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The effects of preoperative education on the thoracic surgical patient

by

James Veenstra

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Dr. Beverly Williams, Nursing

Dr. Carolyn Ross, Nursing

Dr Ken Stewart, Medicine

Abstract

Pain and anxiety are common among patients having surgery and education is essential in enabling patients to cope with postoperative pain and anxiety and improve outcomes. Since there is a trend for shorter hospital stays and a scarcity of supportive healthcare resources, patients will be required to be more self-sufficient. Testing of a randomized preoperative education program was conducted, to see if the program improves the thoracic surgical patient's ability to improve their postoperative pain, anxiety and Quality of Life. This study found that there was no statistically significant difference in pain, anxiety or Quality of Life (with the exception of diarrhea) scores between the education intervention group and the standard group. There were significant clinical alterations in postoperative scores from baseline. Further research is needed to determine if other specific treatments for pain, anxiety and Quality of Life are warranted.

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CHAPTER 1

INTRODUCTION

Lung cancer is a devastating malignant disease that is almost exclusively found among adults. It is the most common malignant disease in Canada and is the leading cause of cancer related deaths among North Americans (Canadian Cancer Society, 2007; Kelley & McCrory, 2003). Lung cancer remains a significant Canadian public health concern with an estimated 23,300 cases of lung cancer occurring in 2007 (Canadian Cancer Society, 2007). For patients presenting with localized non-small-cell lung cancer (NSCLC), surgery provides the best chance of prolonged survival and the only potentially curative method for early stages of NSCLC (Flehinger, Kimmel & Melamad, 1992; Van Schil, 2001). Lung cancer is an aggressive disease with only 15-25% of those diagnosed with lung cancer eligible for surgical resection (Spira & Ettinger, 2004).

Thoracotomy surgical procedures are commonly used for resection of lung cancer and for treatment of other intrathoracic disease (such as para-esophageal hernias). Thoracotomy procedures are amongst the most painful and can be characterized as severe and intense, resulting from tissue damage to the ribs, pleura, muscles and peripheral nerves with attempts to access intra-thoracic organs (Kavanagh, Katz & Sandler, 1994; Montes, Garcia-Valero & Ferrer, 2006; Soto & Fu, 2003). This results in painful somatic, visceral and neuropathic stimuli originating from the ipsilateral shoulder, chest wall incision and pleura, especially if a chest tube remains postoperatively (Chaasry, 2007). Video assisted thoracoscopic surgery (VATS) is less invasive, but there still remains considerable postoperative pain among patients having VATS (Tarjiri, Maehara, Nakayama & Sakamoto, 2007).

The management of postoperative pain is complex and adequate analgesia is essential in maximal short-term recovery of the postoperative thoracic patient. Inadequate postoperative pain control contributes to delay in postoperative ambulation, and ineffective chest wall expansion which increase patient risk of complications including deep venous thrombosis and its associated complications, atelectasis, lung infection, and hypoxia (Atanassoff, 1996; Ballantyne, et al., 1998; Marret, et al., 2005; Richardson, Sabanathan & Shah, 1999). Postoperative pain also influences the patient's ability to perform usual activities while in hospital and after hospital discharge (Galloway et al., 1993). There are comparable rates of adverse outcomes from thoracotomy and VATS, with morbidity ranging from 25% to 49% for these postoperative patients (Onaitis et al., 2006; Patel, Townsend & Fountain, 1992; Stephan et al., 2000) while mortality ranges from 1.2% to 8.9% (Finlayson, Goodney & Birkmeyer, 2003; Onaitis et al., 2006; Wada, Nakamura, Nakamoto, Maeda & Watanabe, 1998).

Chronic pain, also known as (chronic) post-thoracotomy pain is another complication of unrelieved acute postoperative pain. Severe acute postoperative pain is positively correlated with patients who go to experience chronic thoracic pain (d'Amours, Riegler & Little, 1998; Perkins & Kehlet, 2000; Pluijms, et al., 2006). Incidences of chronic post-thoracotomy pain one year after surgery range from 50-67% (Goldstein et. al., 2004; Maguire, Ravenscroft, Beggs & Duffy, 2006; Perkins & Kehlet, 2000; Perttunen, Tasmuth, & Kaslo, 1999; Pluijms, et al., 2006). Incidences of chronic pain have also been shown to be comparable between VATS and thoracotomy patients (Maguire et al., 2006). Chronic thoracic surgery pain is a significant contributor to sleep disturbances among one-quarter of patients, while close to one-half of patients reported

suffering and 40% of patients reported limitations in their daily activities (Maguire et al., 2006; Perttunen, Tasmuth, & Kaslo, 1999).

Proper pain control has been shown to improve postoperative morbidity and mortality, postoperative ambulation, pulmonary function and shorten hospital stay, and decrease costs (Ballantyne, et al., 1998; Gilbert, 1990; Marret, et al., 2005). Aggressive perioperative management of pain is also the recommended strategy to prevent the genesis of chronically painful conditions (d' Amours, et al., 1998; Katz et al., 1996; Perttunen, Tasmuth & Kalso, 1999).

