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Pain Intensity and Pain Control Behaviors  
of Adults Diagnosed with Cancer

by

Diana Joyce Wilkie

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF SCIENCE

in

Nursing

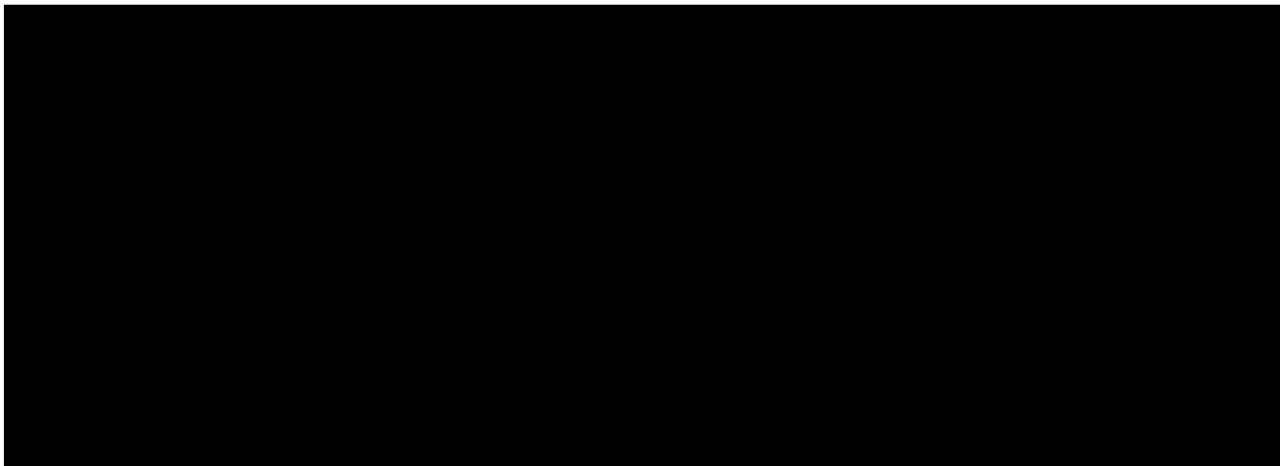
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## Abstract

Little is known about behaviors used by patients to relieve cancer pain or the patient's perception of the effectiveness of the behaviors. The gate control theory of pain and the Johnson Behavioral Systems Model for nursing practice suggest that patients with cancer pain of high intensity and/or long duration are most likely to develop and use behaviors that reduce pain intensity. Using a longitudinal, descriptive-correlational design in a convenience sample of 15 patients with advanced stage cancer, pain control behaviors were identified through participant observation and correlated to pain intensity concurrently measured with a Wachter-Shikora Finger Dynamometer (FD), a Pain Intensity Number Scale (PINS), and a Visual Analogue Scale (VAS). On four separate occasions over two days, pain intensity was measured and behavior was observed for 15 minutes.

Subjects were observed and confirmed using immobilizing/guarding, distractive, positioning, pressure manipulative, and analgesic use behaviors to reduce pain intensity. Distractive and positioning behaviors were used by more subjects and in greater frequency than immobilizing/guarding, pressure manipulative, and analgesic use behaviors.

The VAS and PINS demonstrated strong concurrent validity (Kendall Correlation Coefficient (KCC)-- $r = .82-.89$ ;  $p \leq .001$ ). Pain intensity measured by The FD, however, demonstrated weak concurrent

validity with the VAS (KCC-- $r$ -.38-.46;  $p$  < .05) and moderate concurrent validity with the PINS (KCC-- $r$ -.47-.67;  $p$  < .01). All three scales were sensitive to the transitory nature of cancer pain measured over time.

At three of the measurement times, the total number of validated pain control behaviors was significantly correlated with pain intensity measured with the VAS (KCC-- $r$ -.46-.64;  $p$  < .02) and the PINS (KCC-- $r$ -.46-.62;  $p$  < .02). At the fourth measurement time mean pain intensity was low and patients engaged in more activities of daily living than pain control behaviors. FD measurements were not significantly correlated with pain control behaviors at any of the four measurement times ( $p$  = .05).

Further research in a larger sample is needed to establish the content validity and generalizability of these findings. These results suggest that the PINS is probably a clinically useful measure of pain intensity. However, further research is necessary to establish validity of the FD as a measure of cancer pain intensity.

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## Chapter One

### Introduction

Cancer, a complex disease entity, affects the lives of many Americans. Sixty-six million Americans living in 1983 were predicted to be diagnosed with cancer during their lifetime (American Cancer Society, 1982). Although all individuals diagnosed with cancer do not experience pain, pain is commonly associated with cancer (Huber & Hill, 1980).

Studies indicate that pain is experienced during all stages of cancer. Daut and Cleeland (1982) found that pain was reported as an initial symptom by 18-45% of 667 patients diagnosed with breast, colorectal, prostate, and gynecological cancers. Studies conducted by Twycross (1974), Parkes (1978), and Foley (1979) indicate that 40% of patients with intermediate stages of cancer experience moderate to severe pain whereas 60-80% of patients with advanced cancer experience severe pain. Patients diagnosed with cancer also die in pain. Studying 43 terminal patients with cancer, Oster, Vizel, and Turgeon (1978) found that 72% of them died in pain.

Unrelieved cancer pain results in physical deterioration and emotional disturbance (Bonica, 1982). Sleep disturbances, anorexia, nausea, and vomiting are commonly reported symptoms accompanying cancer pain (Bonica, 1984). Patients with cancer pain also experience more depression and feelings of helplessness and hopelessness than patients who have cancer without pain (Woodforde &

Fielding, 1975). Bond (1979) found that emotional disturbances in patients with cancer pain subsided when pain was controlled.

#### Statement of the Problem

Researchers and pain authorities agree that control of cancer pain is dependent upon accurate evaluation of the pain experience (Bagley, Falinski, Garnizo, & Hooker, 1982; Bonica, 1982; McCaffery, 1979; Meinhart & McCaffery). Pain evaluation must be based upon information from the only person with first-hand knowledge of the pain--the patient (Daut & Cleeland, 1982). Thus, control of cancer pain initiates with the patient experiencing the pain.

When patients have pain of long duration, such as cancer pain, they focus their attention on the pain and finding pain relief (Meinhart & McCaffery, 1983; Shawver, 1977). The ways patients try to relieve their pain have not been well researched; nor has the effectiveness of pain control behaviors been measured in a systematic manner. Hence, little is known about behaviors used by patients to relieve cancer pain or the patient's perception of the effectiveness of the behaviors.

#### Purpose of the Study

The purpose of this study was to describe the behaviors used by patients with advanced stage cancer to control their pain and compare concurrent measures of pain intensity. Specifically, the aims of the study were to:



1. Establish concurrent validity of three pain intensity measurement scales; the Wachter-Shikora Finger Dynamometer, the Pain Intensity Number Scale, and the Visual Analogue Scale.
2. Establish sensitivity of the Wachter-Shikora Finger Dynamometer, the Pain Intensity Number Scale, and the Visual Analogue Scale to measure pain intensity of patients with advanced stage cancer who experience pain.
3. Describe pain control behaviors used by patients with advanced stage cancer.
4. Correlate pain control behaviors with concurrent pain intensity ratings.

#### Significance of the Study

Lazarus (1977, p. 552) said, "Of course, nearly everyone, apart from ESP [extra sensory perception] enthusiasts, will agree that the only way we can know anything about another person is through his or her behavior. . . ." This statement is particularly true of cancer pain. Systematically derived information about the incidence, frequency, and effectiveness of patient initiated pain control behaviors may provide objective criteria for pain assessment by nurses. Description of patient initiated pain control behaviors could also facilitate the development of nursing interventions to control cancer pain. The development of effective pain control measures could eventually dispel the common fear that cancer ends in a painful death. Improved pain control would certainly decrease the

expenditure of resources, that are spent because of ineffective pain control (i.e., patient energy, professional time and effort, and large sums of money for prolonged hospitalizations and frequent physician's office visits) (Bonica, 1982).

Additionally, establishing sensitivity and validity of pain intensity measurement tools is important. If sensitive and valid measures of pain intensity are used in clinical practice, consistent, accurate measurement of the patient's perception of pain would be possible. Accurate assessment of pain intensity would enable nurses to evaluate the effectiveness of pain control measures. The methodological and theoretical information derived from this study may be useful in future studies exploring cancer pain and its control.

## Chapter Two

### Theoretical Framework

The theoretical explanation for patient initiated pain control behaviors is derived from a pain theory and a behaviorally oriented model of nursing practice. Together, the gate control theory of pain and the Johnson Behavioral System Model (JBSM) for nursing practice provided the organizing framework for this research.

#### Gate Control Theory

Melzack and Wall (1965) proposed the gate control theory (GCT) as a conceptual explanation of the complex phenomenon of pain. According to the theory, nociceptive stimuli at free nerve endings initiate the physiological pain circuit (Guyton, 1981) which involves: (a) peripheral afferent access to the central nervous system (CNS); (b) afferent transmission through the CNS, and (c) efferent transmission through the CNS to the peripheral nervous system (Yaksh & Hammond, 1982).

Peripheral afferent access. Free nerve endings, terminals of peripheral afferent neurons, are generously dispersed in "skin, periosteum, arterial walls, joint surfaces, and the falx and tentorium of the cranial vault" (Guyton, 1981, p. 612). They are limited in dispersion in other tissues, but extensive damage can cause summation for an action potential. The transmission of an action potential depends upon the nerve fiber morphology, the conduction velocity, and the stimuli required for activation (Yaksh

& Hammond, 1982).

Although Class A delta and Class C fibers differ in morphology and conduction rate, activation of adequate numbers of these fibers produces somatic pain (Yaksh & Hammond, 1982). A delta fibers are large, myelinated, and conduct at 4-30 meters/second, whereas C fibers are small, unmyelinated, and conduct at less than 2.5 meters/second (Gasser, 1950). A delta and C fibers are activated by physical distortion or changes in the environment of the free nerve endings. Temperature changes, chemical agents, or physical distortions produce a local generator potential which, if strong enough, proceeds to an action potential to propagate the pain impulse (Yaksh & Hammond, 1982). Frequent, strong pain impulses can result in the perception of intense pain.

Class A alpha and A beta fibers are larger, myelinated fibers that conduct at velocities of 30-100 meters/second (Gasser, 1950). A alpha and A beta fibers are stimulated by cutaneous stimulation; i.e., massage, pressure manipulation, heat and cold application. Stimulation of adequate numbers of A alpha and A beta fibers inhibits A delta and C impulses (Wall, 1978), since impulses from larger, faster fibers are received earlier in the CNS. The inhibitory effects of A alpha and beta fibers represent a pre-synaptic mechanism which controls the pain impulse prior to its access to the CNS. Pain intensity may be reduced by stimulation of competitive cutaneous fibers.

CNS afferent transmission. Transmission of afferent pain impulses through the CNS includes spinal and supraspinal systems. At the spinal level, activated A delta and C fibers synapse with wide dynamic range neurons in laminae I, II, and III of the spinal cord (Guyton, 1981; Yaksh & Hammond, 1982). Additional synapses may occur with interneurons of the laminae causing modification of the action potential. Melzack and Wall (1965) proposed that a structure known as the T cell was located in the substantia gelatinosa. The T cell was thought to calculate the excitatory and inhibitory effects of the neuronal impulses associated with tissue injury. When the excitatory effects of A delta and C fibers outnumbered the inhibitory effects of A alpha and A beta fibers, the T cell opened the gate and permitted the pain signal to ascend to the cortex (Melzack, 1982; Melzack & Wall, 1965; Wall, 1978).

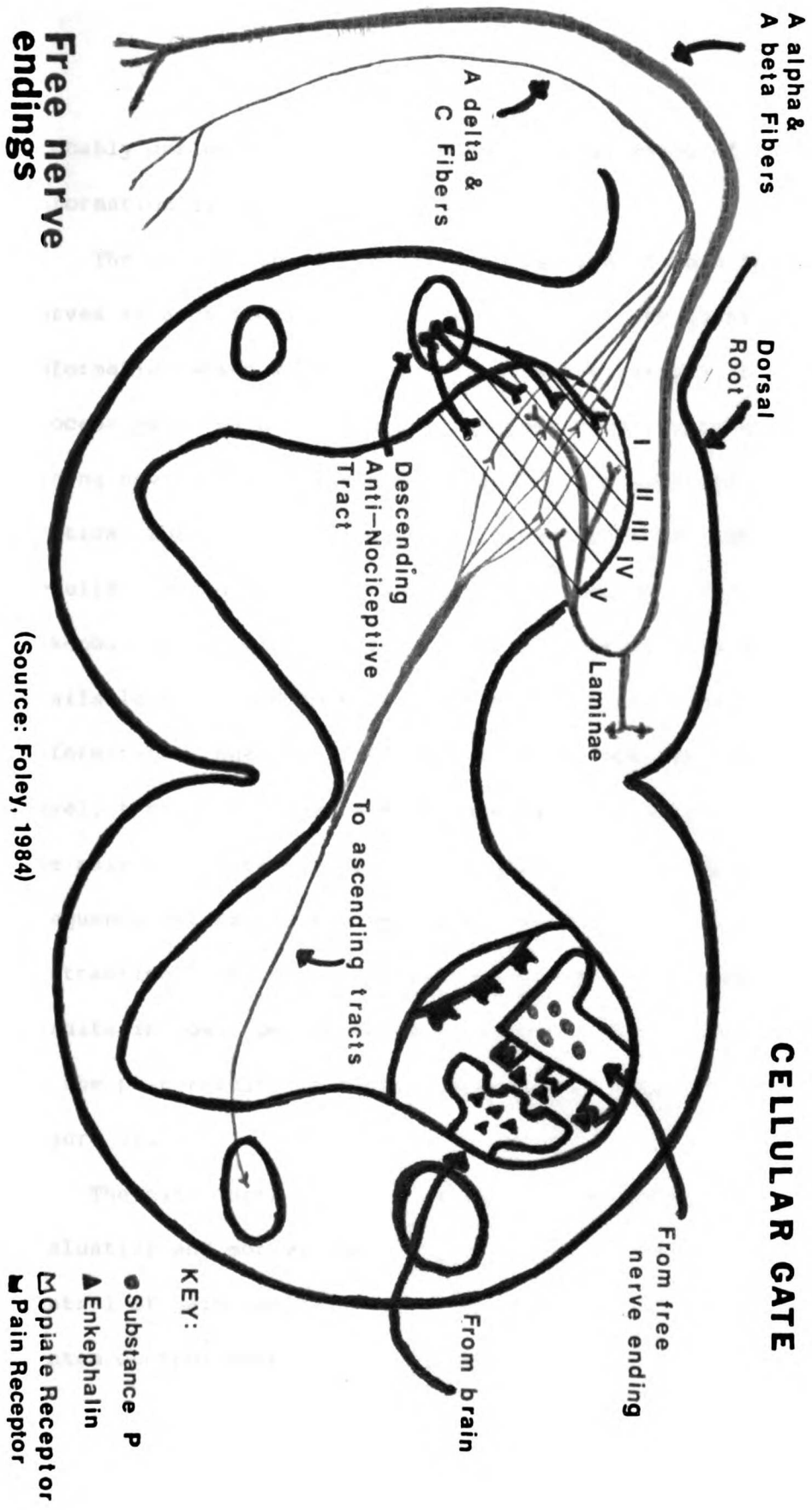
Recent research indicates that a T cell structure probably does not exist. Instead, neurotransmitters have been found to alter the inhibitory or excitatory potential of the interneurons in the substantia gelatinosa. The quantity of these neurotransmitters functions to gate, or control, the pain impulse. Excitatory potential is increased by substance P whereas inhibitory potential is increased by enkephalin (Yaksh & Elde, 1981; Yaksh & Hammond, 1982). Both substance P and enkephalin are found at neuronal synapses throughout the spinal cord. Pain intensity is effected by the quantity and type of neurotransmitter present at neuronal

synapses (See Figure 1).

The non-inhibited action potential is conducted caudally or rostrally for several spinal segments before decussation and relay into the neospinothalamic and paleospinothalamic tracts of the anterolateral spinothalamic pathway (Foley, 1984). Transmission proceeds to the reticular activation nuclei, the thalamus, and the cerebral cortex (Guyton, 1981; Yaksh & Hammond, 1982). The neospinothalamic tract synapses with the higher cortical levels whereas the paleospinothalamic tract synapses in the thalamus (Guyton, 1981). The neospinothalamic tract is believed to transmit impulses to localize and determine the intensity of the pain, whereas the paleospinothalamic tract mediates the arousal and emotional components of pain (Foley, 1984).

