associated pain signals seem to ascend to the brain by at least two main spinal-cord pathways; the spinothalamic tract and the dorsal column to brain. In summary, when those peripheral nerves are activated by direct stimulation and from a release of inflammatory neurotransmitters (substance P), they send signals back through the spinal cord, and into the brain [26].

#### *B. Consequences cancer pain*

The physical and psychological effects of pain influence the course of disease and indirectly influence disease outcomes by reducing treatment adherence [27]. Unrelieved pain impacts all dimensions of quality of life and profoundly influences the patient's ability to endure treatment, return to health as a cancer survivor, or achieve a peaceful death [10]. Pain had a negative influence on activity daily living functions and on the concentration [28][30]. Increasing the anxiety level and the fear about the future and future problems [28][31], interference with sleep, enjoyment of life, work ability, and social interactions [32], negative effect on mood; more anger, fatigue, confusion, and lethargy, cognitive functions disturbed and resulting in depressive feelings and even suicidal thoughts [29][33].

#### *C. Assessment of the symptom pain*

Comprehensive assessment of pain is very important in order to pain relieve strategies [34] Clinical practice guidelines developed by the National Comprehensive Cancer Network (NCCN), and American Pain Society (APS) has been describes for a comprehensive assessment of pain. The three approaches to pain assessment include cognitive (self-report), behavioral (cry, posture, and facial expression), and physiologic (heart rate, variability, blood pressure fluctuations, decreases in oxygen saturation, and metabolic and endocrine increases) [35].

The goals of assessment are to assist in establishing a baseline, selecting interventions, and evaluating the individual's reponse to treatment. Assessment of pain includes the evaluation of pain intensity and other factors considered in pain assessment include discerning the quality of pain, onset, and duration and what actions may worsen or relieve the pain. Careful patient interviews should also probe the degree of patient distress from the pain as well as psychological or social factors and medical history [36].

The commonly used ratings of pain intensity, including Visual Analogue Scale of pain intensity (VAS-I), Numerical Rating Scale of Cancer Pain Intensity (NRS-I), and Verbal Rating Scale of Cancer Pain Intensity (VRS-I), and the facial pain scale (FPS). All appear adequately valid and reliable as measures of pain intensity among the many different samples of persons with cancer [37, 38]. The Brief Pain Inventory (BPI) is the multiple-item intensity measure used most commonly among patients with cancer and the measure most often used to assess the qualitative aspects of pain, including cancer pain is The McGill Pain Questionnaire (MPQ). The Short-Form MPQ more practical than the MPQ to use in cancer pain [37].

A Visual Analogue Scale of pain intensity; Consists of a line, usually 100 mm long. With each end of the line labeled with descriptors representing the extremes of pain intensity (eg, no pain, extreme pain). Respondents place a mark on the line that represents his or her pain intensity level, and the distance measured from the "no pain" end to the mark is that person's VAS pain score [38]. Verbal Rating Scale of Cancer Pain Intensity; Consist of a list of descriptors or phrases (eg, none, some, moderate, severe) that represent varying degrees of pain intensity. Each word or phrase has a number associated with it (eg, none=0, severe=3). Respondents are asked to select the single word or phrase that best represents his or her pain level, and the respondent's score is the number associated with the word chosen [38].

Numerical Rating Scale of Cancer Pain Intensity; Consists of a range of numbers (usually 0 to 10, but sometimes 0 to 100 or other ranges), respondents are told that the lowest number represents no pain and the highest number represents an extreme level of pain (eg, pain as intense as you can imagine). They are asked to write down, circle, or state the single number that best represents their level of pain intensity. The facial pain scale (FPS); consists of several different facial expressions that depict various levels of pain. Patients can choose the facial expression that best depicts the intensity of their pain. The assessor scores the level of pain according to the facial expression [39]. The Brief Pain Inventory; measures both the intensity of pain (sensory dimension) and interference of pain in the patient's

life (reactive dimension). The BPI was validated in patient populations such as bone metastases, breast cancer and postoperative cancer patients [7][12].