Studies indicate that many hospitalized patients do not expect to describe or communicate their pain experience to health professionals; rather they assume health care professionals will know when to treat their postoperative pain (McDonald et al., 2000; Wilder-Smith, & Schuler, 1992; Zalon, 1997). A lack of patient resources such as pre-operative information or unrealistic or unrealized expectations that health care providers have of patients, negatively influences the patient's ability to carry out self-care tasks that are important to them. This is particularly important as postoperative reporting of pain has traditionally been under-reported to health professionals, resulting in under-treatment of postoperative pain (McDonald, et al., 2000).

Warfield & Kahn (1995) also found that unless told otherwise, patients have an expectation that they will have to endure postoperative pain and that the pain will be severe. Some patients fear addiction and side effects of analgesia, which decreases their self-report of pain (Oates, Snowden & Jayson, 1994; Ward et al., 1993). Patients may also want to be considered as the "good patient" and fear that reports of pain might distract the health care provider from more serious medical problems (Neely, 1993;

Ramer, Richardson & Cohen, 1999; Ward et al., 1993). Others may be concerned about medication side effects, or that the medication may become ineffective if used too early. Pre-operative education can dispel misconceptions surrounding the use of analgesics and clarify the importance of the patient taking an active role in communication and pain management. Preoperative education is also expected to reduce unfounded fears, clarify misconceptions and improve postoperative pain control.

Fear and anxiety are prevalent in anticipation of surgery because of the association of surgery with pain, disfigurement, dependence and death (Bailey, 1989; Caumo et al., 2001). The extensiveness and uncertainty of the surgery and a diagnosis of cancer all contribute to the increased prevalence and intensity of preoperative anxiety experienced by patients (Grabow & Buse 1990; Galloway, et al., 1997; Lucente & Fleck, 1972, as cited in Vingerhoets, 1998). Cognitive anticipation of situational future harm is a crucial component of anxiety (Bradely, Mogg & Lee, 1997) which may lead to changes in thinking such as catastrophizing, changes in working memory capacity, altered concentration and problem solving skills, and interfering with patient's natural ability to cope with and lessen painful experiences (Arntz, Van den Hout, van den Berg & Meijboom, 1991; Sorg & Whitney, 1992; Vlayen & Linton, 2000). A number of studies have shown a relationship between anxiety and reported pain intensity and pain tolerance postoperatively, likely due to increased vigilance associated with the anxiety state (Carter et al., 2002; Lin & Wang, 2005; Vlayen & Linton, 2000; Weisenberg, 1977, as cited in Eli, Schwartz-Arad, Baht & Ben-Tuvim, 2003). Researchers also report that patients with higher levels of anxiety (Asmundson, Frombach & Hadjistavropoulous, 1998; Gammon & Mulholland, 1996; Lang, Sorrell, Rodgers & Lebeck, 2006), or past experience with

inadequate pain control (Keogh & Cochrane, 2002) have higher levels of postoperative pain.

In order to cope with anticipation of their surgery, most patients will seek information to increase their understanding of surgery-related events. Accurate, relevant information is required for the emotional-regulation and problem-solving functions used to cope with the threat patients attribute to a diagnosis of cancer and anticipated postoperative pain (Galloway, et al., 1993; Lazarus & Folkman, 1984). Preoperative education has been shown to reduce patients' postoperative pain and anxiety following a number of surgical procedures including abdominal (Lin & Wang, 2005; Egbert, Battit, Welch, & Bartlett, 1964), breast (Danino et al., 2005), oral (Klages, Kianifard, Ulusoy & Wehrbein, 2006; Ng, Chau & Leung, 2004; van Wijk & Hoogstraten, 2005), and orthopedic surgery (Gammon & Mulholland, 1996; LaMontagne, Hepworth, Salisbury & Cohen, 2003). To date there has been a lack of studies that have examined the impact of preoperative education on postoperative pain, anxiety and associated health related quality of life (HRQOL) among patients requiring an open thoracotomy.

Study Purpose

The purpose of this study was to increase our understanding about preoperative education. Education about preoperative pain management and communication skills (Appendix A), was tested among surgical patients undergoing a thoracotomy and the effects of this intervention on postoperative pain, anxiety and HRQOL were measured. The results of this study will add to our knowledge about the role of preoperative education on postoperative recovery among thoracic surgical patients who require a thoracotomy.

Research Questions

Three research questions were used to guide the study of a sample of adults scheduled for an elective thoracotomy. The specific questions were:

Do surgical patients undergoing a thoracotomy who are provided with routine preoperative education differ from patients assigned to routine preoperative education plus an additional educational intervention on self-reported measures of postoperative: 1) pain, 2) anxiety, and 3) quality of life

Significance to Nursing

The results of this study add to our knowledge about the role of pre-operative education on post-operative outcomes and will also help inform the development of preoperative education programs to influence outcomes among thoracic surgery patients. The results of this study can also be generalized to other patient populations, to help guide more cost-effective patient care.