CNS efferent transmission. Descending pathways can inhibit impulses evoked by afferent stimulation (Willis, Haber, & Martin, 1977). This inhibitory activity originates from several supraspinal centers, the central gray and caudal raphe nuclei (Fields, Basbaum, Clanton, & Anderson, 1977; Willis et al., 1977), the nucleus gigantocellularis (Morrow & Casey, 1976), and the thalamus (Curry, 1972a, 1972b). Descending, spinal and supraspinal, inhibition of the pain impulse probably occurs through an enkephalinergic circuit (Yaksh & Hammond, 1982). Serotonin, dopamine, and norepinephrine are neurotransmitters which also mediate descending inhibition of the pain impulse (Foley, 1984). These descending systems were

**Figure 1. SPINAL GATE BIOCHEMICAL.**



(Source: Foley, 1984)

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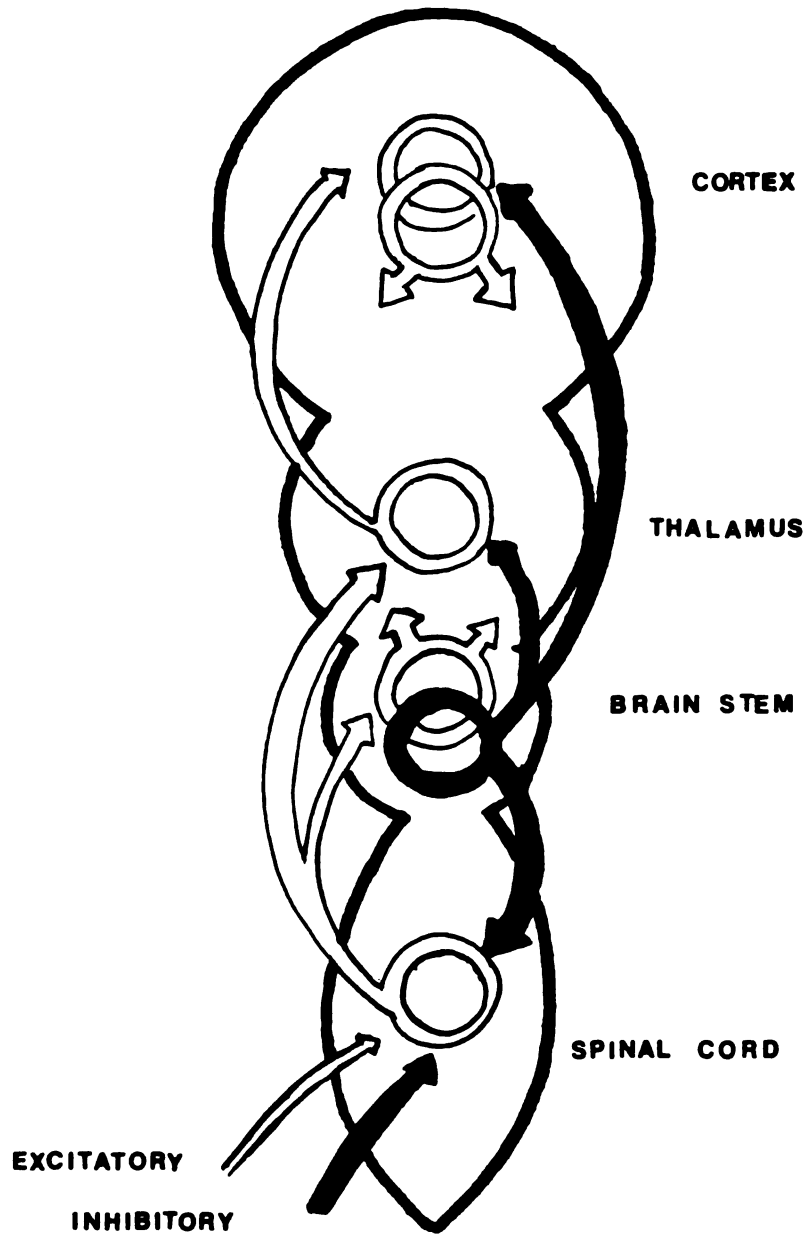


probably designed to prevent rostral transmission of the nociceptive information (Yaksh & Hammond, 1982).

The modulation of rostral transmission of pain information serves as a protective mechanism to control the quantity of information which must be processed by the cerebral cortex. Rostral processing of pain information has been compared to a radio-like tuning device (Yaksh & Hammond, 1982). The quantity of input is critical for priority processing. Lower centers (the thalamus and medulla) respond to low frequency pain impulse with reflexive and enkephalinergic circuits to control the pain so the cortex remains available to attend to environmental input, such as other sensory information. When the frequency of pain impulses exceeds a critical level, the cortex rejects environmental information and processes the pain information. Cortical "tuning" to the input of highest frequency determines the perceived intensity of the pain. Cortical distraction from the pain impulses through other sensory input results in lower perceived pain intensity whereas cortical attention to the pain results in higher perceived pain intensity (See Figure 2).

The gate control theory emphasized the influence of cognitive-evaluative and motivational-affective input upon the descending control of pain (Melzack, 1983; Melzack & Casey, 1968). Limbic system control over pain perception is influenced by affective states, such as anxiety and depression (Foley, 1984; Melzack, 1983).

**Figure 2. Ascending and descending paths for pain control.**



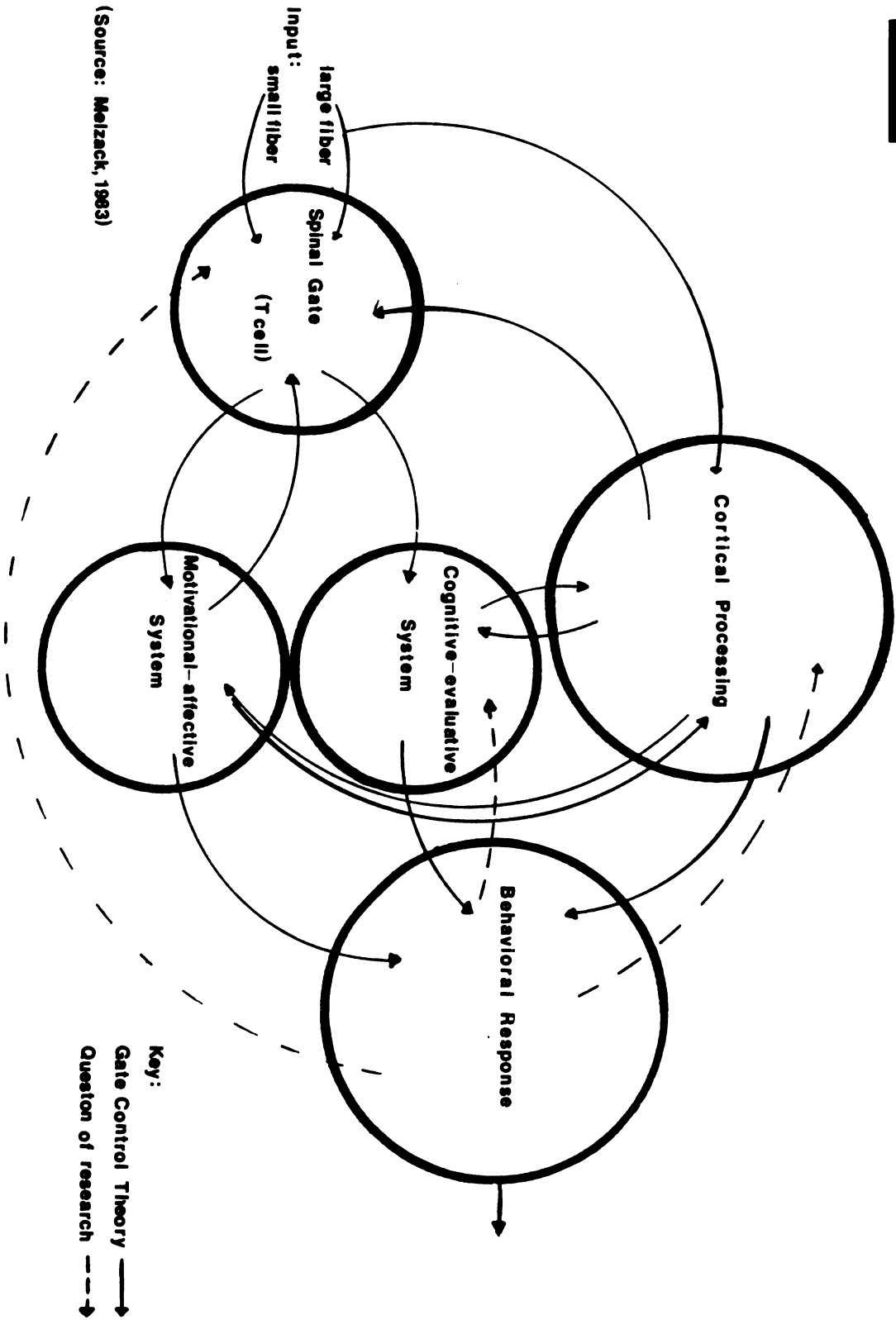
(Source Melzack, 1982)

When pain is intense, the motivational-affective properties of pain "demand immediate attention, disrupt on-going behavior and thought, and drive the organism into activity aimed at stopping the pain" (Melzack, 1982, p. 148). The verbal and behavioral expression of pain is related to operant conditioning encountered in childhood and throughout life (McCaffery, 1979) (See Figure 3).

From the description of the pain circuitry it is evident that afferent nociceptive information may be modulated at several points along the conductive pathway. Pain intensity may be controlled by: (a) removing the noxious mechanical, thermal, or chemical stimuli; (b) stimulating competitive cutaneous fibers; (c) increasing the inhibitory potential at interneuronal synapses; and (d) stimulating cortical tuning to environmental information.

Based upon the GCT, pain intensity may be controlled by behaviors that alter the ascending input of noxious stimuli and/or alter descending inhibition mechanisms. Melzack (1983) stressed the importance of considering both paths for effective pain control. Traditional comfort measures, such as positioning (West, 1981), massage (Wolfe, 1980), as well as nontraditional measures, such as transcutaneous nerve stimulation (Melzack, 1975) are examples of behaviors which alter ascending input by competitive cutaneous stimulation. Distraction (West, 1981), relaxation techniques (Wolf, 1980), and placebos (Melzack, 1982) are examples of behaviors which may stimulate descending control mechanisms by altering cortical

**Figure 3. Gate control model of pain.**



tuning. Patients who effectively control their pain may use pain control behaviors that both alter the ascending input and stimulate descending inhibition of pain intensity perception.

#### Johnson Behavioral System Model

From the perspective of the JBSM, nursing views man as an adaptive system, composed of an interrelated biological and behavioral system (Johnson, 1980; Lovejoy, 1983). Medicine is principally responsible to maintain biological system balance, although nursing provides assistance to medicine to promote biological balance (Lovejoy, 1983). Nursing, however, is primarily responsible to maintain balance and stability in the behavioral system (Johnson, 1980).

All behavior is directed toward achievement of the goals of seven interrelated subsystems which, conceptually, constitute the behavioral system (Johnson, 1980) (See Figure 4). The goal of the aggressive subsystem is self-protection and preservation. Since pain is a protective mechanism to motivate man to eliminate the cause of pain (Guyton, 1981), pain control behaviors are consistent with the goal of the aggressive subsystem.

Theoretically, pain control behaviors are "developed and modified over time through maturation, experience, and learning" (Johnson, 1980, p. 208), with each person developing habitual ways to relieve pain. Yet each person may know other ways of relieving pain that are less commonly used. Johnson (1980) defines habitual

Figure 4. Seven subsystems and goals

Johnson Behavioral System Model for nursing practice.

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Subsystem	Goal
Achievement	Mastery or control
Affiliative	Security, inclusion, intimacy
Aggressive	Self protection and preservation
Dependency	Nurturance
Injunctive	Appetitive satisfaction
Eliminative	Waste excretion
Sexual	Gratification and procreation

---

(Source: Johnson, 1980)

pain control behaviors as the pain control set and the entire repertoire of pain control behaviors as pain control choices. Choices are acquired or modified throughout life, but the rate of acquisition tends to decrease with increasing age. More adaptable individuals are assumed to be characterized by a larger number of behavioral choices (Johnson, 1980). Hence patients who effectively control their pain may have a very efficient pain control set or a large number of pain control choices, which probably stimulate both ascending and descending pain control mechanisms.

Through observation, nursing identifies a person's pain control set and choices for the purpose of altering them when pain control behaviors are ineffective or insufficient to control the intensity of the pain. When the pain control choices include behaviors which may effectively control pain but are not part of the pain control set, nursing encourages more frequent use of known but infrequently used behaviors. When pain control choices are limited in number, nursing suggests new choices to enlarge the pain control repertoire (Johnson, 1980; Loveland-Cherry, & Wilkerson, 1982).

Theoretically, the patients with pain of long duration, chronic pain, are most likely to develop and use pain control behaviors. The more intense the pain the more likely pain control behaviors will be selected from known pain control choices. However, unknown is the pain duration or pain intensity degree that must be experienced before pain control behaviors are used and/or modified.

The critical pain duration may be a day, a week, a month, or perhaps several months, but may vary by the individual patient and perceived pain intensity. Therefore, the pain control set of patients with advanced stage cancer pain may vary with chronicity and intensity of pain.



## Chapter Three

### Literature Review

The integrated physiological-behavioral conceptualization for cancer pain control was supported by a literature review which focused upon: (a) measurement of pain intensity, (b) physiological and psychological factors influencing cancer pain intensity, (c) behavioral expression of pain, and (d) effects of cancer pain on behavior.

### Pain Intensity Measurement

Pain intensity has been measured by a variety of methods and with many instruments in clinical and experimental settings. Selected verbal descriptor scales and sensory matching measures of pain intensity are discussed in terms of reliability, validity, and advantages or disadvantages for clinical use.

Measurement of pain intensity (location, quality, onset, and duration) is not a measure of the entire pain experience. Rather, pain intensity is one component of a multidimensional pain experience which also includes cognitive, sensory, affective, and behavioral components (Melzack, 1982). Since the pain experience is subjective, selective measurement of one dimension has inherent problems in terms of reliability and validity. Measurement of the intended dimension may be confounded by another dimension resulting in invalid measurement (i.e., instead of measuring the magnitude of the pain, intensity, perhaps the cognitive effect of the pain

experience is actually measured (McGuire, 1984).

However, the complexity of the entire pain experience makes a multidimensional approach to pain research difficult. Therefore, parts of the pain experience are usually investigated and inductively pieced together to promote understanding of the entire experience. The gate control theory was developed in this way (Melzack, 1984).

When the pain experience is measured, subjects are able to differentiate pain intensity from the cognitive-affective dimension of pain (Johnson & Rice, 1974). Pain intensity is measured with a variety of instruments.

Verbal descriptor scales. Written or verbal measures of pain intensity have included word descriptor scales, number descriptor scales, and a combination word-number descriptor scales. Kremer, Atkinson, and Ignelzi (1981) studied 32 patients with cancer pain and 18 patients with chronic benign pain to correlate pain intensity ratings using a visual analogue scale (VAS), a numeric scale (NS), and an adjective scale (AS). The VAS was a 10 centimeter (cm) line, anchored with "no pain" and "pain as bad as it could be," on which the subject placed a vertical mark to indicate pain intensity. The NS was a 0 to 100 numerical scale where 0 was "no pain" and 100 was "pain as bad as it could be." The AS used the words "no pain, mild, moderate, horrible, and excruciating" to describe present pain intensity (Kremer et al., 1981, p. 243). Concurrent affective

states were assessed using the depression and anxiety scales from the Profile of Mood States and the Brief Symptom Inventory. Analysis of variance indicated no statistically significant difference in pain intensity measures with VAS, NS, and AS ( $F < 1$ ). Strong to very strong correlation was found between the VAS, NS, and AS ( $r = .59-.86$ ,  $p < .05$ ). The three scales were not found to be differentially influenced by dysphoric mood. However, subjects reported preference for the AS ( $n = 27$ ) as the scale which best allowed them to report their pain intensity (VAS:  $n = 7$ ; NS:  $n = 12$ ).

Kremer et al. (1981) did not report the statistical method by which the three pain intensity scales were analyzed. Unless a Point-biserial correlation was used, inappropriate statistical analysis may have provided questionable results. A disadvantage of the AS is that ordinal data are obtained whereas the VAS and NS provide interval data. The two groups of data should not be considered the same for data analysis.

Alternative forms of VAS have been developed to measure pain intensity. Variations of the original VAS, a horizontal line 10 cm long, include: (a) a vertical line, (b) a semicircular line, (c) the line lengthened to 20 cm, and (d) the line marked with dissecting points of specified intervals. Each VAS line is anchored with opposing descriptors, such as "no pain" and "pain as bad as it could be." Descriptors may also be placed between the anchors to indicate gradation of the continuum.

Some investigators have found that certain subjects were unable to use the VAS to report pain intensity, possibly because decreased ability to think in the abstract may affect a patient's ability to use this instrument (Kremer et al., 1981). However, careful explanation of instrument use has been reported to produce valid measures of pain intensity (Sriwatankul, Kelvie, Lasagna, Calimlin, Weis, & Mehta, 1983).

Preference for five concurrently administered variations of the VAS was investigated in 107 healthy volunteers by Sriwatankul et al. (1983). A statistically significant number ( $p < .001$ ) indicated preference for the high intensity anchor "agonizing pain" rather than "pain as bad as it could be." Subjects also indicated preference for the scale that was divided by midline marks (Sriwatankul et al., 1983) but response set ratings near the midline marks have been reported with this type of VAS (Berry & Huskisson, 1972; Scott & Huskisson, 1976).

The straight, 10 centimeter line, anchored with "no pain" and "pain as bad as it could be" has been shown to be a valid measure of pain intensity (Pilowsky & Kaufman, 1965). Test-retest data indicated the VAS is a reliable measure of present pain intensity (Carlsson, 1983; McGuire, 1984). Most researchers agree that the VAS is a sensitive instrument for pain intensity measurement (Kremer et al., 1981; Scott & Huskisson, 1976; Sriwatankul et al., 1983).