McGill Short Form Questionnaire (MPQ); The MPQ consists of 78 pain descriptors classified into 20 categories of pain that can be scored to assess 4 major dimensions of pain: sensory, affective, evaluative, and miscellaneous pain, as well as a total pain severity score [40] Then, the SF-MPQ consists of a subset of 15 descriptors from the MPQ drawn from the sensory and affective categories [41]. Patient characteristics related to cancer pain, such as patient demographics; Age, gender, education, marital status, medical history [3]. Age has been shown to affect cancer pain; younger patients experience more pain and more pain flares than older patients. Some studies indicate older adults are more sensitive to experimental pain than young adults, whereas others suggest a decrease in sensitivity with age. Pain is commonly under recognized, under-treated in older adults compared to younger adults [42]. Studies using the GREP have found both men and women view women as more willing to report pain, less able to endure pain, and more sensitive to pain than men [43][44].

### III. CHALLENGING CANCER PAIN ASSESSMENT PROBLEM

Children patients with cancer; Infants and children may have a limited capacity for communication. Studies have shown that children ages 5-7 are capable of accurately self-reporting their own pain using the Wong-Baker FACES scale [35]. The revised FACES pain scale, the Wong-Baker Faces scale, and the 10-cm visual analog scale are used in many healthcare settings to assess a pediatric patient's pain [45]. The neonatal infant pain scale (NIPS); neonatal facial coding system (NFCS); neonatal pain, agitation, and sedation scale (N-PASS); cry, required oxygen, increased vital signs, expression, sleeplessness scale (CRIES); COMFORT Scale are the Reliable, valid, clinical utility is well established to measure pain [46].

Elderly patients with cancer; Cancer pain in elderly is a challenging problem for clinicians. Accurate assessment of pain in elderly patients requires that clinicians choose an appropriate assessment tool. The level of education and cognitive function of elderly patients with cancer should be assessed prior to the selection and use of a pain scale. Verbal Rating Scale of Cancer Pain Intensity was unaffected by level of education or cognitive function, and it's no response rate was lower than that of the other scales evaluated in this study. Clinical nursing personnel use the Verbal Rating Scale of Cancer Pain Intensity first to assess the pain intensity of elderly patients with cancer is recommended [47].

However, pain can be difficult to assess in cognitively impaired individuals because their self-reports of pain can be inaccurate or difficult to obtain. Behavioral observation-based assessment is optimal in these patients. Common pain behaviors are as follows; Facial expressions (frowning, grimacing, distorted expression, rapid blinking), Verbalizations/vocalizations: (sighing, moaning, calling out, asking for help, verbal abuse), Body movements (rigid, tense, guarding, fidgeting, increased pacing/rocking, mobility changes such as inactivity or motor restlessness), Changes in interpersonal interactions (aggressive, resisting care, disruptive, withdrawn) Changes in activity patterns (appetite

change, sleep change, sudden cessation of common routines) and Mental status change (crying, increased confusion, irritability, distress). Clinician observations of facial expressions and vocalizations are accurate means for assessing the presence of pain, but not its intensity, in patients unable to communicate verbally because of advanced dementia [48], pain assessment in older people with any degree of cognitive impairment is complex and there is no gold standard [49].

### IV. INTERVENTION MANAGEMENT OF THE SYMPTOM PAIN

Pharmacological and Non-Pharmacological approaches knowledge on cancer pain management is of extreme importance for healthcare providers dealing with cancer patients.

Pharmacological approach: World Health Organization guidelines form the basis of cancer pain management, recommending a step-by-step approach to manage cancer pain based on pain intensity. The first step is with non-opioid analgesics, such as acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs). The second step, for mild pain, then adds a so-called weak opioid if the pain persists or increases. The third step, replaces the weak opioid with an opioid for severe pain. Morphine is recommended as a first-line opioid to relieve cancer-related pain [50]

Based on Clinical Guideline for Pharmacological Management of Cancer Pain: The Japanese society of palliative medicine recommendations [51], for Patients with mild pain: The type of non-opioid analgesic should be chosen in accordance with the effectiveness and tolerability of an individual patient; acetaminophen should be administered to cancer patients with mild pain. Patients with moderate-to-severe pain or inadequately controlled pain despite treatment with non-opioid analgesics: Patients with inadequately controlled pain despite initial opioid use and Non-opioid analgesics should be treated concurrently with opioids in patients who experience continuous pain with regular opioid use. Patients with breakthrough pain; the rescue dose of opioids should be used in patients with breakthrough pain, for patients with end-of-dose failure, the dose of regular opioids should be increased or interval of regular opioids should be shortened.