Definition of Terms

Anxiety is defined as a vague individual emotion associated with uncertainty, helplessness, worry or specific fears (Aldrich, Eccleston & Crombez, 2000; Morrell, 2001). Spielberger, Auerbach, Wadsworth, Dunn & Taulbee (1973, as cited in Carr, Thomas & Wilson-Barnet, 2005), suggests that anxiety is comprised of two particular components; state anxiety which is associated with perception of a particular harmful situation; and trait anxiety which reflects anxiety susceptibility. Since the purpose of this paper is to examine situational anxiety related to surgery, the term anxiety will refer only to state anxiety. While the term anxiety is commonly found in the literature, it is often

used uncritically to reflect diverse emotions (Edelmann, 1992). For the purpose of this study, such emotions as worry and fear will be considered synonymous with anxiety.

Pain will be defined as "an unpleasant sensory and emotional experience associated with actual or potential damage" (Mersky & Bogduk, 1994, p. 210). Of the numerous factors influencing pain, anxiety is one of the most extensively studied factors and may exacerbate pain or predict pain severity (Syrjala & Chapko, 1995; Linton 2004). For the purposes of this study, pain will be the unpleasant experience felt after thoracic surgery.

Preoperative education will be defined as an intervention before surgery that provides accurate and relevant information that supports emotional-regulating and problem-solving functions in relation to the surgical procedure (Lazarus & Folkman, 1984). In the literature, preoperative teaching primarily involves information about preoperative preparations, the events that the patients will likely experience, rationales regarding use of specific equipment, and information about preoperative self-care actions to be performed (Devine, 1992; Hathaway, 1986). For the purposes of this study, the preoperative education intervention will include routine preoperative education in addition to information about postoperative pain, the patient's role in reporting pain, and the use of a visual analogue scale to facilitate the communication of pain intensity.

Quality of Life is comprised of common concepts such as an individual's perception of position in life in the context of the cultural and value system in which people live and in relation to their goals, expectations, standards and concerns (World Health Organization, 1995). The patient's HRQOL specifically

relates to concerns about areas of their life affected by health or illness and treatment of their medical condition (Bergner, 1989; Cella, 1995).

CHAPTER 2

LITERATURE REVIEW

The current literature relevant to the study purpose is presented in this chapter. Following a brief description of the literature search strategies used, the principles of adult education are summarized. Then the epidemiology, consequences and reasons for inadequate postoperative pain and anxiety control are described. Next, the effect of preoperative education on pain and anxiety, the relationship between pain and anxiety and typical preoperative education content and teaching interventions are discussed. Finally key gaps identified from the literature review are summarized.

Search Strategies

CINHAL, PubMed, and Medline were searched with assistance from the University of Alberta librarian. Articles and abstracts that were published between 1995 and 2007, peer reviewed and written in English were evaluated. Literature was included or excluded first by title, then by reading the abstract, and finally by reading the article. Reference lists of relevant articles were also searched revealing “classic” literature that predated 1995. The search literature terms used were: patient education, communication, preoperative, teaching, effectiveness, knowledge, randomized control trials, lung cancer, pain, anxiety, quality of life, thoracotomy, thoracoscopy and surgery. The literature review revealed large amounts of information relating to the preoperative education of the surgical patient. Therefore, studies included in the literature review dealt primarily with preoperative patient education, communication and patient pain and anxiety outcomes related to patient education. Numerous studies involving patient samples from same-day surgery populations were excluded as many same-day surgeries did not include

a formalized preoperative teaching component, but involved informal education during patients visits to clinics. Likewise, preoperative educational interventions that were designed for groups other than adults were excluded, as findings should be specific enough to be generalized to the primary age group of patients undergoing a thoracic surgery.

Preoperative Education

Preoperative information is provided to help patients understand and participate in treatment decisions, not only as part of legal consent, but also in determining the actual course of treatment. Hayward (1975, as cited in Hughes, 2002) stated that it is an unfortunate truth that many patients enter hospitals and operating rooms with unnecessary fears and anxieties, stemming from a lack of knowledge. Numerous overviews have shown that psychological preparation of the patient through teaching contributes to improved patient outcomes (Devine, 1992; Devine, 2003; Devine & Cook, 1986; Gallagher, 1999; Hathaway, 1986; Johnston & Vogele, 1993; Klafta & Roizen, 1996; Kok, van den Borne & Mullen, 1997; McAllister, 2004; Sola, Thompson, Subirana, Lopez & Pascual, 2005). For example, Gallagher (1999) outlines a pain management training plan that usually takes place in behavioral treatment groups with the goal to enable "helpless-feeling, functionally impaired patients develop a sense of control over their pain and minimize its negative impact on their daily lives" (p. 831).

Awareness of underlying components that define the learning climate is essential in allowing the nurse to influence the outcomes by incorporating principles conducive to learning. The literature specific to adult learning was categorized around two themes (Knowles, 1990) that help define the learning climate: physical and psychological.

Physical Climate

Knowles (1990) discusses the physical aspects that are essential to a proper learning environment for adult learners. This segment of the population needs to feel physically comfortable. The equipment and furnishing of the room should be appropriate with the meeting room arranged informally and decorated according to adult tastes with acoustics and lighting taking into account declining audiovisual acuity. Leinonen, Leino-Kilipi & Jouko (1996) also acknowledge that the quality of nursing care is influenced by the noise level, temperature, interior design, comfort, and possibilities for interaction. Distraction from numerous sources such as phone calls, have also been shown to decrease patient learning during health education sessions (McDonald, Wiczorek & Walker, 2004). These factors must be considered when planning patient care. Patients also experience improved learning in familiar environments or in environments that are private and do not involve constant interruptions (Mitchell, 1997).