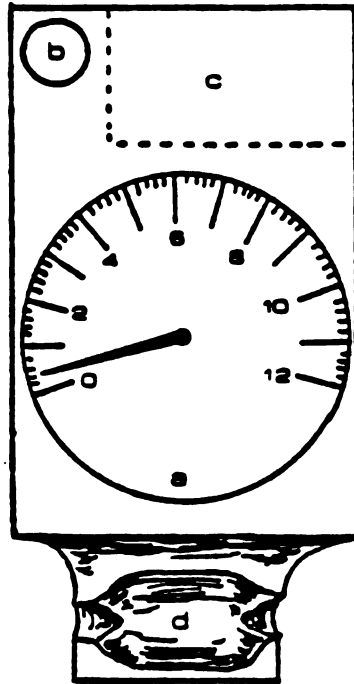
Zero to ten number scales have been used extensively to measure pain intensity (Bourbonnais, 1981; Daut & Cleeland, 1982; McGuire, 1981). Although the 0-100 scale has been tested for concurrent validity with the VAS, the 0-10 scales has received little empirical testing (Bourbonnais, 1981).

Sensory matching. Pain intensity has been measured with tools which require the subject to match the intensity of pain to a color or a pressure. Stewart (1977) developed a pain color scale (SPCS) with gradated colors from yellow (no pain) to red-black (worst possible pain). Validity of the scale was established using a descriptive scale (name not reported) in 160 patients (diagnoses not reported). Correlation was significant ( $r=.60$ ,  $p=.001$ ). Reliability data were not reported.

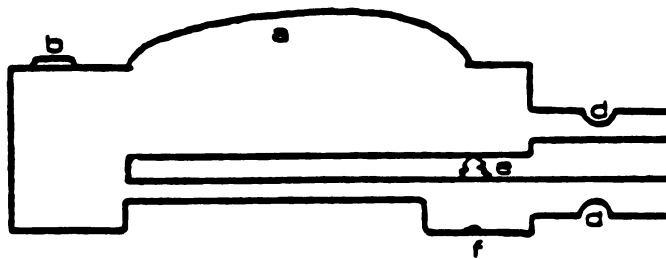
The Wachter-Shikora Finger Dynamometer (FD) measures pain intensity as a tactile pressure force (squeeze) with a Preston Pinch Gauge (5036M). The subject matches present pain intensity with a squeeze on the FD using a thumb and forefinger (See Figure 5). A dial on the gauge registers a number between 0 and 12 that represents kilograms of force. The FD, VAS, and a descriptive scale were used to concurrently measure the first and second pain associated with intramuscular (IM) injection in 90 subjects (Wachter-Shikora, 1980a). Significant correlation was found between the FD and VAS ( $p<.011$ ). However, Reville (1983) failed to demonstrate correlation between the FD and VAS when studying the

**Figure 5. Wachter-Shikora Finger Dynamometer**

(Source: Wachter-Shikora, 1980a)



**Top View**



**Side View**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>a Dial and Needle</li> <li>b Release Button</li> <li>c Area Where Gauge was Secured in Vise</li> </ul> | <ul style="list-style-type: none"> <li>d Finger Depression with Groove for Hanging Weights</li> <li>e Screw which Presses against Dial Mechanism to Register Mechanical Force</li> <li>f Hexagonal Hole which Receives a Hollow Set Screw Key for Recalibration</li> </ul> |
|---|--|

effects of psychoprophylaxis training on the pain associated with chemotherapy related venipuncture in 27 patients with cancer ( $r=.135$ ,  $p=.51$ ). Perez (1982) used the FD in 48 presurgical subjects to measure the effects of varying the duration of IM injection on pain intensity. The FD was sensitive to differences in first and second pain ( $p<.02$ ). However, concurrent reliability or validity was not tested with another pain intensity instrument.

Reliability of accuracy and precision was established for the FD, indicating the instrument required recalibration once in 1000 uses (Wachter-Shikora, 1980b). When used the FD is mounted in a portable vise so that it can be secured in a fashion similar to reliability test conditions. Further instrument testing is warranted to assess validity and reliability of the FD to measure pain intensity.

#### Cancer Pain Etiology--Physiological

Stimuli which initiate the pain impulse in cancer patients are usually related to tumor proliferation or antitumor therapy. However, pain stimuli may be totally unrelated to cancer. Unrelated causes include other pathological conditions such as arthritis, osteoporosis, and lumbar disc disease. Foley (1979) found that of 156 hospitalized patients with cancer, 122 had tumor related pain, 31 had therapy related pain, and 3 had pain totally unrelated to the cancer. Twycross and Fairfield (1982) reported similar findings. Thus, most but not all pain experienced by patients with cancer is

related to the disease trajectory.

Tumor proliferation causes mechanical and/or chemical stimulation of free nerve endings when: nerves are compressed and/or infiltrated; pathological fractures disrupt nerve pathways; viscus and vascular structures are obstructed; and tissue erosion or hollow viscus rupture occurs from necrosis, infection, or inflammation (Lund, 1982; Shawver, 1977; Ziga & Yasko, 1983). Antitumor therapy may cause stimulation of free nerve endings when: surgical tumor resection disrupts nerves; chemotherapy produces peripheral neuropathy, pseudorheumatism, femoral or humeral head aseptic necrosis, postherpetic neuralgia, or mucositis; and radiation therapy produces fibrosis or skin lesions (Foley, 1984). Pain related to tumor proliferation and antitumor therapy may be acute or chronic in origin. Often, because of the nature of cancer, cancer pain is considered chronic pain (McCaffery, 1979).

Twycross and Fairfield (1982) investigated the incidence of pain in a prospective study of 100 consecutively admitted patients with advanced cancer. These patients reported from one to eight anatomically distinct pains. The causes of the pains were related to tumor involvement with bone (31), nerve (31), soft tissue (31), viscera (31), muscle spasm (11), lymphoedema (3), intracranial pressure (2), and myopathy (1). The diagnostic criteria used to determine the cause of the pain were not reported. Although 80% of these subjects reported more than one pain, 34% reported four or



more distinct pains. The findings suggest that patients with advanced cancer may have multiple sources of noxious stimuli related to multisystem dysfunction.

Foley (1979) investigated the incidence of pain by primary cancer site in 540 hospitalized patients with cancer. Pain was reported by 156 (29%) of the patients. The number of patients reporting pain with each tumor type was compared with the total number of patients in-hospital with the same tumor type. Thus, pain was reported by 85% of the patients with primary bone tumors, 52% breast, 45% lung, 80% oral cavity, 75% male genitourinary, 70% female genitourinary, and 5% of the patients with leukemia. These findings suggest that solid tumor malignancies are associated with a high incidence of pain.

Tumor involvement with bone or nerve roots is associated with a high incidence of pain (Foley, 1979; Lund, 1982; Twycross & Fairfield, 1982). Primary bone tumors and metastatic breast, lung, and prostate carcinomas are commonly associated with bone involvement (Foley, 1979; Mauch, 1982). Tumors associated with nerve root involvement are not as clearly identified since peripheral, plexus, meninges, and spinal cord involvement are common (Foley, 1979). Generally, metastatic tumor involvement is associated with a high incidence of pain (Daut & Cleeland, 1982).

In a sample of 667 patients with breast, prostate, colon, cervical, ovarian, and uterine corpus carcinomas, Daut and Cleeland

(1982) found that metastatic disease was accompanied by pain more frequently than nonmetastatic disease in all sites except cervical carcinoma. These differences were significant between the metastatic and nonmetastatic groups for breast ( $p < .005$ ) and prostate cancers ( $p < .01$ ). Conversely, metastatic disease was accompanied by reports of "no pain" less frequently than nonmetastatic disease for all sites except cervical. The number of patients in the metastatic cervical group was small ( $n=6$ ) compared to the nonmetastatic group ( $n=85$ ). Thus, results concerning the incidence of metastatic cervical cancer pain should be viewed with caution. Metastatic disease is commonly associated with advanced stage cancer.

#### Cancer Pain Etiology--Psychological

Bond (1976) reported that 39 of 52 women with advanced cervical cancer reported pain on an analogue scale, but 17 did not request analgesic drugs for the pain. The Eysenck Personality Inventory (EPI) was used to explore personality differences between the patients without pain, those with pain who requested analgesics, and those with pain who did not request analgesics. Statistically significant differences were noted for introversion ( $p < .05 > .02$ ) and neuroticism ( $p < .02 > .01$ ). The patients who had pain but did not request analgesics were introverted and had the highest neuroticism scores. Pain-free and patients with pain who received analgesics were equally extroverted, but pain-free patients had lower neuroticism scores. The total patient group mean scores were similar to the

mean scores of a control group of housewives. Thus, these results suggest that introverted patients with cancer may be at risk to experience pain without requesting assistance. Emotionality, particularly anxiety, was associated more with pain than the diagnosis of cancer in this particular group of patients.

Bond (1976) investigated the effect of providing total pain relief with percutaneous cordotomy upon extroversion and neuroticism scores on the EPI in 30 patients. No difference was noted in extroversion scores, nor was statistical significance found in scores on neuroticism scales administered preoperatively or postoperatively. However, a bimodal distribution of preoperative neuroticism scores was normalized postoperatively, suggesting that patients with cancer pain reduce their emotionality, or anxiety, when pain is relieved. The findings of this study must be considered as tentative because 30 subjects were tested preoperatively, but only 12 subjects were tested postoperatively. Perhaps the normalization of the neuroticism curve was related to loss of subjects rather than changes in emotionality with pain relief.

In another study, Bond (1971) investigated the relationship of reports of pain to physical and emotional symptom reports and attitudes toward illness. A group of 52 patients with advanced cervical cancer reported pain with an analogue scale and completed the Cornell Medical Index (CMI) (symptom reports) and Whiteley Index

of Hypochondriasis (attitudes toward illness). As a group, the patients scored high on symptoms reporting, but the hypochondriasis score was lower than hypochondrical psychiatric patients. However, the hypochondriasis score was higher than normal subjects and non-hypochondrical psychiatric patients. Patients who reported no pain scored significantly lower on symptom reporting and hypochondriasis than patients who reported pain. Scores were not significantly different between patients with pain who received analgesics and those patients who did not receive analgesics. The probability level was not reported. Bond concluded that the presence of disease symptoms (i.e., pain) was related to anxiety about illness.

Woodforde and Fielding (1970) investigated the relationship of emotional state and response to pain therapy in 47 patients with cancer pain using the Cornell Medical Index. Patients were found to have personality disturbances related to depression, psychosomatic symptoms, gastrointestinal symptoms, and hypochondriasis. It was expected that patients with higher disturbances would receive less benefit from pain therapy. However, no correlation was found between reported disturbances and response to pain therapy. These results concur with Bond's (1976) suggestion that pain reduction in patients with cancer is associated with fewer personality disturbances.

The Cornell Medical Index (CMI) was utilized to investigate the relationship of emotional disturbance to pain intensity (McKegney,

Bailey, & Yates, 1981). In a group of 55 patients with cancer, pain intensity, measured with a 0 to 100 number scale, was found to correlate significantly ( $p < .05$ ) with high CMI scores during the last 60-120 days of life. The correlation persisted during the last 60 days of life, but statistical significance was not reached. No correlation was found during the 120-240 day period prior to death. These results suggest that psychological factors influence pain reports during critical periods in the disease process.

Results of studies that investigated psychological variables indicate that affective states of patients with cancer are related to reports of pain. These findings lend credibility to clinical observations that patients with cancer experience depression and anxiety (Bond, 1979). Patients with cancer and pain may experience more depression and anxiety than patients who have cancer without pain (Woodforde & Fielding, 1970).

Ten patients with cancer pain and 10 patients with chronic benign pain were matched for sex and pain intensity (Kremer, Atkinson, & Ignelzi, 1982). The McGill Pain Questionnaire was administered and scores on the affective dimension were compared to a 0-100 numerical pain intensity report. In this small sample, pain intensity was correlated with affective state. Patients with high intensity pain scored significantly higher on the affective dimension ( $p < .001$ ) whereas patients with pain of low intensity scored lower on the affective dimension. Cancer pain intensity

approached significance ( $p=.059$ ) with benign pain intensity.

Patients with low intensity cancer pain reported higher affective scores than patients with low intensity benign pain. However, this difference was not seen when pain intensity was high. Since the sample was selected from a larger group, based upon extremes of pain intensity, errors in sampling may be responsible for these findings. Therefore, results should not be generalized.

Ahles, Blanchard, and Ruckdeschel (1983) investigated the affective dimension of patients with cancer; 40 with pain and 37 pain-free patients matched for diagnosis, stage of disease, age, sex, and inpatient versus outpatient status. Depression scores on the Beck Depression Scale were significantly higher ( $p<.004$ ) for patients with pain than pain-free patients. Depression scores on the Symptom Checklist-90 (SCL-90) showed a similar trend but did not reach significance ( $p<.07$ ). Anxiety was measured with the State and Trait Anxiety Scale and the anxiety subscale of the SCL-90, but significant differences were not found. During interview, patient reports of depression but not anxiety were significantly higher in patients with pain ( $p<.007$ ). Results suggested that in patients with cancer, pain and depression may be related, while anxiety may be associated with the cancer diagnosis. These findings concur with the conclusions of Bond (1971; 1976) and may describe the phenomenon of emotionality in patients with cancer and pain. The findings of Kremer et al. (1982) suggested that the level of pain may be a

critical variable to correlate with the affective state of the patient with cancer pain.

McKegney et al. (1981) considered the relationship of pain intensity to locus of control in 55 patients with advanced cancer. Using a modified Rotter Locus of Control (I-E) scale, they found that during the last 60-180 days of life patients with high I-E scores (indicating greater expectation for control outside themselves) had significantly higher ( $p < .05$ ) pain intensity scores than patients with low I-E scores. The difference persisted during the last 60 days of life, but statistical significance was not reached. No significant correlation of I-E scores and pain intensity was found during the 180-240 day period prior to death. These findings suggest that there may be a critical period in the progression of cancer for psychological factors to be correlated with pain intensity.

Chapman (1979) states that cognitive expectation that cancer pain indicates disease progression, debilitation, and probably death causes cortical hyperreceptivity to any noxious stimulus. Although disease progression is not always correlated with pain progression, many patients believe their pain is an indicator that their condition is deteriorating. Perhaps during the last 60 days of life, the patient with cancer develops a cognitive expectation of deterioration which influences the cancer pain experience.

In a descriptive study that controlled for cancer diagnosis, stage of disease, age, sex, and inpatient versus outpatient status, Ahles et al. (1983) investigated the meaning of pain experienced by 40 patients with tumor-proliferation related pain. Sixty-one percent of the patients believed the pain indicated deterioration of their condition. That possibility had not occurred to 39% of the patients. Only 26% of the patients recalled receiving any information from health care professionals regarding the source of their pain or what pain course they could expect. Previous studies did not investigate the cancer pain meaning and Ahles et al. failed to investigate the relationship of this variable to affective variables. The results of such a comparison may have been interesting since patients were matched on critical variables. However, the study by Ahles et al. was the most thorough investigation of pain in cancer populations and provided interesting information.

Studies indicate that physiological and psychological variables are involved with the cancer pain experience. Tumor location and proliferation are important physiological causes of cancer pain. Depression, and possibly anxiety, may intensify the cancer pain experience through limbic and cortical mechanisms. Together, the physiological and psychological variables influence the perception of pain intensity.



### Behavioral Expression of Pain

Zborowski (1952) studied the pain response pattern of 103 subjects from four cultural groups. He found that Old Americans, third generation immigrants, had a low tolerance for pain, tended to withdraw when in pain, and avoided behavioral expressions of pain. The Irish group was also found to withdraw from family and friends when in pain and responded to pain in an unemotional, calm manner. However, unlike the Old Americans, the Irish had a high tolerance for pain. Jews had a low tolerance for pain and tended to give dramatic accounts of the pain experience by crying and moaning. They believed these pain manifestations would mobilize people to offer help and sympathy because they were pessimistic about the potential of pain relief measures. Italians also had a low tolerance for pain and tend to cry and moan so that family and friends would distract them from the pain. Differences in pain expression are attributed to reinforcement of behaviors consistent with familial norms which are culturally defined.

Pain expression is also related to the sensitivity of the individual to painful stimuli. Woodrow, Friedman, Siegelau, and Collen (1975) demonstrated that tolerance to pain was related to sex, age, and race in a sample of 41,110 subjects. Pain tolerance decreased with increasing age, with those over 60 tolerating two thirds to three fourths the deep pain tolerated by those under 30. Men tolerated more pain than women ( $p < .001$ ) whereas whites tolerated

more pain than blacks who tolerated more than orientals ( $p < .001$ ). These findings for experimentally induced pain should not be generalized to the clinical pain of cancer. However, sex, age, and race may be variables which influence the reporting of pain intensity by patients with cancer pain.

Abu-Saad (1981) investigated the relationship of pain intensity reports to behavioral manifestations of pain in 10 children experiencing acute, postoperative pain. Vocalizations, facial expressions, and body movement were documented using a behavioral checklist. Comparison of pain intensity ratings and frequencies of behaviors indicated that higher pain intensities were related to vocalizations of pain, facial expressions, and body movements. Low pain intensities were related to absence of behavioral expressions. Although the children were reported to be 9 to 15 ( $M = 11.9$ ) years old, the sex and ethnicity of the children were not reported. While determination can not be made about the influence of culture and sex, this research suggests that a relationship does exist between pain intensity and behavioral manifestations of pain.