Non-pharmacologic and Complementary Therapies: Non-pharmacologic interventions are important adjuncts to treatment modalities for patients with cancer pain. Psycho-educational interventions, music interventions, acupuncture plus drug therapy, Chinese herbal medicine plus cancer therapy, compound kushen injection, reflexology, lycopen, TENS, qigong, cupping, cannabis, Reiki, homeopathy (Traumeel), and creative arts therapies might have beneficial effects on adult cancer pain. However, the evidence levels for these interventions were low or moderate due to high risk of bias and/or small sample size of the primary studies [52]. Studies about acupuncture, hypnosis and imagery showed beneficial effects for pain cancer relieve [53-57]. However, for nursing practice the safe technique should be performed by a well-trained, experienced, licensed health care provider.

Acupuncture: Twenty randomized controlled trial studies involving a total of 1,639 patients, Meta-analysis indicated that acupuncture alone did not have superior pain-relieving effects as compared with conventional drug therapy.

However, as compared with the drug therapy alone, acupuncture plus drug therapy resulted in the increased pain remission rate, shorter onset time of pain relief, longer pain-free duration, and better quality of life without serious adverse effects. Indicate acupuncture plus drug therapy is more effective than conventional drug therapy alone for cancer-related pain [58]. Study by Chiu et al., (2017) on 29 acupuncture Randomized controlled trial studies, shown the overall effect of acupuncture on cancer-related pain was 0.45 (95% confidence interval = 0.63 to 0.26), and the subanalysis indicated that acupuncture relieved malignancy-related and surgery-induced pain (effect size ( $g$ ) = 0.71, and 0.40; 95% CI = 0.94 to 0.48, and 0.69 to 0.10] but not CT- or RT-induced and HT-induced pain ( $g$  = 0.05, and 0.64, 95% CI = 0.33 to 0.24, and 1.55 to 0.27). Indicate acupuncture is effective in relieving cancer-related pain, particularly malignancy-related and surgery-induced pain [53].

**Hypnosis:** Hypnosis is a suggestion offered during the experience for changes in sensation, perception, cognition, affect, mood, or behavior [59]. Hypnosis provides a safe and efficacious supplement to pharmaceutical management of cancer pain [60]. Significant evidence proved that hypnosis is effective at reducing cancer-related symptoms such as pain. Randomized controlled trial study demonstrated that a brief pre-surgery hypnosis intervention reduces medication use, pain intensity, pain unpleasantness in women undergoing breast cancer surgery [61], it was indicated that hypnosis is effective in cancer pain management.

**Imagery:** Several randomized controlled trial studies demonstrated guided imagery relief cancer pain [54]. The study with 40 hospitalized patients with cancer pain showed the percentage changes in pain intensity guided imagery 31% versus control 8%, percentage changes in pain-related distress 37% Imagery versus 16% in control [62]. A study of 62 hospitalized cancer patients showed average pain intensity score decreased in 90% of participants [63]. Another study from Anderson et al., (2006) on 59 cancer patients with pain immediate rating of pain after listening to relaxation and distraction tapes significantly decreased [64].

## V. CONCLUSION

Pain is one of the most feared, burdensome symptoms and still a major problem in cancer patients. The prevalence of pain in cancer patients is to consider the following categories of pain related to the cancer, treatment and unrelated causes. The meaning of cancer pain as what a person experiences that can be a chronic, acute, malignant or nonmalignant pain. Cancer pain is marked as uniquely, terrible consequences of cancer and seen as hurting, and unfortunate misery, unwanted and is perceived as a suffering behavior. Unrelieved pain impacts all dimensions of quality of life, negative influence on activity daily living functions and on the concentration, effect on mood; more anger, fatigue, confusion, and lethargy, cognitive functions disturbed, increasing the anxiety level and the fear about the future and future problems, interference with sleep, enjoyment of life, work ability, and social interactions, and resulting in depressive feelings and even suicidal thoughts.

Comprehensive assessment of pain is very important in order to determine the pain relieve strategies. VAS-I, NRS-I, VRS-I are adequately valid and reliable as to measure the

pain intensity in persons with cancer. The Brief Pain Inventory (BPI) and The Short-Form MPQ use in multidimensional cancer pain assessment. However, pain can be difficult to assess in cognitively impaired individuals. Pharmacological and non-pharmacological approaches are important in pain management. Pharmacological approach considered with cancer pain level, in addition non-pharmacology such as acupuncture, hypnosis and imagery is recommended for cancer pain management as a nursing intervention. However, safe technique performed by well-trained, experienced, licensed health care provider is needed. Rigorous trials on complementary study is recommended for future study in order to conclude high evidence levels.

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