The timing of providing information must also be considered. For example, preoperative information given three days prior to an intervention is superior to that given the day before or at the time of an intervention (Buttow, Brindle, McConnell, Boakes & Tattersall, 1998; Mitchell, 1997; Nicklin, 2002). The complexity of health information (Egiker, Kirsch & Becker, 1994), poor presentation of information (Carrese & Rhodes, 2000) and the patient's level of anxiety (Grahn & Johnson, 1990; Sorg & Whitney, 1992) greatly influence the patient's ability to retain and to use that information for learner empowerment.

Best (2001) notes that advanced age has several effects on the physical health of the patient such as loss of hearing or vision. Since the majority of patients having thoracic surgery are elderly, learning will be compromised if information presentation is not tailored to compensate for these age-induced deficiencies (de Rond, de Wit, van Dam & Muller, 2000). Patients with poor eyesight may have difficulty with written information. Petterson (1994) reviewed 70 hospital information pamphlets and found that only seventeen per cent met the recommendations of the Royal National Institute of the Blind. Written material should be written at a minimum size 12-point font with clear headings, especially as many older people have poor eyesight and are also major consumers of health care (Petterson, 1994). Hines (2000) found that older people over the age of 60 predominated in the health care setting (78 per cent) and investigated the difficulties experienced by hearing impaired patients. His conclusion was that despite some attempts by nursing staff to communicate effectively, "The survey confirmed that the inability of hospital staff to communicate effectively with hearing-impaired patients is a national problem" (p. 37).

Johnson, Stanford & Tyndall (2003) noted in their systematic review that providing visual and written materials is more effective in terms of information retention and satisfaction than providing verbal or written information alone. This finding has been repeatedly demonstrated in research (Stern & Lockwood, 2005). Print material supports and enhances knowledge shared in the patient- healthcare team communication (Chelf, et al., 2002; Chumbley, Ward, Hall & Salmon, 2004; Watkins, 1995). In designing written information for patients, it is essential that the information presented is relevant, covers a variety of topics, and is specific enough to meet the differing information needs of

patients (Bakker, Weung, Crommelin & Lybeert, 1999; Braddock, et al., 1999; Coulter, Entwhistle & Gilbert, 1999).

Butow et al. (1998) have shown the importance of the readability level when designing written information. When they compared five information booklets they found that the readability level of a written information booklet (grade eight), was preferred over four other booklets written at the level of grades eleven-twelve. Estey, Musseau & Keehn (1991) also studied reading comprehension levels of medical and surgical patients regarding information written at grade five and nine levels. The authors found that the information written at a grade nine level was too complex for patient comprehension and recommended that information be written at a level no higher than grade five. Likewise, when designing information the nurse must consider not only literacy levels, but illiteracy as well. The efficacy of computer-assisted learning, audio and video programs, and telephone information has been demonstrated with other patient groups (Chelf et al., 2001). Although it is well recognized that patient information needs are highly specific, this specificity of information is rarely achieved (Feldman-Stewart, Brundage & Hayter, 2000).

Psychological Climate

Psychological preparation of the learner has been identified as central in the development of knowledge, especially in terms of learner self-direction (Brookfield, 1993; Knowles, 1990). Brookfield (1993) also advocates for the learning climate that respects patients and values their experiences, as an accepting environment encourages learners to cooperate, in an environment where concerns and fears can be discussed without fear of rejection or intimidation. Failure on the part of the nurse to allow open

communication and patient self disclosure is likely to increase patient anxiety and decrease patient satisfaction (Maguire, Faulkner, Booth, Elliot & Hillier, 1995; Svensson, Sjostrom & Halijamae, 2001). A positive attitude conveyed by the teacher and treating the patient with courtesy is important as both can strengthen self-esteem and facilitate coping (Charmaz, 1990). The planning and implementation of effective educational interventions should take the factors affecting patient learning into consideration. Factors influencing patient learning include: awareness of adult learning principles, patient preferences for interactive, interpersonal communication, as well as knowledge of special instructional methods and learning needs that are adaptable to a specific population (Best, 2001; Chalmers, Thomson & Degner, 1996; Echlin & Rees, 2002).

One of the central pillars to learning is advanced by Knowles (1990) who summarized andragogy, or adult learning theory in a core set of adult learning principles. These principles include: 1) the learner's need to know, 2) self-concept of the learner, 3) prior experience of the learner, 4) readiness to learn, 5) orientation to learning, and 6) motivation to learn. The nurse should be familiar with these principles as they help provide a framework from which to design a teaching intervention. For example, awareness of the adult learner's wealth of experience allows the nurse to draw on and improve their understanding of new material by making information relevant to real life situations. Nurses need to visualize immediate practical applications to what patients learn and need to include the application of information in learning sessions.