Teske, Daut, and Cleeland (1983) investigated pain expression behaviors as perceived by nurse observers. Medical-surgical inpatients ( $n = 34$ ) and chronic benign pain outpatients ( $n = 37$ ) rated their pain intensity on a visual analogue scale while nurses observed their behaviors and also rated the patient's pain intensity, but used a seven point descriptive scale. Behavioral

indices of pain included; muscle tenseness, restlessness, guarding/holding, rubbing, facial expressions, and grunts, moans, or whimpers. Nurses significantly underrated the pain intensity of patients with chronic pain ( $p < .001$ ), but very closely approximated the pain intensity of patients with acute pain. The behaviors used by patients were not differentiated by type of pain (acute versus chronic). Thus, behavioral indicators nurses used to determine pain intensity were not described. The findings of this study suggest that the behavioral indices of pain were not sensitive enough to evaluate chronic pain.

Bond and Pilowsky (1966) investigated the relationship of patient's pain intensity reports to the pain relief treatments provided by nurses. Forty-seven patients with advanced cancer of multiple primary sites rated their pain intensity on a 10 cm visual analogue scale. Nurses recorded all patient requests for pain relief and all analgesic administrations. Three groups emerged from differences in the data--a group that reported no pain ( $n=9$ ), a group (A) that reported pain but did not request or receive analgesics ( $n=13$ ), and a group (B) that reported pain, requested, and received analgesics ( $n=25$ ). Differences between groups were analyzed according to sex with both sexes represented almost equally in each group. Significant differences included: group A males recorded more pain than group A females ( $p < .001$ ); group B females recorded more pain than group A females ( $p < .001$ ); and group B males

recorded more pain than group A females ( $p < .001$ ). Although not analyzed for significance, the frequencies of analgesic administration demonstrated that more males requested analgesics at times which corresponded to the patient recording a 0 pain intensity (no pain) whereas more females were given analgesics on the nurse's initiative when a 0 pain intensity was recorded by the patient. Additionally, when patients recorded pain intensity greater than 0, equal numbers of males and females received analgesics upon their request. However, more women received analgesics upon initiative of the nurse.

While the methodology of the study did not reveal possible causes for these differences, behavioral differences may account for the findings. Men certainly requested analgesics prior to onset of pain which is a behavior related to pain control. Females, on the other hand, may have used more nonverbal pain expression behaviors to communicate their pain to the nurses who responded with pain control techniques, namely analgesics.

#### Effects of Cancer Pain on Behavior

Behavioral control of pain has not been directly investigated. Investigators have attempted to correlate pain intensity with behaviors. These behaviors have not been conceptualized as pain control behaviors, but extrapolation is possible from behavioral descriptors of pain.

Fordyce, Lansky, Calsyn, Shelton, Stolov, and Rock (1984) compared pain intensity to activity of 150 outpatients with chronic benign pain. They found a positive correlation between high pain intensity and sleep disturbances ( $p < .014$ ), intolerance for sitting ( $p < .014$ ), and interference of the pain with activities of daily living ( $p < .002$ ). These findings suggest that with high pain intensity chronic benign pain patients curtail their sitting time, sleep, and other activities of daily living which were not well defined. These findings were then compared to the health care utilization and medication intake of the patient, but no significant correlation was found. Thus, activity pattern may be an important indicator of pain intensity.

Daut and Cleeland (1982) reported that pain significantly interfered with the activities of 407 patients with cancer. On a scale from 0 to 10 where 0 was defined as "does not interfere" and 10 as "completely interferes," patients rated how much their pain interfered with their activity level. Pain intensity was also measured on a 0-10 numerical scale. Pain intensity ratings of 1-4 were related to mean activity interference ratings of 0.2 to 2.6 whereas pain intensities of 5-10 were related to mean activity interference ratings of 4.4 to 7.1. In this sample 304 patients reported a pain intensity rating of 5 or more. Patients who perceived their pain was caused by the cancer disease, rather than cancer treatment or unrelated to cancer, reported higher

interference with activity ( $p < .001$ ). Conceivably, tumor proliferation may cause pain of such high intensity that activity must be curtailed. Daut and Cleeland did not elaborate on the types of activities that were curtailed because of cancer pain.

Rankin (1982) studied the relationship of pain intensity to activities of daily living in 40 hospitalized patients with advanced, metastatic cancer. On a verbal descriptor scale, pain intensity was rated as moderate to excruciating by 90% of these patients whereas 10% rated their pain as mild to moderate. For some unreported reason, only 25 patients responded to questions related to activity interference because of pain. Interference with living was defined by sleep disturbances, concentration disturbances, physical movement disturbances, and irritability. Of these, physical movement ( $p = .047$ ) and irritability ( $p = .041$ ) were significantly related to pain intensity. Patients who reported irritability and difficulty moving had significantly more pain than patients who were not irritable and had no difficulty with movement. In a small sample, loss of subjects from the interference with living analysis may account for the nonsignificant findings for sleep and concentration disturbances since 76% of the 25 patients reported sleep disturbances and 60% reported concentration disturbances.

In the same population ( $N = 40$ ), Rankin also investigated the effectiveness of analgesic use as correlated with pain intensity.

Using daily analgesic score (based on number of analgesic doses, type of analgesic, and schedule for administration) a significant, weak to moderate correlation was found between analgesic score and current, worst and average pain intensity ( $r=.36-.43$ ,  $p=.001$ ). Since neither a mean analgesic score nor a mean pain intensity were reported, correlation cannot be interpreted. However, although 70% of the subjects ( $n=28$ ) reported inadequate pain relief with the analgesic regimen prescribed for them, only 40% ( $n=18$ ) indicated that they would have preferred some change. Most ( $n=38$ ) of the patients took an active role in requesting analgesics when needed. Only 2 patients passively waited for the nurse to offer analgesics. A verbal request for analgesics may be considered as a pain control behavior.

Ahles et al. (1983) reported that standing and walking were significantly ( $p<.001$ ) curtailed more by patients who had cancer pain than pain-free patients who had cancer. Patients believed that others were aware of their pain by their facial expressions (49%), mood changes (21%), going to bed (8%), and verbal complaints of pain (6%). Patients expected significant others to express concern (72%), offer aid (72%), and assume responsibilities for them (49%) when they used the above mentioned behaviors. These findings indicate that patients with cancer behave in ways, particularly by reducing activities, to indicate that they are in pain and elicit assistance.

Summary

Behaviorally oriented research indicates that cancer pain intensity is inversely related to activities performed by patients. Although activities used for pain expression have been insufficiently described, pain control behaviors are virtually unexplored. Extrapolated findings suggest that investigation into the pain control behaviors of patients with cancer pain may provide clinically useful information to help understand cancer pain.

Research findings of other investigators suggest that patients with high intensity pain may attempt to control their pain by curtailing physical movement and requesting analgesics. These types of pain control behaviors represent limited utilization of the body's pain control mechanisms (i.e., ascending and descending pain control paths). They also represent a limited pain control set. Further investigation of pain control behaviors used by patients with cancer pain may yield fruitful information.



## Chapter Four

### Methodology

The purpose of this study was to describe the behaviors used by patients with advanced stage cancer to control their pain and compare concurrent measures of pain intensity. Specifically, the following questions were explored:

1. What is the concurrent validity of the Wachter-Shikora Finger Dynamometer (FD), the Pain Intensity Number Scale (PINS), and the Visual Analogue Scale (VAS)?
2. What is the sensitivity of pain intensity measurement by the FD, the PINS, and the VAS?
3. What pain control behaviors are used by patients with advanced stage cancer?
4. Is there a correlation between pain control behaviors and concurrent pain intensity ratings?

### Research Variables

Independent variable. The intensity of pain experienced by the patient with advanced cancer is considered the independent variable of this study.

Dependent variable. The pain control behavior of the patient with cancer who has pain is the dependent variable of this study.

Confounding variables. Age, sex, ethnicity, educational level, handedness, and strength are attribute variables. Cancer diagnosis, date of diagnosis, metastasis, and admitting diagnosis; pain onset,

duration, and location; and concurrent antitumor and analgesic therapy are pain intensity moderator variables.

#### Definition of Terms

For the purposes of this study, the following terms were theoretically and operationally defined:

Acute cancer pain. An episode of discomfort which has a duration less than 6 months (McCaffery, 1979).

Adult. A person 18 years of age or older.

Advanced Stage Cancer. A Stage III or IV solid tumor malignancy that is recorded on the patient's medical record.

Chronic cancer pain. A sensation of discomfort which has a duration in excess of 6 months, and is caused, at least in part, by malignant pathology (McCaffery, 1979).

Pain. A subjective sensation of discomfort as indicated by an affirmative response to the question, "Do you have pain?".

Pain control behavior. An observable action of a patient who experiences pain that produces a reduction in pain intensity.

Pain Intensity. A subjective perception of the magnitude of discomfort experienced by the patient with advanced stage cancer as measured by each of three instruments--the FD, the PINS, and the VAS.

Solid tumor. Primary malignancy diagnoses other than leukemia or lymphoma (Terry & Hodes, 1982).

Statistical correlation strength. The amount of linear relationship between two variables where: (a)  $r=.00$  to  $.20$  indicates no linear relationship, (b)  $r=.21$  to  $.40$  indicates weak linear relationship, (c)  $r=.41$  to  $.60$  indicates moderate linear relationship, (d)  $r=.61$  to  $.80$  indicates strong linear relationship, and (e)  $r=.81$  to  $1.0$  indicates very strong linear relationship (Marasculio & Serlin, 1984).

### Assumptions

The major assumption of this study was that man makes automatic behavioral adjustments to protect himself from cancer pain (Johnson, 1980). Consequently, all observed behaviors that occurred in conjunction with pain were assumed to be pain control behaviors until denied by the patient.

Contingent assumptions included the following:

1. Patients experiencing pain related to advanced stage cancer are aware of behaviors that reduce the intensity of their pain.
2. Self-reported pain intensity is a valid and reliable measure of experienced pain.
3. Patients who repeatedly report the intensity of their pain do not develop a response set.
4. The researcher is qualified to objectively, consistently observe and record the behaviors of patients experiencing pain related to advanced stage cancer.

5. The researcher is able to approach and relate to each patient in a consistent manner.

#### Research Design

A descriptive, correlational design was used to explore the research questions. Specifically, longitudinal, participant observation and semi-structured interview were employed to investigate the incidence of pain control behaviors and to compare pain intensity ratings. Since little is known about the behaviors patients with cancer use to control pain, participant observation was conducted in an unstructured manner. Repeated measures of the dependent variable were used to capture the range and diversity of pain control behaviors used by each patient whereas repeated measures of pain intensity were used to determine the sensitivity of the instruments.

Pilot study. Feasibility of the study protocol was tested and standardized by conducting a pilot study with two patients who met the eligibility criteria (see Sample section). Based upon observations noted during the pilot study, scheduled observations were changed from once per day for four days to twice per day for two days. This modification was necessary because length of hospitalization was shorter than expected, being four to five days or less. The pool of eligible subjects was increased with this modification in study design. Time of day for observation was changed from 8 a.m., 12 p.m., 4 p.m., and 8 p.m. to 8 a.m. and 4

p.m. since patients were frequently unavailable for observation at 12 p.m. Missing data were minimized with this modification.

During the pilot study, standardized instructions for study instrumentation were confirmed to be comprehensible to the two pilot study subjects. Data obtained from pilot study subjects were excluded from the main study data analysis.

#### Research Setting

This research was conducted in Long Hospital, a 520 bed, acute care, teaching hospital at the University of California, San Francisco. Subjects were observed in their rooms on a 36 bed medical-oncology unit unless the subject was transported to another department during the observation period. Two subjects were observed on one occasion while in the X-ray department. All other observations occurred in private or double occupancy rooms.

#### Sample Selection

A convenience sample of 15 subjects was obtained from the patient population of the medical-oncology unit. Adult patients with solid tumor and hematological malignancies were admitted to this unit for diagnostic evaluation, chemotherapy, radiation therapy, pain management, and terminal care. During the study period, August 15, 1983 to March 30, 1984, a larger than usual percentage of the patients on this unit were admitted for diagnosis and treatment of hematological malignancies.

Selection criteria. Each subject was required to meet specific criteria to be admitted to the study. Selection criteria were as follows:

1. The hospitalized adult had a Stage III or IV solid tumor malignancy diagnosis recorded on the medical record.
2. The expected length of hospitalization was at least four days. (For the pilot study, the expected length of hospitalization was at least 6 days.)
3. The nursing care plan indicated that pain was an active problem for the patient.
4. The patient was hospitalized at least 24 hours.
5. The patient's nurse recommended the patient for inclusion in the study.
6. The patient was mentally competent.
7. The patient affirmatively answered the following questions:  
(a) "Do you speak English?" and (b) "Do you have pain?"
8. The patient negatively answered the following question:  
"Have you been asked to participate in an excessive number of research studies?"
9. The patient signed a written informed consent for participation.
10. The patient demonstrated ability to exert pressure on the Wachter-Shikora Finger Dynamometer adequate to register a reading of at least 3.4 kilograms of force. If the subject was not able to

squeeze this force the subject was considered too weak to reliably report pain intensity with this tool (Reville, 1983).

Human subjects assurance. Review and approval of the study was obtained from the Committee for Protection of Human Rights and the Nursing Research Committee at the University of California, San Francisco (#943303-01). The investigator explained the purpose and procedure of the study to each patient and any family members present. The patient was informed of his/her right to: (a) refuse to participate; (b) withdraw from the study at any time, (c) be guaranteed freedom from harm, (d) privacy, and (e) confidentiality. If the patient verbally agreed to participate, he/she was asked to sign a consent form (See Appendix A). Each subject was given a copy of the consent form. No subjects refused to participate after signing the consent form. One subject requested the results of the study. This request was documented and the results will be summarized and mailed to the subject.

Medical authorization for access to the patients was sought with a letter of information and request mailed to the Chief of Cancer Research Institute and all attending oncologists who admitted patients to the unit (See Appendix B). Approval was granted by the Chief and no oncologists denied access (See Appendix C).

#### Instrumentation

Data collection included use of a demographic information tool, a behavior observation and validation tool, and pain intensity

measurement tools. Some tools were constructed specifically for this study whereas others were developed by other researchers.

Demographic-Pain Data Form. This tool was developed by the investigator to gather data related to factors that may have influenced the perception of pain intensity such as: sex, age, education, ethnicity, disease process, character of pain, analgesic therapy, and antitumor therapy (See Appendix D). The tool included semi-structured interview questions designed to characterize the patient's pain. During the pilot study the instrument was field tested and the questions were found to be easily answered by the subjects within 10 minutes.

Medication Administration Log. This tool was developed by the researcher to document all analgesic and antitumor therapies received by the subject including: name of agent, dose, route, and time (See Appendix E). Field testing during the pilot study demonstrated the tool to be useful for the designed purpose.

Behavior Observation-Validation Form. This form was a double column page developed by the investigator. Recorded in the right column were all actions of a subject during a 15 minute observation period. Recorded in the left column were subjects' validation or denial of the behavior (in the right column) as a pain intensity reducing behavior (See Appendix F). The tool was field tested during the pilot study and was found to be useful for the designed purpose. Details of the recording procedure are presented in the



Procedure section. Objectivity of behavioral recording was determined by the opinion of a doctorally prepared nurse familiar with behavior research.

Wachter-Shikora Finger Dynamometer (FD). The FD (New York: Preston, 5036M) is a small (10 cm X 6 cm X 3 cm) finger pinch gauge (See Figure 5). A measure of pain intensity is obtained by asking the subject to describe his/her pain by "squeezing the FD as hard as you hurt" (See Appendix G). The subject must conceptualize the pain intensity and match it with psychomotor action, squeezing the FD (Wachter-Shikora, 1980a). The FD provides a numerical representation of pain intensity in kilograms of force (0-12). The greater the pain intensity, the greater the squeeze of force is expected to be. Numerical readings are not visible to respondents.

Use of the FD to describe pain intensity is purported to avoid language and word discrepancies (Perez, 1982; Wachter-Shikora, 1980a). Although accurate and reliable, FD measurements are not precise. Wachter-Shikora (1980a) demonstrated that the numerical force (as measured by repeated trials with kilogram weights) required multiplication by a constant (1.121) to determine actual force. Therefore, each FD numerical reading must be multiplied by 1.121 to ensure precision of actual force.

Validity of IM injection associated pain intensity measurement with the FD was established by Wachter-Shikora (1980a) by conferring with three pain experts. However, validity of pain intensity

measurement with the FD in other populations has not been confirmed (Reville, 1983). Additionally, reliability of pain intensity measurement with the FD has not been confirmed (Perez, 1982; Reville, 1983; Wachter-Shikora, 1980a) since repeated measures of the same pain have not been conducted. Repeated measures designed to measure first and second pain intensity associated with IM injection were not reported in terms of reliability between measures. Thus, validity and reliability of the FD as a measure of cancer pain intensity must be determined.