Nurses can also facilitate patient and family learning by considering the interactive manner in which learners acquire health information. By acknowledging how past experiences or perceptions influence the present, nurses can also help patients

identify, and strengthen or modify beliefs influencing their health experiences (Friesen, Pepler & Hunter, 2002). Modification of educational interventions to reflect patient preferences for interactive, interpersonal, and supportive communication has the power to promote proper understanding and facilitate empowerment (Chalmers, et al., 1996; Grahn & Danielson, 1996). Interactive education often reveals the underlying resistance patients may experience towards pain treatment, ranging from misinformation, psychopathology, family, and other psychosocial issues (Gallagher, 1999). Nurses should give patients an opportunity to ask questions and be prepared to give accurate information. Nurses should also be aware that personal cultural values and beliefs influence the way we view or stereotype others. Despite the stereotypes that are assigned to others, and the influence these stereotypes have on interactions, patient's needs should not be neglected due to nurse biases. For example, in a patient population diagnosed with breast cancer, those who were married, and those who had a high level of education or income, all had a high level of information need (Galloway, et al., 1997). Graydon et al. (1997), also evaluated the information need of women undergoing surgery, chemotherapy, or radiation therapy and found that all women had high information needs, irrespective of type of treatment received. They revealed that all women wanted information about recurrence, and how to know if it had recurred. The nurse must also be aware of patient need for information, and the possible nurse biases against other people that may interfere with communication (Miller, 2002).

Effective communication is essential to nursing practice and is needed to assess, plan, implement and evaluate the process of teaching as well as learning. Communication is described "as the lynchpin of nursing action", and "the basic tool for the development

of nurse-patient relationships" (Miller, 2002, p. 12). Despite the centrality of communication in learning, there still remains a lack of meaningful interaction between nurses and patients (Cunningham, Hanson-Heath & Agre, 2003; Edwards, 1995; Humphreys, 2000; Silliman, et al., 1997).

While all patients have a need for social conversation, patients also have a need for therapeutic conversation. Therapeutic conversation is usually a nurse-patient relationship relating to the health of the patient in terms of emotions, feelings, problems and solutions (Arnold, 1999, as cited in Miller, 2002). The development of a therapeutic relationship requires that the nurse assess, and adapt their communication skills to meet patient needs. The removal of as many barriers as possible is important to quickly establish a nurse-patient relationship. This relationship will help both the nurse and patient interpret and act on the verbal and the non-verbal communication in the nurse-patient relationship. The nurse must not only be aware of their own verbal and non-verbal communication techniques, but also how to interpret those of the patient. This requires an understanding of the basic theories of communication, and also the ability to adapt their teaching to be effective and flexible. This may require feedback and formal communication courses (Maguire & Faulkner, 2002; Miller, 2002).

In order to advance education and patient empowerment, the nurse must also be aware of the particular areas in which patients need to be educated. A lack of patient knowledge creates a major barrier for effective pain and anxiety management. Patients also desire information specific to their situation such as information about their disease, treatments, and investigative tests (Fuki, 2002; Graydon et al., 1997). This information can help alleviate anxiety and positively influence satisfaction and the quality of

decisions patients are able to make in relation to their care (Silliman, et al., 1997; Svensson, et al., 2001).

Providing patients with unwanted information has been shown to increase patient anxiety (Salmon, 1992), although studies have shown that education about an aversive event is generally favored over no information (Lejuez, Eifert, Zvolensky & Richards, 2000). Likewise, enabling patients to be able to properly communicate and be involved in their treatment of pain may increase anxiety, which may contribute to an already present public concern with under-treatment of pain (Carr, Jacox & Chapman, 1992).

Education also aims to remove irrational beliefs by providing accurate information and advice on how the patient can achieve the best outcomes. Patients may fear that pain is an indication that their disease is progressing, and for this reason, they may deny or be reluctant to discuss their pain. Patients may also want to be considered a "good patient" and fear that reports of pain might distract the health care provider from more serious signs (Ward, et al., 1993). Ward, et al. (1993) also identified that patients' may fear addiction and medication side effects, which decrease patient self reporting of pain. Patients' may also be concerned that the medication may become ineffective if used too early in treatment of pain, leading to the underuse of pain medications and in unnecessary pain and suffering.

In designing an effective preoperative educational study it is imperative to look at the quality of the educational intervention. Designing an effective teaching intervention based solely on the literature is difficult, as there is a paucity of reporting on the elements of the education intervention and if it meets the requirements necessary to be considered effective. For example, the content, context and manner of information is rarely discussed

in the literature that addresses preoperative education. It would be worthwhile for researchers to provide evidence that their educational intervention has been designed within the context of learning, and discuss the content of their educational intervention. It is very difficult to educate a patient if the information presented is not properly communicated, or if the information is irrelevant to the patient.

Pain

By definition pain is an "unpleasant sensory and emotional experience associated with actual or potential damage" (Mersky & Bogduk, 1994, p. 210) or "is whatever the experiencing person says it is and exists whenever he says it does" McCaffery, 1979, p. 11). Thus the experience of pain is influenced by the interaction of sensory, affective-motivational, and cognitive components of pain that can be altered by our memories, emotions and attention (Price, 1988). Since the patient is the only person able to define their experience of pain, it is essential that patients are prepared to communicate their experience (Wilson, 1981). Numerous factors have been found to influence pain perception including age, attitudes, beliefs, gender, attention, self-efficacy, expectancy, depression, and anxiety (Ochroch et al., 2006; Riley et al., 1998, Riley & Wade, 2004; Tang & Gibson, 2005).

Adequacy of Postoperative Pain Control

Acute postoperative pain is often untreated, under-treated or disregarded (Ducharme, 2000; Sherwood, Adams-McNeil, Starck, Nieto & Thompson, 2000). There is a high degree of public concern about the under-treatment of pain (Carr, Jacox & Chapman, 1992). A survey of 500 adults who had undergone a variety of surgical procedures during the preceding five years found that their number one concern was that

of postoperative pain. Of those surveyed 75% of patients reported pain after surgery, with 80% of these patients characterizing their postoperative pain as moderate to extreme (Warfield & Kahn, 1995). Apfelbaum, Chen, Mehta & Gan (2003) surveyed patients (n=250) that also had a variety of surgical procedures in the past five years, and found that 80% of patient's experienced acute pain after surgery, with 86% of these patients characterizing their pain as moderate, severe or extreme. These findings are consistent with other studies (Bruster et. al., 1994; Sjoling & Nordahl, 1998) that showed reliance on healthcare professionals alone to treat postoperative pain has resulted in suboptimal patient relief of pain.

Consequences of Postoperative Pain

Breivik (1998) found that the consequences of unrelieved postoperative pain included a negative impact on physiological and psychological functions, and an associated delay in discharge from hospital and postoperative recovery. Untreated pain contributes to ineffective coughing and deep breathing, as patients who have decreased pain are more likely to deep breathe, have effective chest wall expansion, cough, and be more cooperative with physical rehabilitation (Atanassoff, 1996; Ballantyne, et al., 1998; Marret, et al., 2005). Untreated or under-treated pain is associated with an increased incidence of deep vein thrombosis, pulmonary embolism, acute coronary ischemia, myocardial infarction, pneumonia, poor wound healing, insomnia and demoralization (Carr, & Goudas, 1999; Breivik, 1998, as cited in Apfelbaum, Chen, Mehta & Tong, 2003). Pain also restricts usual activity, leading to pain-related fear and avoidance of activities that cause pain. This may lead to physical disuse, muscular reactivity, and hyper

vigilance to internal and external factors that are associated with pain (Vlayen & Linton, 2000).

Another consequence of untreated acute pain is the development of chronic pain (d'Amours, Riegler & Little, 1998; Katz, Jackson, Kavanagh & Sandler, 1996; Liem, van den Graff & van Steelsel, 1997). There is growing evidence that inadequately managed acute pain may have long term consequences. In a study of more than 5,000 patients, Desbines et al., (1997) found that 40% of those experiencing moderately severe pain while in hospital had similar pain at six-month follow-up. The savings estimate of the early detection and treatment in the postoperative period of a 30 year old patient who would otherwise go on to develop a chronic pain syndrome is estimated to be around one million dollars (Cousins & Smith, 2000).

Inadequate Control of Pain

Inadequate control of postoperative pain can often be attributed to patients hesitating to discuss their pain with their healthcare providers (Carr, & Thomas, 1997; McDonald, McNulty, Erickson & Weiskopf, 2000; Oetker-Black & Tauton, 1994; Ward, et al., 1993; Wilder-Smith & Schuler, 1992). Ward, et al. (1993) also identified that patients' may fear addiction and medication side effects, which decreased patient self report of pain. There also remains a lack of discussion of pain among patients and their families, who may themselves not have enough knowledge to help the patient alleviate their pain (Brown & McCormack, 2006).

Lack of communication among healthcare professionals (Brockopp et al., 1998; Manias, 2003; Rehnsfeldt & Eriksson, 2004) and fragmented contact between nurses and patients (Cunningham et al., 2003), has been observed to negatively influence patient

pain. In a study of 3,724 geriatric patients, there was a reported prevalence of pain in 56.7% of the sample (Lovheim, Sandman, Kallin, Karlsson & Gustafson, 2006). Of those who reported pain, it was found that 27.9% received no regular analgesics and in 72.7% of these cases, the staff member who knew the patient best, still believed that the patient was receiving medication for their pain. Ocitti & Adwok (2000) examined the common methods of analgesia and their effectiveness in 160 patients admitted for thoracotomy or laparotomy and found that over 60% of the patients did not achieve adequate pain relief during the first 72 hours after surgery. They concluded that the standard of post-operative pain control was poor and that patients need to be told more about what to expect and demand postoperatively.