In order to compare pain intensity ratings between subjects, individualized FD scores were created (Wachter-Shikora, 1980a). First, each FD numerical score was adjusted--multiplied by the constant ( $y=1.121 \times$  ). The FD pain intensity score (FDPI) represented the adjusted pain intensity score. The FD strength score (FDS) represented the adjusted average of two baseline maximum squeezes. A ratio was created with the numerator being FDPI and the denominator being FDS. This ratio score reflects the subject's report of pain in relation to his/her maximum strength at a particular time (See Literature Review).

Pain Intensity Number Scale (PINS). The PINS is used to measure the intensity of pain perceived by the subject. Pain intensity is measured by the subject's response to "Call your pain a number between 0 and 10, where 0 is no pain and 10 is pain as bad as it could be" (See Appendix H). The anchor descriptors helps the

subject to conceptualize the pain in terms of numbers. For statistical analysis, the intervals are assumed equal on the scale (Stewart, 1977). Although this tool has been commonly used in clinical practice (McGuire, 1981), the validity and reliability of the tool has not been established (See Literature Review).

Visual Analogue Scale (VAS). The VAS has been used extensively in pain research as a measure of pain intensity. The VAS is a scale 10 centimeters in length. The line is anchored on the left with "no pain" and on the right with "pain as bad as it could be" (See Appendix H). The subject reports pain intensity by drawing a vertical mark at the appropriate interval on the horizontal line. The pain intensity score is determined by measuring the distance, in millimeters, from the left side of the line to the mark placed by the subject.

Use of the VAS does not require that the subject relate his pain to specific words or numbers. The VAS has been found to be valid, sensitive, and reliable as a measure of pain intensity, particularly when the scale is anchored with descriptors and has no midline descriptors (Carlsson, 1983; McGuire, 1984; Pilowsky & Kaufman, 1965). Subjects tend to use the entire continuum when only anchor descriptors are used (Berry & Huskisson, 1972; Clark & Spear, 1964) (See Literature Review).

### Procedure

From the patient population on the medical-oncology unit, the investigator sought eligible subjects by:

1. Reviewing the Kardex, medical record, and nursing care plans of patients to determine if a particular patient met basic eligibility requirements.
2. Discussing potential subject suitability with the nurse caring for the patient.
3. Approaching the patient, no sooner than the second hospital day to explain the study purpose and procedure and obtain consent.

When the patient agreed to participate and the informed consent process had been completed, the subject was asked to demonstrate his/her strength by producing two maximal squeezes on the FD. If the subject qualified to remain in the study by squeezing at least 3.4 on the FD, the interview questions on the Demographic-Pain Data Form were asked in the printed order. Then the subject was given specific instructions on use of the PINS, VAS, and FD for pain intensity description. Practice was provided for all three instruments, until the subject verbally reported understanding of the use of all three tools. The patient was then told that the investigator would return twice the following day. The time of the investigator's return was not revealed to the subject or the nurses.

At 8 a.m. the following morning (Time One), the researcher asked the subject to produce two baseline maximum squeezes on the

FD, think about the pain presently felt, report pain intensity first as a squeeze on the FD, as a number on the PINS, and then as a line on the VAS. This procedure was consistently used during each measurement period.

After the subject completed the pain intensity measures, the investigator invited the subject to resume activities as usual and disregard the researcher's presence. Sitting in a chair to which the patient directed the researcher, the researcher began recording all actions of the subject on the Behavior Observation-Validation form. The body position of the subject at the beginning of the observation period was recorded in narrative form. All subsequent actions and verbalizations during a 15 minute observation period were recorded in a narrative form. After 15 minutes, the researcher informed the subject that another observation would take place later that day.

At 4 p.m. (Time Two); and 8 a.m. (Time Three) and 4 p.m. (Time Four) the subsequent day, the same procedure was followed (See Appendix I). When the final observation was completed, an unstructured interview was conducted to determine which actions observed by the researcher were perceived as pain control behaviors by the subject. Observed actions were read to the subject and the subject either denied or validated whether each observed behavior was used to control pain. A behavior observed multiple times was read to the subject only once. The behavior was recorded as a

validated or denied pain control behavior, depending upon the subject's response to the first reading of the behavior. Answers were recorded in narrative form using the subject's own words. When the validation process was complete, the subject was thanked for his/her participation in the study.

During the study period, all analgesic and antitumor therapy administered to the subject were documented on the Medication Administration Log (See Appendix I). These data were obtained from review of the subject's medical record.

#### Limitations

Limitations were inherent in the methodology of this study. Generalization of results were expected to be confined only to the group studied because:

1. Subjects' acquaintance with the researcher in a staff nurse role may have influenced their responses during the study.
2. Subjects' anxiety about being observed may have influenced their actions during the observation periods.
3. Subjects may have developed a response set of actions during observation and/or in measures of pain intensity.
4. The convenience sample may not have been representative of patients diagnosed with cancer at the institution where the research was conducted or other patients with cancer at other institutions.
5. The investigator may have had an unconscious bias that affected collection and/or analysis of data.

6. Confounding variables were not controlled.

7. Affective state and locus of control were not measured.

8. The Demographic-Pain Data Form and the Behavior

Observation-Validation Form had not been previously tested for reliability and validity.

## Chapter Five

### Results

The purpose of this study was to describe the behaviors used by patients with advanced stage cancer to control their pain and to compare concurrent measures of pain intensity. The Wachter-Shikora Finger Dynamometer (FD), the Pain Intensity Number Scale, and the Visual Analogue Scale were consecutively used to measure pain intensity. Descriptive and correlational data analysis utilized the Statistical Package for the Social Sciences (SPSS).

### Sample

Seventeen patients hospitalized between August 15, 1983, and March 30, 1984, met eligibility criteria to participate in the study. Two patients, eligible for participation, refused to consent because they considered themselves too ill to participate. Fifteen subjects gave informed consent and participated in the study. No subject failed to demonstrate minimal strength of 3.4 kg with the FD. One subject completed all measurements except pain control validation. This subject reported intense pain at time four and fell asleep during the observation period. The researcher did not awaken the subject for validation. On the following day the subject was discharged prior to completing pain control validation. One other subject was discharged after time two. All data missing from these two subjects were recorded in the computer program as missing data. Thirteen subjects completed all study measures.



Sample characteristics. The five male and ten female subjects had a mean age of 51 (range 27-78 years). Eleven subjects were caucasians, two black, and two were from other ethnic origins. The mean education was 12.5 years with a range of 7-16 years.

The subjects' solid tumor malignancy diagnoses included; hepatoma (three subjects), breast (one subject), trachea (one subject), lung (two subjects), colon (two subjects), uterus (one subject), multiple myeloma (one subject), and unknown primary (four subjects). Subjects had known of their diagnosis for less than 1 month to 45 years (mean=59 months, mode=1 month, median=8 months). Six subjects had no known metastasis, two subjects had liver metastasis, three subjects had bone metastasis, two subjects had lung metastasis, and two subjects had more than one metastatic site. None of the subjects had a hospitalization admission diagnosis of pain.

Ten subjects consistently used the dominant hand for Finger Dynamometer initial and baseline strength and pain intensity measures. Two subjects consistently used their nondominant hand for all FD measures whereas three subjects were inconsistent in dominant hand use because of intravenous needle placement that interfered with their use of a particular hand. The subjects demonstrated an initial strength range of 4.03-10.31 kilograms of force with the FD (mean initial strength was 6.59 kilograms).

Pain Characteristics. In response to semi-structured interview questions from the Demographic-Pain Data Form, subjects spontaneously named up to six descriptors for their pain. However, one subject was unable to describe the pain with a spontaneous descriptor. Subjects had experienced pain for 1-98 months (mean=16 months, mode=4 months) but 11 subjects had the pain 6 months or less. Eight subjects reported the pain was constant, one subject had pain with movement, five subjects had intermittent pain, and one subject couldn't describe the duration of pain. The pain was internal (8), external (2), or both internal and external (5). These subjects reported from 1 to 14 anatomically distinct pains. One pain site was reported by four subjects; two pain sites by two subjects; three pain sites by six subjects; eight, ten, and fourteen pain sites by one subject, respectively.

In response to interview questions, subjects reported one to six behaviors that "made the pain better." Use of medication was most frequently reported (n=6). Twelve subjects recognized one to three behaviors that intensified the pain whereas three subjects were unable to identify a pattern in the pain. Pain interfered with the following activities: (a) all activity in and out of bed (n=2), (b) all activity out of bed (n=4), (c) only specific activities (n=8), and (d) no pattern identified (n=1).

Six subjects received antineoplastic chemotherapy and five subjects received radiation therapy during the study period. All

subjects received analgesics during the study period. At the  $p=.05$  significance level using Kendall Correlation Coefficients, analysis failed to show a significant relationship between pain intensity and each of the following variables: (a) antineoplastic chemotherapy, (b) radiation therapy, or (c) time since last analgesic dose. Data for analgesic use are presented in Figure 6. Most subjects were consistently beyond the peak of most analgesics (i.e., had not received an analgesic for more than 2 hours prior to the measurement time). Additionally, 50-73% of the 15 subjects had not received an analgesic within 4 hours of the measurement time.

#### Data Analysis

Study questions guided analysis of data and will be individually addressed:

Instrument validity. Kendall Correlation statistic was used to determine the concurrent validity of the FD, PINS and VAS. A consistent, weak to moderate, positive correlation ( $r=.38-.46$ ) was demonstrated when the FD was compared to the VAS on all four occasions. Correlations were significant at the  $p<.05$  level, as shown in Table 1. A moderate to strong correlation ( $r=.47-.68$ ) was found between the PINS and the FD, at the  $p<.01$  significance level on all four occasions (Table 2). A consistent, strong to very strong correlation ( $r=.77-.89$ ) was found between the PINS and the VAS on all four occasions. Again, the correlations were significant at the  $p<.001$  level as shown in Table 3.

Figure 6. Analgesic Use by Observation Time.

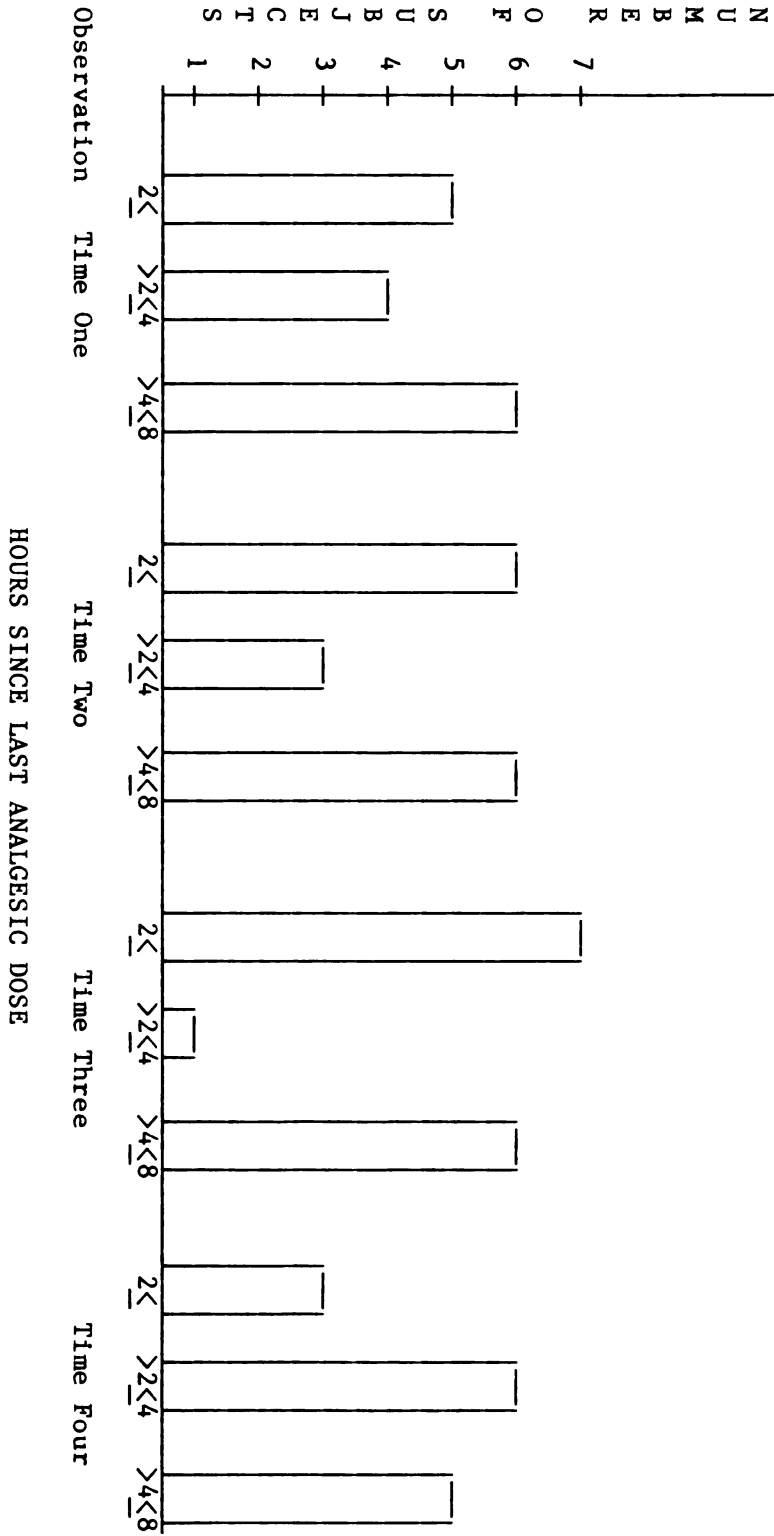


Table 1

Kendall Correlation Coefficients of Visual Analogue Scale and Finger  
Dynamometer

	FD <sub>1</sub> ( <u>n</u> =15)	FD <sub>2</sub> ( <u>n</u> =15)	FD <sub>3</sub> ( <u>n</u> =14)	FD <sub>4</sub> ( <u>n</u> =14)
VAS <sub>1</sub>	.46*			
VAS <sub>2</sub>		.38*		
VAS <sub>3</sub>			.40*	
VAS <sub>4</sub>				.42*

\*p<.05

FD<sub>1</sub> to FD<sub>4</sub> = Finger Dynamometer Time One to Time Four.

VAS<sub>1</sub> to VAS<sub>4</sub> = Visual Analogue Scale Time One to Time Four.

Table 2

Kendall Correlation Coefficients of Pain Intensity Number Scale and  
Finger Dynamometer

	FD <sub>1</sub> ( <u>n</u> =15)	FD <sub>2</sub> ( <u>n</u> =15)	FD <sub>3</sub> ( <u>n</u> =14)	FD <sub>4</sub> ( <u>n</u> =14)
PINS <sub>1</sub>	.50*			
PINS <sub>2</sub>		.47*		
PINS <sub>3</sub>			.68*	
PINS <sub>4</sub>				.54*

\*p<.01

PINS<sub>1</sub> to PINS<sub>4</sub> = Pain Intensity Number Scale Time One to Time Four.

FD<sub>1</sub> to FD<sub>4</sub> = Finger Dynamometer Time One to Time Four.

Table 3

Kendall Correlation Coefficients of Visual Analogue Scale and Pain Intensity Number Scale

	PINS <sub>1</sub> ( <u>n</u> =15)	PINS <sub>2</sub> ( <u>n</u> =15)	PINS <sub>3</sub> ( <u>n</u> =14)	PINS <sub>4</sub> ( <u>n</u> =14)
VAS <sub>1</sub>	.89*			
VAS <sub>2</sub>		.88*		
VAS <sub>3</sub>			.77*	
VAS <sub>4</sub>				.82*

\*p<.001

VAS<sub>1</sub> to VAS<sub>4</sub> = Visual Analogue Scale Time One to Time Four.

PINS<sub>1</sub> to PINS<sub>4</sub> = Pain Intensity Number Scale Time One to Time Four.

Instrument sensitivity. Mean pain intensity scores were computed for each measurement period. Scores on all three measures increased during the sampling period, indicating a higher pain intensity at time four than at time one. Mean scores, standard deviation, and score ranges for each of the instruments are presented in Table 4.

Inconsistent correlations were found using Kendall Correlation coefficients between pain intensity ratings with all three instruments at time one, two, three, and four (Table 5). Significant correlation ( $p=.05$ ) was found between VAS time one and time two; and PINS time one and time two ( $p=.02$ ). Significance was approached ( $p=.06$ ) between PINS time two and time three, and FD time one and time three ( $p=.07$ ). No significant ( $p>.05$ ) correlations were noted between measures at other times.

The sensitivity of each instrument was also computed by an analysis of variance (between measures and error). Ratings of pain with the VAS were not comparable at times one through four ( $F=.998$ ,  $Df=3,39$ ,  $p=.40$ ). For the FD, the analysis of variance indicated pain ratings were not comparable over time ( $F=1.38$ ,  $Df=3,39$ ,  $p=.26$ ). Analysis of PINS variance again indicated inconsistent pain ratings at times one through four ( $F=.62$ ,  $Df=3,39$ ,  $p=.60$ ).

Description of pain control behaviors. Behaviors recorded on the Behavior Observation Validation Form were analyzed for behavioral themes. Thirty-seven behaviors were observed during 58,



Table 4  
Pain Intensity Scores Over Time

Measurement	<u>n</u>	Mean	<u>SD</u>	Range
Time One:	15			
FD		4.30	1.80	0.22 - 7.4
PINS		3.50	2.47	0 - 8
VAS		30.67	26.39	0 - 81
Time Two:	15			
FD		3.47	2.32	0 - 6.95
PINS		3.47	3.39	0 - 10
VAS		27.67	35.62	0 - 97
Time Three:	14			
FD		4.27	1.85	2.02 - 8.74
PINS		4.46	3.27	0 - 10
VAS		39.50	36.63	2 - 102
Time Four	14			
FD		4.98	2.54	0 - 9.42
PINS		4.71	2.30	0 - 9
VAS		45.07	25.05	0 - 94

SD = Standard Deviation  
FD = Finger Dynamometer  
PINS = Pain Intensity Number Scale  
VAS = Visual Analogue Scale

Table 5

Correlation of Pain Intensity by Time of Measure (Each measure compared with other measures of the same instrument)

---

	Time One	Time Two	Time Three
Time Two			
FD	.057		
PINS	.438*		
VAS	.32*		
Time Three			
FD	.29	.24	
PINS	.09	.33	
VAS	.25	.25	
Time Four			
FD	-.23	.22	.07
PINS	-.22	-.05	.14
VAS	-.18	.10	.12

---

\*p<.05

FD = Finger Dynamometer

PINS = Pain Intensity Number Scale

VAS = Visual Analogue Scale

15 minute observation periods. Of these, 30 behaviors were validated by at least one subject to be a behavior that reduced pain intensity. The remaining seven behaviors included activities of daily living such as eating and grooming.

Of the 13 subjects who validated pain control behaviors, all subjects validated using a "special or favorite position" as a pain control behavior. Nine subjects reported watching or listening to the television to reduce pain. Rubbing or pressure application to the pain area helped to relieve pain for seven subjects. Socialization with family and friends were helpful for seven subjects.

Observed behaviors that were validated as pain control behaviors were classified by five categories: immobilizing/guarding, distractive, positioning, pressure manipulative, or analgesic use behaviors, based upon an operational definition of each category (See Figure 7). Other behaviors were categorized as "other," and primarily included activities of daily living.

The reliability of pain control behavior categorization was established by an independent panel of experts. Using a Reliability Test for Pain Control Behavior Categories, an instrument developed by the investigator (See Appendix J), three experts in pain and research independently and without consultation indicated in which of the five categories each validated pain control behavior

Figure 7. Operational definitions of pain control behavior categories.

<u>Behavior Category</u>	<u>Activities Represented by Category</u>
Immobilize or Guard	The patient maintains one position of the entire body or a body part for most of the observation period when the eyes are open. Also includes maintenance of the body or a body part in a rigid or stiff position while awake.
Distraction	Activities which help the patient to divert attention; such as rereading, watching or listening to the T.V., conversing with non-healthcare providers, gazing at objects, sleeping, slow breathing, etc.
Positioning	Activities which include movement of the body or a body part into a new position, stretching, etc.
Pressure Manipulation	Activities which include rubbing, massage, or application of pressure to a body area.
Analgesic Use	Activities which include consumption of analgesics, discussion about analgesics, complaints of pain to another person, monitoring medication time schedule, etc.

belonged. There was 93% agreement between the investigator and the experts in categorization of the 30 validated pain control behaviors.

For further analysis of behavioral data, the frequency of behaviors by observed time was computed. Table 6 presents these data. During the second observation period, the mean of other behaviors was higher than the mean of all pain control behavior categories which indicates that the subjects were involved with more activities of daily living at time two. The total number of behaviors observed was computed by observation time (Table 7). The mean number of behaviors was similar at all times ( $\bar{M}=12.0-15.6$ ,  $R=19-22$ ), except at time two where fewer behaviors were noted ( $\bar{M}=8.5$ ). The range of the number of behaviors seen at time two was also smaller ( $R=10$ ).

Data are presented by behavior category for observed behaviors, validated pain control behaviors, and denied pain control behaviors. Both number of subjects and frequency of behavior are reported.

Immobilizing/Guarding behaviors were used by few subjects (Figure 8) but most of those subjects who used this type of behavior considered it effective. Only one subject denied that the behavior reduced pain intensity (Figure 9). Few immobilizing/guarding behaviors were observed (Figure 10), but again the few types used were considered effective by the subjects (Figure 11). Only one immobilizing/guarding behavior was not effective.

Table 6

Mean Frequency of Observed Behaviors by Category and Time

Category	Mean			
	Time One	Time Two	Time Three	Time Four
Immobility/Guard	0.33	0.26	0.35	0.07
Distraction	2.53	2.13	2.70	3.00
Positioning	5.26	3.40	6.14	4.07
Pressure Manipulation	0.93	0.40	0.14	0.86
Analgesic Use	0.47	0.33	1.00	0.79
Other	4.20	6.67	3.67	3.21

Table 7

Total Frequency of Observed Behaviors by Time

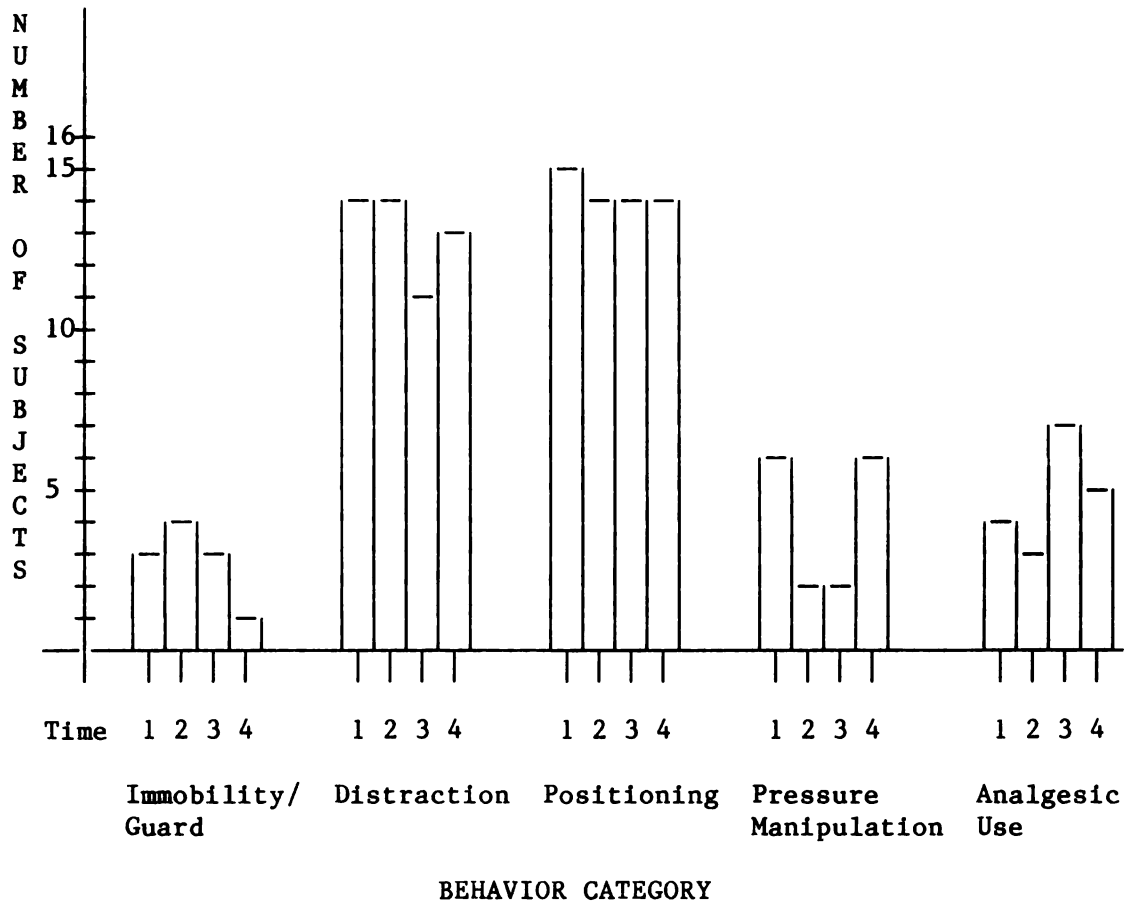
Observation Time	Min-Max	Range	Mode	Mean	<u>SD</u>
One	9-31	22	16	15.6	5.78
Two	4-14	10	7	8.5	2.97
Three	5-24	19	16	13.1	5.20
Four	3-24	21	10	12.0	5.45

Min = minimum score

Max = maximum score

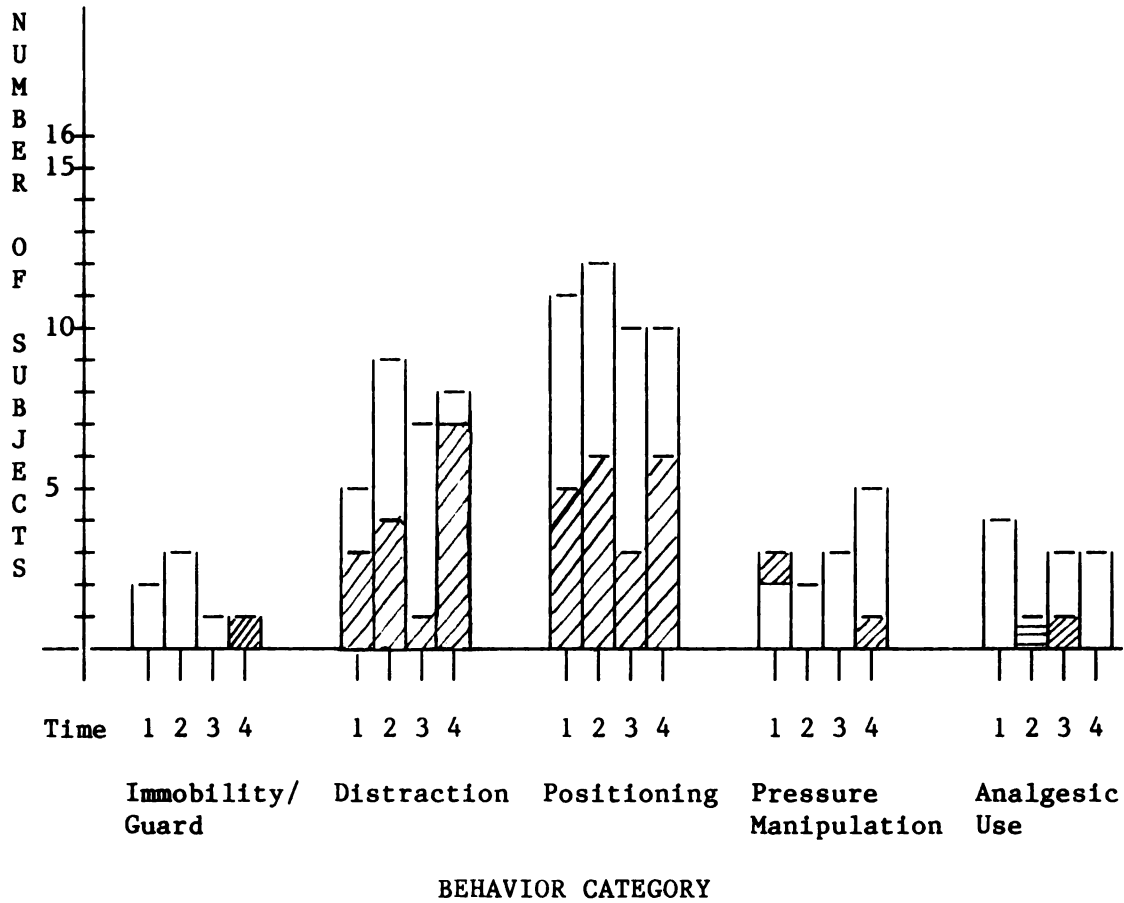
SD = Standard Deviation

**Figure 8.** Number of subjects observed using behavior by category and time.





**Figure 9.** Number of subjects validating and denying behavior by category and time.



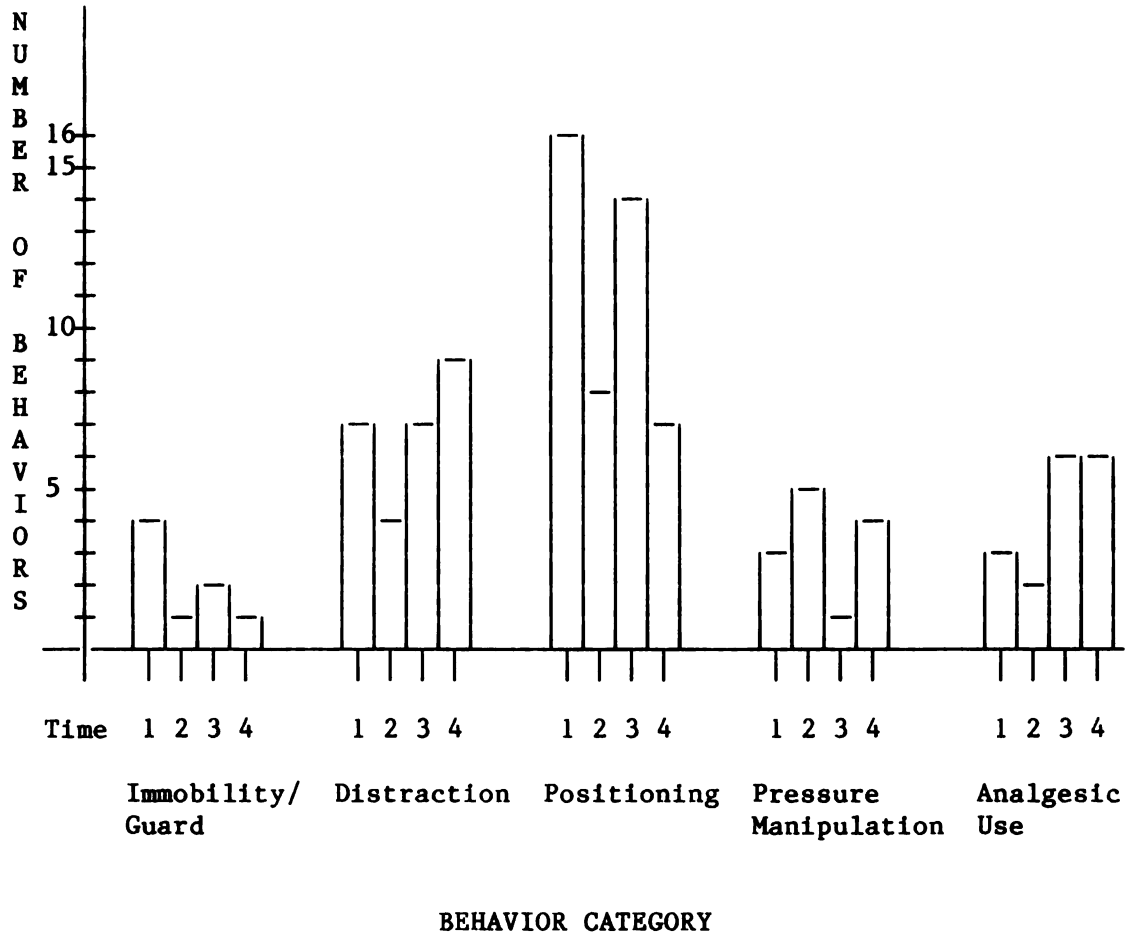
Key:

□ Validated behavior

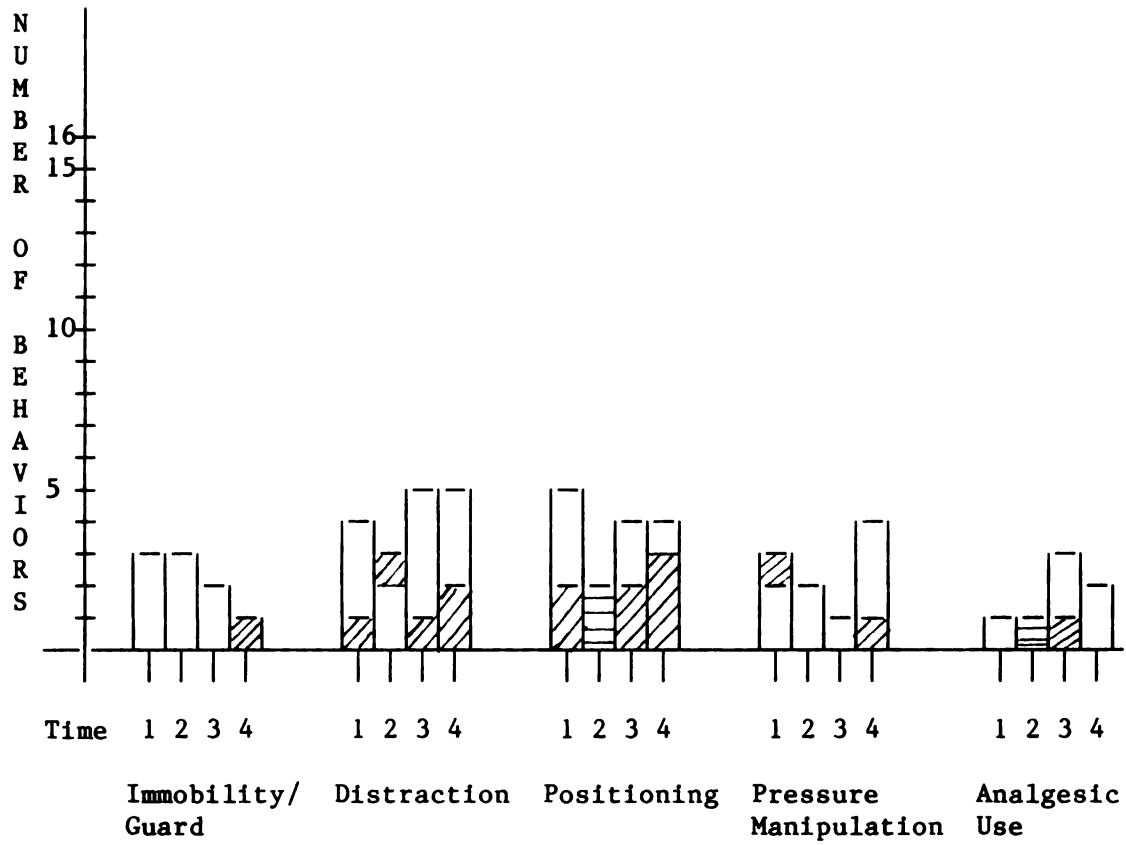
▨ Denied behavior

▤ Equal number of validated and denied behavior

**Figure 10.** Frequency of observed behavior by category and time.



**Figure 11.** Frequency of validated and denied pain control behavior by category and time.



BEHAVIOR CATEGORY

Key:

□ Validated behavior

▨ Denied behavior

▤ Equal number of validated and denied behavior

Most subjects used distractive behaviors on all four observation occasions (Figure 8). Additionally, larger numbers of subjects ( $n=8-9$ ) validated use of distraction as an effective pain control behavior. Yet, at time four, seven subjects reported that at least one distractive behavior was not effective (Figure 9). Many (7-9) distractive behaviors were observed at times one, three, and four (Figure 10). Subjects also reported that up to five distractive behaviors were effective for pain reduction (Figure 11). The mean number of distractive behaviors validated as effective was greater than the mean number denied (Table 8). One to two distractive behaviors were denied to be effective at each observation time (Figure 11).