A lack of communication between the healthcare professionals and patients also contributes to poor pain control. Volker & Bile (2003) identified varied topics that nurses perceived as challenging, and found that unrelieved pain precipitated difficult communication between the nurse and patient. Other problems related to communication problems among health providers included inconsistent/nonexistent leadership, inability of nurses and physicians to collaborate together, and cultural biases of health care providers (Brockopp et al., 1998). Health care professionals also influence treatment of postoperative pain by misinterpreting the patient's pain experience due to different beliefs and attitudes surrounding the experience (Klopfenstein, Herrmann, Mamei, Van Gessel, & Forster, 2000; Manias, Botti, & Bucknall, 2002; Thompson, 1989). This is reflected in significant differences between nurses and patient's pain ratings (Field, 1996; Geisser, Bingham & Robinson, 1995; Klopfenstein et al., 2000; Manias et al., 2002; Thomas, Robinson, Champion, McKell & Pell, 1998). Nurses add to the problem by not

discussing patient's pain with other healthcare professionals, or when dispensing analgesics providing dosages at the lower end of the prescribed dosage (Brockopp et al., 1998; Celica, 2000). Likewise, there are still widespread reports of inadequate knowledge among nurses about pain and pain management and the side effects of opioid analgesics (Clarke et al., 1996; de Rond, de Wit, & van Dam, 2001; Furstenberg et al., 1998; Puls-McColl, Holden, & Buschmann, 2001; Van Niekerk & Martin, 2001).

Preoperative Education and Postoperative Pain

Numerous studies have shown that preoperative education of patients has a significant influence on postoperative pain. For example, preoperative discussion of postoperative pain was shown to result in a 50% reduction in patient analgesic requirements (Egbert et al., 1964). In a meta-analysis, Kok, van den Borne & Mullen (1997) reported a substantial mean effect size of 0.46 for primary prevention and 0.49 for patient education and secondary prevention. They suggest that the potential effectiveness could be increased if the teaching interventions were systematically planned and were designed for individual patients. Harmer & Davies (1998) studied 2, 738 patients in 15 hospitals in the United Kingdom and examined the effect of guidelines for staff and patient pain education, formal assessment of pain and a simple algorithm for pain analgesia. In an open audit they found a reduction of patients experiencing pain at rest from 32% to 12%, a reduction of severe pain on movement from 37% to 13%, and moderate to severe pain on deep inspiration from 41% to 22%. They concluded that the "use of better education, pain assessment, and simple algorithms should be the foundation stones of any acute pain service" (p. 430).

Devine's (2003) meta-analysis on the effects of psycho-educational interventions on pain in adults with cancer, found statistically significant evidence for the use of education in producing a positive treatment effect on pain (standardized mean difference measured in standard deviations = 0.41; 95% confidence interval = 0.29, 0.52). Devine's findings must be taken with a note of caution as there were not many large randomized double blinded studies to draw a concrete conclusion and the psycho-educational interventions were not discussed in detail.

In a randomized control study Lin & Wang (2005) compared a control group receiving basic care only (n=32) to an experimental group (n=30) receiving extra instruction related to postoperative pain from abdominal incisions. Power analysis was used. The results showed that the experimental group had significantly lower reports of postoperative pain at four hours after surgery and significantly lower pain intensity within the first 24 hours after surgery ($p \leq .05$). Postoperative analgesic dosage after surgery did not differ significantly between the groups. The authors suggest that the experimental group's perception of pain control compared to the control group may have contributed to their lower pain scores after surgery.

In contrast, McDonald, Hetric & Green (2004) found in a systematic review that there is little evidence to support the use of new preoperative education to improve the pain outcome of patients undergoing hip and knee arthroplasty, and found only small improvements in patient anxiety. This may be related to the improved and comprehensive education material that is typically given to hip and knee arthroplasty patients about postoperative pain. Shuldham, Fleming & Goodman (2002) found no difference in recovery among 356 randomized coronary bypass surgery patients. The authors speculate

that lack of significant differences were likely due to limited differences in the content of routine education and the experimental intervention. They conclude that preoperative education is effective. The results of another study of general abdominal surgery patients showed a 50% reduction in postoperative analgesics used among patients provided with preoperative education about postoperative pain and its management (Egbert et al., 1964).

Anxiety

Of the psychological factors associated with postoperative pain, anxiety is among the most extensively examined. Unfortunately, the pathophysiology of anxiety is not yet fully understood. Anxiety is generally viewed as a complex phenomenon that involves components of a person's affective, cognitive, behavioral and neurophysiological response (Edelmann, 1992). The affective component of anxiety has been identified as a complex subjective emotional state in response to a threatening situation with apprehension and helplessness being the most prominent features (Mitchell, 1997; Morrell, 2001). The diagnosis of malignant disease has been associated with five emotional steps which are anxiety/fear, denial, anger, depression, and reconciliation (Bond, 2001). Cognitive anticipation of situational future harm is a crucial component of anxiety (Bradely, Mogg & Lee, 1997) which may lead to changes in thinking such as catastrophizing, changes in working memory capacity, altered concentration and problem solving skills, and interfering with patient's natural ability to cope with and lessen painful experiences (Arntz, et al., 1991; Sorg & Whitney, 1992; Vlayen & Linton, 2000). Apprehensions about pain, loss of independence, uncertainty about the future and fear of death are also common sources of anxiety (Caumo et al., 2001).