Positioning behaviors were also used by most subjects (Figure 8). Most subjects ( $n=10-12$ ) considered some positioning behaviors as effective. However, three to six subjects denied at least one positioning behavior as effective (Figure 9). Although the number of subjects using positioning remained constant over time, the number of times a positioning behavior was used varied by observation period (Figure 10). Subjects used more positioning behaviors at 8 a.m. [time one ( $n=16$ ) and time three ( $n=14$ )] than at 4 p.m. [time two ( $n=8$ ) and time four ( $n=7$ )]. Up to five positioning behaviors were considered effective pain reducing behaviors (Figure 11). Additionally, the mean number of positioning behaviors validated as effective was greater than the mean number denied

Table 8

Mean Frequency of Pain Control Behaviors by Category and Time

Category	Mean				
	Time One	Time Two	Time Three	Time Four	
Immobility/ Guard	val	0.23	0.38	0.15	0
	de	0	0	0	0.15
Distraction	val	0.69	1.00	0.69	1.15
	de	0.23	0.61	0.07	0.77
Positioning	val	1.69	1.30	1.69	1.46
	de	0.46	0.61	0.46	0.84
Pressure Manipulation	val	0.31	0.23	0.23	0.84
	de	0.31	0	0	0.08
Analgesic Use	val	0.31	0.08	0.38	0.31
	de	0	0.07	0.77	0

val = validated effective

de = denied as effective

Table 9

Correlation of Pain Control Behaviors and Pain Intensity

Time	<u>n</u>	FD	PINS	VAS
One	15	.14	.62*	.54*
Two	15	-.27	-.01	.08
Three	14	.11	.46*	.64*
Four	14	.32	.47*	.46*

\* = p<.02

FD = Finger Dynamometer

PINS = Pain Intensity Number Scale

VAS = Visual Analogue Scale

Table 10

Correlation of Observed Behaviors and Pain Intensity

---

Number of Observed Behaviors	<u>n</u>	FD	PINS
Time One	15	.26	.12
Time Two	15	-.04	.01
Time Three	14	-.14	.02
Time Four	14	.53*	.43*

---

\* = p<.02

FD = Finger Dynamometer

PINS = Pain Intensity Number Scale

(Table 8).

At times one and four, six subjects were observed using pressure manipulation whereas at times two and three, two subjects used this behavior (Figure 8). Most subjects who used pressure manipulative behaviors considered them effective, particularly at times two, three, and four since few subjects denied pressure manipulative behaviors as effective pain control behaviors (Figure 9). Additionally, of the one to five pressure manipulative behaviors used by subjects, one to four of the behaviors were considered effective (Figure 10 and Figure 11). Only one to two pressure manipulative behaviors were considered ineffective (Figure 11). Table 8 shows the mean number of pressure manipulative behaviors was equal to or greater than the denied behaviors at all four observation times.

Analysis of the analgesic use category revealed that three to seven subjects used these behaviors at each of the observation times (Figure 8). However, only one to four subjects considered the behaviors as effective for pain intensity reduction. One subject at time two and time three denied effectiveness of the analgesic use behavior (Figure 9). Although two to six types of analgesic use behaviors were observed, one to three were reported effective as pain control behaviors (Figure 10 and Figure 11). Only one behavior was denied as pain reducing (Figure 11).



Correlation of pain control behaviors and pain intensity. A final analysis utilized Kendall Correlation Coefficients to compare the number of validated pain control behaviors and pain intensity at times one, two, three and four. There was a moderate, significant correlation ( $r=.46-.64$ ,  $p<.02$ ) between pain control behaviors and PINS and VAS values at times one, three, and four (Table 9). At the  $p=.05$  significance level, no correlation was found with the FD at any of the four times. No consistent, significant correlation was found between the numbers of observed behaviors and pain intensity measured by any of the three pain intensity measures (See Table 10).

#### Anecdotal Data

Although not measured in any manner, a consistent finding was noted by the investigator when subjects reported pain intensity with the FD. When reporting their pain, subjects frequently squeezed the FD to the same force reading as they had squeezed to demonstrate their strength. However, the investigator noted that when reporting their pain intensity, the subjects squeezed the FD for a longer duration. The duration of the squeeze was not measured.

#### Additional Analysis

T test statistical analysis was computed to determine the difference in pain intensity and the presence of metastatic disease. No significant difference was found between those with and those without metastatic disease.

## Chapter Six

### Discussion

The aims of this study were to: (a) establish concurrent validity of three pain intensity measurement scales--the Wachter-Shikora Finger Dynamometer (FD), the Pain Intensity Number Scale (PINS), and the Visual Analogue Scale (VAS); (b) establish sensitivity of the FD, the PINS, and the VAS to measure pain intensity of patients with advanced stage cancer who experienced pain; (c) describe the pain control behaviors used by patients with advanced stage cancer; and (d) correlate pain control behaviors with pain intensity ratings. Using a longitudinal, descriptive-correlational study design, pain control behaviors were identified and compared to pain intensity ratings. The discussion presented in this chapter will include the significance and limitations of the research, implications for nursing, and recommendations for future research.

### Significance of the Results

Sample characteristics. A heterogenous group of 15 patients with advanced stage cancer participated in this study. For a small sample size, a large number of different malignancies (8) were represented. That one-fourth of the sample ( $n=4$ ) had an unknown primary diagnosis may be reflective of the setting of the research, a University affiliated, teaching hospital. Most of the subjects had metastatic disease ( $n=9$ ) which is consistent with advanced stage

cancers (Mauch, 1982). However, metastatic disease was not associated with a higher intensity of pain since no difference was found in pain intensity ratings of subjects based on metastatic or non-metastatic disease status.

Subjects in this study demonstrated a lower mean strength when their initial strength was measured with the FD ( $\underline{M}=6.59$ ) than the hospitalized, pre-surgical subjects in the study conducted by Perez (1982) ( $\underline{M}=9.8$ ). These subjects with advanced stage cancer may have been cachectic with muscle wasting which resulted in decreased strength. However, the range of their initial strength was 4.03-10.31 and at each of the four measurement times, the subjects maintained a stable baseline strength. Therefore, the conclusion can be made that any muscle wasting that may have been present probably did not effect the subjects' ability to use the FD as a measure of pain intensity.

Pain characteristics. None of the subjects were hospitalized primarily because of pain even though the subjects had experienced pain for 1-98 months. Most of the subjects had experienced pain for less than 6 months. Therefore, by definition, their pain would not be classified as chronic pain (McCaffery, 1979). Only four subjects had chronic pain by definition.

Subjects in this study reported a higher frequency of anatomically distinct pains than the subjects in the study conducted by Twycross and Fairfield (1982). The range of anatomically

distinct pains was 1-14 whereas Twycross and Fairfield found a range of 1-8. The sample size did not allow for an analysis of differences in pain intensity by the number of anatomically distinct pains or chronicity of pain.

All subjects received analgesics during the study period, but discrete analysis was not conducted for analgesic scheduling, administration route, or dose equivalents. At each measurement time, the interval since the last administered dose exceeded 2 hours for 50-73% of the subjects. Two hours is the average peak effectiveness interval for the opiates prescribed for these subjects (Jaffe & Martin, 1980). Although analgesia continues beyond the peak effectiveness interval, many subjects ( $n=6$ ) had not received an analgesic for 4 or more hours and were beyond the analgesic duration period of the prescribed opiates.

Adequate numbers of subjects were not available to analyze for difference between subjects who had and had not received an analgesic for more than 2 hours prior to the measurement time. The non-significant correlation between analgesic intake and pain intensity may be a function of the small sample size, but is similar to the findings of other researchers (Bond & Pilowsky, 1966; Fordyce et al., 1984).

Instrument validity. The VAS was used as a criterion to establish the concurrent validity of the PINS and FD (Polit & Hungler, 1983). The strong to very strong significant correlation

between the VAS and PINS at all four measurement times indicates that the two instruments measure the same phenomenon, pain intensity, with little variance. Therefore, for these subjects, the VAS and PINS were found to demonstrate concurrent validity as measures of cancer pain intensity. This result is similar to findings of other researchers (Kremer et al., 1981). Subjects demonstrated no difficulty in using either scale. Further support is thus given to careful explanation of use of the scale as suggested by Sriwatankul et al. (1983).

The VAS and FD were found to measure pain intensity, but variance was present between measures with the VAS and FD. This result indicated that the FD was a valid measure of pain intensity when compared to the validity criterion, the VAS. However, the FD did not predict the pain intensity of these subjects as well as the VAS. The significant, moderate to strong correlation between the PINS and the FD also indicated validity of the FD as a measure of cancer pain intensity, again with variance. These results are consistent with the findings of Wachter-Shikora (1980a). Perhaps the variance present in pain intensity measurement with the FD and VAS were responsible for the inconsistent findings reported by Reville (1983) and Perez (1982).

Instrument sensitivity. The FD, PINS, and VAS were found to be sensitive to the measurement of cancer pain intensity in this group of subjects. Intensity of pain related to pathological processes,

such as cancer, is not stable over time because many factors may influence the perception of pain intensity. Repeated measures of an unstable phenomenon capture the phenomenon at a specific point in time. Comparison of repeated measures may show little correlation with each other (Spielberger, 1980). With valid measurements, no correlation between measures is an indication of the unstable nature of the phenomenon. Thus, the FD, PINS, and VAS were sensitive to the unstable nature of pain intensity. This sensitivity is indicated by the poor reliability of pain intensity ratings between subjects and between the four measures of each subject. Additionally, no consistent correlation was found between each of the four measures with each of the three instruments, the FD, the PINS, and the VAS. The instruments used at specific points in time were sensitive to the unstable nature of pain intensity. These results are consistent with the findings of Carlsson (1983) that chronic benign pain measured over time with the VAS showed variation in ratings.

Pain intensity was not found to be related to time of day (i.e., morning or afternoon). Additionally, these subjects did not develop a response set to the pain intensity measures, as indicated by different mean pain intensities at each measurement time, and the poor reliability of ratings between the four measures of each subject.

Description of pain control behaviors and pain intensity.

Study results suggest that longitudinal, participant observation was an effective way of identifying pain control behaviors used by patients with advanced stage cancer pain. Immobilizing/guarding, distractive, positioning, pressure manipulative, and analgesic use of behaviors were used by either some or all of the subjects. All subjects validated use of distractive and positioning behaviors for pain control. Immobilizing/guarding, pressure manipulative, and analgesic use behaviors were validated as pain control behaviors by at least one subject.

Each subject's validated pain control behaviors represent some of the subject's pain control choices. Frequent use of a pain control behavior at each of the observation periods, theoretically, would mean this behavior is part of the subject's pain control set. Data obtained in this study indicate that the pain control set of all of these subjects probably included distractive behaviors (i.e., watching or listening to the television) and positioning behaviors (i.e., moving to a special or favored position).

Correlation of pain control behaviors and pain intensity.

Subjects' pain control set (the sum of all validated pain control behaviors) was found to be related to pain intensity at time one, three and four. This suggests that with higher pain intensity, subjects used a higher frequency of pain control choices. At time two, the mean pain intensity was low and no significant correlation

was found between pain intensity and pain control behaviors. The observed mean frequency of activities of daily living was also increased. These combined results suggest that at lower pain intensity subjects may use activities of daily living with greater frequency and possibly as a pain control choice. These results support the findings of Daut and Cleeland (1982), Fordyce et al. (1984), and Rankin (1982) that subjects report that high intensity pain interferes with activity.

The mean pain intensity score for these patients was 3.5 to 4.7 on the PINS, and no patient completely curtailed his/her activity, as suggested by other studies (Daut & Cleeland, 1982; Rankin, 1982). Therefore, perhaps a critical pain intensity level must be reached before patients seek refuge in inactivity. Given that these patients had pain intensity that ranged from 0-10, inactivity may be related to excruciating pain.

The pain control choices used by these subjects may represent behaviors which stimulate ascending and descending pathways for pain control as described by the gate control theory of pain. Theoretically, distractive pain control choices may increase cortical tuning to environmental stimuli thereby decreasing pain through descending mechanisms. Positioning and pressure manipulation behaviors may alter ascending input through large fiber stimulation, thereby decreasing the perception of pain. The design of this study did not allow for verification of these theoretical



suppositions, but they are consistent with the conceptual framework of the study.

Anecdotal data. Perhaps the unaccounted variance present between the FD and VAS measures and the FD and PINS measures was related, at least in part, to the unmeasured duration of squeeze noted by anecdotal observation. When lower intensity of pain was reported with the VAS and PINS, subjects frequently represented their pain intensity with a FD squeeze near to or less than their maximal ability to squeeze (i.e., their maximal strength at the measurement time). Also the duration of the squeeze representing their pain intensity seemed to be the same as or shorter than the duration of the maximum strength squeeze. However, when higher pain intensities were reported with the VAS and PINS, the force of the squeeze representing pain intensity was the same as the force of strength, but the duration of the pain intensity squeeze seemed to be longer than the duration of the strength squeeze. Since the dial of the gauge was covered, the subject could not visualize when the force of the squeeze had reached maximal strength. Subjects may have believed that the longer duration of squeeze was demonstration of their pain intensity, since they did not realize the FD force could not surpass their maximal strength. Therefore, these subjects may have attempted to communicate their pain intensity with a time component in addition to the motor pressure force. Perhaps when pain is experienced over time, the intensity cannot be adequately

described with a "quick squeeze," regardless of the force of the squeeze. Although the pain associated with intramuscular injection, acute pain, has been accurately described by quick squeezes (Perez, 1983; Wachter-Shikora, 1980a), with pain of longer duration, perhaps a time component is necessary for the subject to accurately describe the sensation of pain intensity.

#### Limitations of the Results

Generalization of the results of this study is confined to the group of subjects studied. Variables known to influence pain intensity were not controlled, particularly affective states, fatigue, and environmental input. Additionally, although attempts were made to validate the objectivity of behavioral data collection, the reliability of participant observation was not assured with the design of this study. However, the results of this study indicate that study of pain control behaviors may provide useful findings. With replication in a larger sample and with fewer limitations, the results of this study would have implications for nursing theory and practice.

#### Implications for Nursing

The results indicated that the physiological-behavioral conceptualization of pain control may be useful for nursing theory development and nursing practice. However, such a conceptualization provides a limited view of the pain experience because the cognitive-affective dimensions were not included.

Nursing theory. The results of this study suggested that the JBSM provided a useful framework to study pain control behaviors. The model helped to focus attention on protective behavior sets and choices. The theoretical assumption that patients with advanced stage cancer pain develop and use pain control behaviors was validated by subjects. Empirically derived information suggested that patients with cancer pain engage in certain activities because pain was reduced by performing those activities. The finding that patients purposefully engage in distractive and positioning behaviors to attempt to control their pain supported the theoretical assumption that ascending and descending pain inhibitory paths would be activated by pain control behaviors.

Nursing practice. These results have several implications for nursing practice. Since the VAS and PINS demonstrated concurrent validity and were highly correlated to pain, they may be useful measures of pain intensity in the clinical setting. Since the PINS is quicker and easier to administer and score, clinically it could be a useful measure of pain intensity.

Results indicate that nurses should recognize that pain is reduced when the patient uses selected pain control behaviors, particularly distractive and positioning behaviors. Nurses should attempt to nurture and stimulate these selected behaviors. For example, nurses can nurture distractive pain control behaviors by helping to control the environment of a patient using distraction.

Such nursing interventions might include: (a) positioning and maintaining the television control apparatus in close proximity to the patient, (b) assigning patients with pain to rooms with operating television sets, and (c) ascertaining that the television is within the vision of the patient (not positioned out of reach or vision to the patient after health care providers give care to the patient). Positioning pain control behaviors can be nurtured by nurses in the following ways: (a) documenting the favored position in the care plan, (b) asking the patient to move from favored positions only when necessary, and (c) helping the patient to maintain a favored position with pillows or other mechanical supports. Pain control behaviors should be nurtured or stimulated by nurses before pain intensity reaches a critical level and prohibits activity.

Nurses should also be cognizant of the time interval that has passed since an analgesic was administered to the patient with cancer pain. Offering an analgesic dose to patients engaged in purposeful distraction, positioning, or pressure manipulation may be a protective intervention that may assist the patient to achieve pain control. The analgesic intervention may be more effective if the patient is still able to utilize pain control choices so that each augments the other.

### Recommendations for Future Research

Further testing of the FD is warranted. Since the subjects appeared to enjoy using the FD to describe their pain intensity, measurement of force and duration of squeeze may provide useful information regarding validity and, ultimately, reliability of the FD for measurement of cancer pain intensity. Possibly, research should be directed to investigation of a constant that converts the FD score to a factor of ten for the purpose of establishing concurrent validity with instruments based on a factor of 10 (i.e., the VAS, PINS).

Further investigation is necessary to assess the effect of time on strength. Data in this study were not analyzed to determine if there was a difference in baseline FD measures. Perhaps functional status of the patient influences the patient's ability to report pain intensity with the FD.

Replication of the results of this study are important. The results indicate that pain control behaviors are performed by patients with cancer to attempt pain reduction. Verification of this is necessary in a larger sample with fewer design and methodological limitations. Identification and description of pain control behaviors could add significantly to nursing knowledge in terms of theory development and for the development of nursing interventions.

Development and testing of a pain control behavior check list may provide a useful research instrument and possibly a clinical assessment tool for cancer pain. Results from this study are adequate to begin development of such a tool. Further research is necessary to describe pain control behaviors as influencing ascending or descending inhibitory tracts. Related critical levels of pain intensity may also be determined.

Related research questions which were derived from this research include:

1. Are the number of pain control behaviors directly related to pain intensity or time of day?
2. What pain control path (ascending or descending) is activated by pain control behaviors?
3. Is the quality of pain intensity related to the anatomy of the pathology causing pain?
4. What constant would accurately convert the FD pain intensity rating to a factor of 10?
5. Is there a significant difference in baseline measures of the FD over time?
6. Is the FD a concurrent measure of functional status?
7. What is the concurrent validity of the FD and the VAS and PINS when duration of squeeze and force of squeeze of the FD are measured in patients with cancer pain?

8. How long must cancer pain be experienced before patients develop pain control behaviors?

9. What is the relationship of anxiety, depression, locus of control, and fatigue to pain intensity?

This study has only opened a door to allow a glimpse of what may be learned about pain intensity and pain control behaviors of patients diagnoses with cancer. Further research is indicated.

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## Appendix A

University of California, San Francisco

## Consent to be a Research Subject

Diana Wilkie, R.N., a graduate nursing student, School of Nursing, UCSF, is doing a study on patients who experience pain. The study is looking at the actions patients take to manage the pain they experience.

If I agree to be in the study, today I will answer some questions about myself and the pain I feel. I will also squeeze a machine with my fingers. This will take 15 minutes.

Then twice a day for two days, I will describe my pain:

- 1) as a number,
- 2) as a line drawn through another line, and
- 3) by squeezing a little machine with my fingers. This will take 5 min.

Ms. Wilkie will observe my actions for 15 min. after I have described my pain. She may ask me if any of the actions she sees is my attempt to manage the pain I feel.

Ms. Wilkie will obtain information from my chart.

No risk or discomfort is anticipated, unless answering the questions tires me. Participating will not interfere with the care I receive here at the hospital, or interfere with medical treatment or diagnostic procedures.

There will probably be no direct benefit to me, unless answering the questions helps me to know my pain better. Nurses may learn more about interpreting pain experienced by patients.

All information will be kept as confidential as possible and my identity will not be revealed to anyone or in any publications.

I have discussed this study with Ms. Wilkie and my questions have been answered. If I have any other questions, I may call Ms. Wilkie at (415) 665-6024 or 666-1384.

Participation is completely voluntary. I am free to be in this study, or to withdraw at any time, without affecting my medical or nursing care in any way.

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Date

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Subject's Signature

943303-01A

## Appendix B

Diana Wilkie, R.N.  
1547 9th Avenue # 4  
San Francisco, CA 94122  
July 9, 1983

Attending Physicians  
Admitting to 11 Long  
UCSF

Dear Dr.

I am Diana Wilkie, R.N., a student in the Master's Oncology Program, School of Nursing, UCSF. For my thesis, I am conducting a nursing study about the pain management behaviors of hospitalized cancer patients. I have received Human Subjects Committee and Nursing Education and Research approval for the study.

Since I plan to include patients in the study who are admitted to 11 Long, I want to extend the courtesy of providing information about the study to all attending physicians who admit to 11 Long. I am enclosing a copy of the expedited HSC form and the instruments I plan to use to collect the data.

Briefly, though, the study is a descriptive correlational design utilizing participant observation and verbal responses from subjects to collect data. The aim of the study is to determine the behavioral patterns of cancer patients experiencing pain as they attempt to manage their pain. Pain intensity will be measured and correlated with the behavioral patterns. Hopefully, the knowledge gained from this study will promote more effective pain assessment by nurses who care for hospitalized cancer patients.

I am hopeful that you will have no objections to any of your patients participating in this study. Should you have reservations or questions about the study, please feel free to seek answers from me. I work on 11 Long, night shifts. If I receive no communications from you, I will assume that you have no objections to your patients participating in the study. Thank you for your time and cooperation in this nursing research.

Respectfully,

*Diana Wilkie*

Diana Wilkie, R.N.



SCHOOL OF MEDICINE  
CANCER RESEARCH INSTITUTE

SAN FRANCISCO, CALIFORNIA 94143

July 15, 1983

Appendix C

Ms. Diana Wilkie  
1547 - 9th Avenue, #4  
San Francisco, CA 94122

Dear Ms. Wilkie:

Thank you for informing me of your research that you will be doing on the cancer patients admitted to the 11th floor of Long Hospital. I hope your study will provide useful information. I would like to learn of your results when completed.

Have a pleasant day.

Sincerely,

A handwritten signature in black ink, appearing to read "Edwin C. Cadman".

Edwin C. Cadman, M.D.  
Professor of Medicine  
Director,  
Cancer Research Institute

ECC/rv

Appendix D

Demographic-Pain Data Form

Demographic Data

Code Number \_\_\_\_\_ Dominant hand \_\_\_\_\_

Squeeze this finger dynamometer with your thumb and fore finger as hard as you can. Numerical reading \_\_\_\_\_

Age \_\_\_\_\_ Sex \_\_\_\_\_ Religion \_\_\_\_\_

Ethnic background \_\_\_\_\_

Highest education \_\_\_\_\_ Occupation \_\_\_\_\_

Cancer Diagnosis \_\_\_\_\_ Date told \_\_\_\_\_

(From medical record) Stage of cancer \_\_\_\_\_

Time of interview \_\_\_\_\_ Room # \_\_\_\_\_

Admit Date \_\_\_\_\_ Admit Diagnosis \_\_\_\_\_

Pain-Subjective

Quality. In your own words, describe the pain you feel. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Onset. When did your pain start? \_\_\_\_\_

Duration. How long does your pain last? \_\_\_\_\_

Behaviors. What do you do that makes the pain better? \_\_\_\_\_

\_\_\_\_\_  
What do you do that makes the pain worse? \_\_\_\_\_

\_\_\_\_\_  
Does the pain prevent you from doing something you want to

do? \_\_\_\_\_

\_\_\_\_\_

Demographic-Pain Data Form

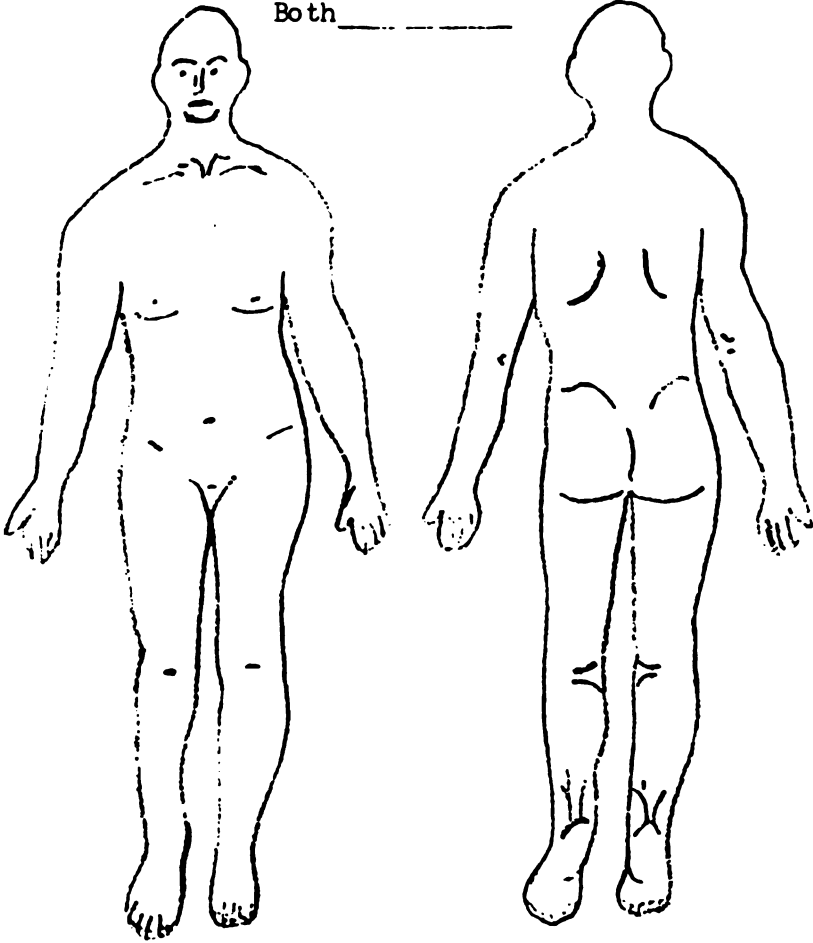
Code # \_\_\_\_\_

Location. Point to the place(s) or trace the area(s) where you feel pain. Is the pain:

Inside \_\_\_\_\_

Outside \_\_\_\_\_

Both \_\_\_\_\_



Appendix E

Medication Administration Log

Code number \_\_\_\_\_ Time \_\_\_\_\_

Medication

Route

Time Administered

Appendix F  
Behavior  
Observation-Validation Record

Code # \_\_\_\_\_

Behavior- an attempt to  
manage pain, validated  
by patient as yes or no.

Behavior researcher observed  
and time of observation.

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## Appendix G

Finger Dynamometer Instructions(Verbal Instructions Given to Each Subject)

This is a finger dynamometer (FD). It measures the strength of your squeeze on a calibrated dial. It can also be used to show doctors and nurses how much you hurt. Since you are the only person who knows how much pain you have, this little machine can be used to describe your pain so we can know how much pain you have.

This is how you will use it to describe your pain on each of the four times you describe your pain:

1. Grasp the handle of the FD by placing your thumb on the top groove and your forefinger on the bottom groove in a comfortable way.

2. Now squeeze the handle as hard as you can with your dominant hand.

3. Do this again several times so you can be sure you are holding the handle in a comfortable way.

4. Now squeeze the handle again as hard as you can so I can see how strong you are today. After I have read the dial, you can squeeze as hard as you can again. I'll read the dial.

5. Now think about how much pain you have right now. Then squeeze the handle to show me how much pain you have. If you have a little pain, squeeze the FD with a little pressure; if you have a

lot of pain, squeeze the FD with more pressure. Show me how much pain you have by squeezing the FD as hard as you hurt.

6. For the purposes of this research, I have covered the dial so you can't see it when you squeeze.

Appendix H

Code # \_\_\_\_\_ Time \_\_\_\_\_

Intensity. On a scale of zero to ten (0-10), where 0 is no pain and 10 is pain as bad as it could be, rate the intensity of your pain. \_\_\_\_\_

Place a verticle mark ( | ) on the line below to represent the intensity of the pain you feel now.

No pain \_\_\_\_\_ Pain as bad  
as it could be

mm reading \_\_\_\_\_

Squeeze this finger dynamometer with your thumb and fore finger to represent the intensity of the pain you feel now.

Numerical reading \_\_\_\_\_

Appendix I

Study Design

Day One

Patient Hospitalized--No research activity

Day Two

Informed consent, study procedure  
Demographic--Pain Data Questions  
FD, PINS, VAS--Instruction and Practice

Day Three

8 a.m.: FD, PINS, VAS Measures  
(Time One) 15 minute observation/recording

4 p.m.: FD, PINS, VAS Measures  
(Time Two) 15 minute observation/recording

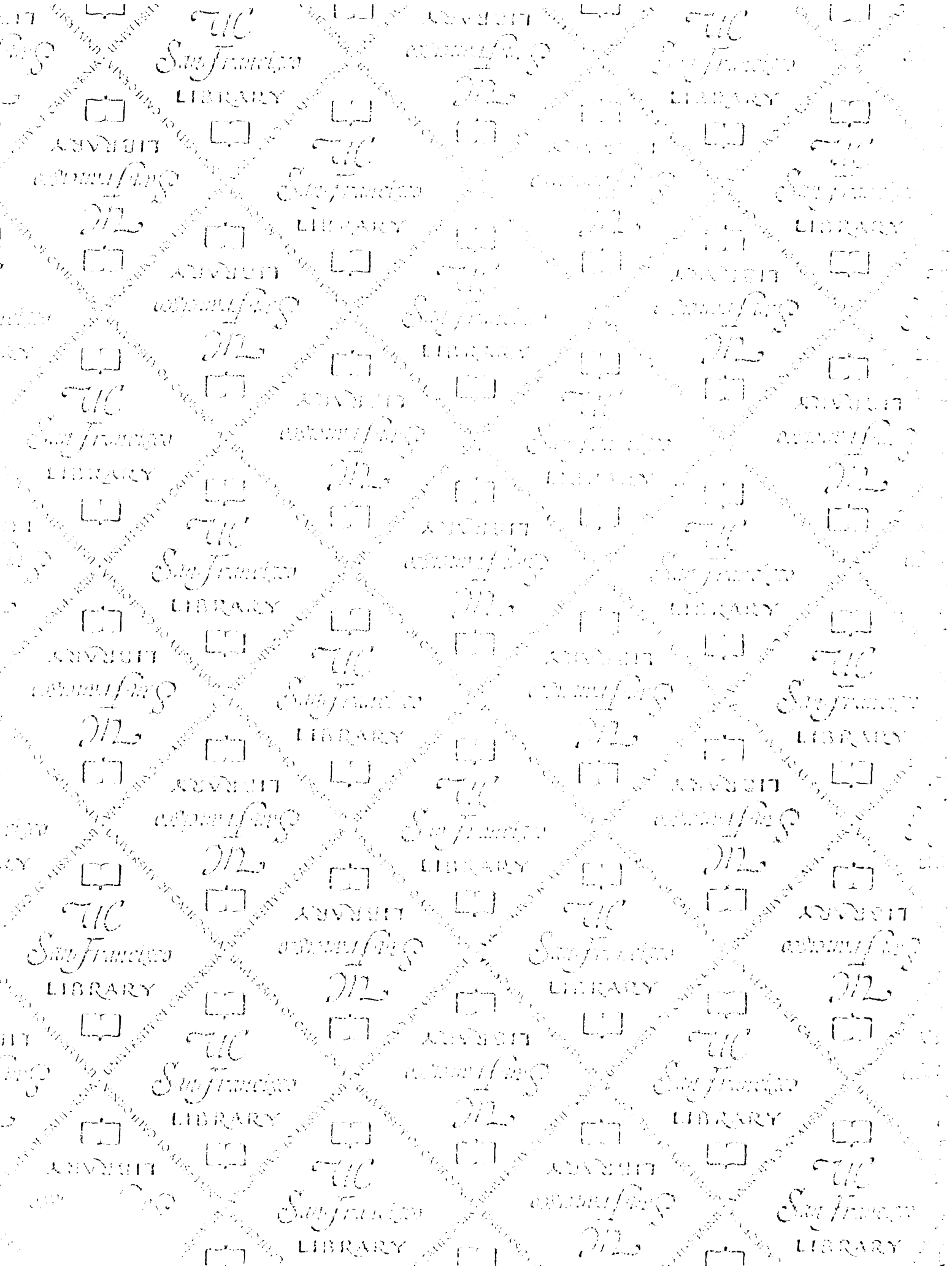
Day Four

8 a.m.: FD, PINS, VAS Measures  
(Time Three) 15 minute observation/recording

4 p.m.: FD, PINS, VAS Measures  
(Time Four) 15 minute observation/recording  
Pain Control Behavior Validation/  
Denial  
Thank You!  
Medical Record review to record  
analgesic and antitumor therapies.







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