Epidemiology of Anxiety

Anxiety is a natural reaction to potentially threatening situations (Lazarus & Folkman, 1984). Anxiety disorders are the most common categorizations of psychiatric disorders, with one-quarter of the U.S. population having previous or current symptoms of an anxiety disorder (Brawman-Intzer, 2001). The majority of patients scheduled for elective surgery experience preoperative anxiety (Carr, Jacox & Chapman, 1992; Kindler, Harms, Amsler, Ihde-Scholl & Scheidegger, 2000; Warfield & Kahn, 1995). This is particularly true among patients that have been diagnosed with cancer when compared to other diagnosis (Cassileth, Lusk, Hutter, Strouse & Brown, 1984, as cited in Ozalp, Sarioglu, Tuncel, Aslan & Kadiogullari, 2003). Between 20% and 60% of patients recently diagnosed with cancer report significant psychological distress (Grabow & Buse, 1990; Zabora, Brintzenhofeszoc, Curbow, Hooker & Piasntodosi, 2001). The degree to which a patient displays preoperative anxiety relates to many factors such as age, expectations, gender, mood, type and extent of surgical procedure, previous surgical and anesthetic experience the patient's susceptibility to anxiety producing situations and familiarity and preparedness for the surgery (Badner, Neilson, Munk, Kwiatkowska & Gelb, 1990; Grabow & Buse, 1990; Millar, Jelcic, Bonke & Asbury, 1995; Sullivan, Rodgers & Kirsch, 2001). For example, patients who are young, female, and have no previous anesthetic experience have been found to have the highest levels of preoperative anxiety (Kindler et al., 2000; McCracken, Gross, Sorg & Edmands, 1993).

Consequences of Anxiety

The neurophysiologic response to anxiety is often accompanied by signs of autonomic activation leading to physical symptoms such as vomiting, blood pressure

changes, increased corticosteroids, and increased pulse rate that may cause suffering and disability. Anxiety's detrimental physiological effects can be caused by increased epinephrine and nor-epinephrine which is associated with increased blood pressure, heart rate and potential arrhythmias (Cousins, 1994; Kiecolt-Glaser, Page, Marucha, MacCallum & Glaser, 1998). This may translate into real events such as, a myocardial infarction, stroke or heart failure. Other symptoms of anxiety include excessive worry and anxiety, difficulty in controlling the worry, difficulty concentrating or one's mind going blank, muscle tension, irritability, sleep disturbance, restlessness and being easily fatigued (Gallagher & Verma, 2004).

Preoperative anxiety is also related to higher surgical and anesthetic risk (Demirtas et al., 2005; Maranets & Kain, 1999). Other risks associated with preoperative anxiety are an increased length of hospitalization (Devine, 1992; Krohne & Stangen, 2005), delayed wound healing (Kiecolt-Glaser, et al., 1998) and adverse perioperative outcomes and patient treatment compliance (Dunbar-Jacob, Burke & Puczynski, 1995; Kok et al., 1997; Nelson, Zimmerman, Barnason, Nieveen & Schmaderer, 1998).

Inadequate Control of Anxiety

One of the reasons why anxiety is inadequately controlled is that it is commonly overlooked in surgical patients. In a study examining pain and anxiety management of surgical patients, Manias (2003) found that nurses routinely assessed pain to determine patients' comfort needs, but that "all participants demonstrated a lack of emphasis on patient anxiety" (p. 592). Another reason for inadequate control of anxiety is that patients have decreased access to healthcare professionals who may be able to answer questions and alleviate concerns. Traditionally patients were admitted to the hospital the day before

the surgery to familiarize themselves with the hospital, establish relationships with professionals and have questions or concerns addressed. This allowed nurses to assess the patient's psychological and physiological state (Boker, Brownell & Donen, 2002).

Patients who have been found to have high preoperative anxiety levels have also been found to have high levels of postoperative anxiety (Badner, et al., 1990; Carr, et al., 2005; Caumo, et al., 2001). Patients who know what to expect during their surgery may cope better and experience less postoperative anxiety. Geer, Davidson & Gatchell (1970, as cited in Walding, 1991) acknowledge the importance of perception of control and suggest that 'perhaps the next best thing to being master on one's fate is being deluded into thinking he is'. Hayward (1975) found that patients who are able to have an element of control over their situation are more likely to cope effectively with their anxiety, and therefore experience less pain. Blyth, March, Nicholas & Cousins (2005), examined patient's pain self-management strategies and found that using passive strategies (such as denial) increased the likelihood of having high levels of pain related disability, while using active strategies (such as engaging health professionals) significantly reduced the likelihood of having high levels of pain related disability.

Preoperative Education and Anxiety

A number of studies have shown preoperative education reduces levels of anxiety following cataract, abdominal, breast and orthopedic surgery (Carr & Goudas, 1999; Daltroy et al., 1998; Danino et al., 2005; Devine, 1992; Gammon & Mulholland 1996; Hathaway, 1986; McDonald, Hetric & Green, 2004; Morrell, 2001; Sjoling, Nordahl, Olofsson, & Asplund, 2003). Patients who receive and are satisfied with preoperative information also are more satisfied with the care that they received following obstetrical

surgery and general medical care (Hobson, Slade, Wrench & Power, 2006; Larson, Nelson, Gustafson & Batalden, 1996). Hathaway's (1986) meta-analysis of 68 studies found preoperative education to have had its greatest effect on patients' anxiety. Hathaway (1986) reported that 67% of patients receiving preoperative instructions had improved fear/anxiety outcomes, with those outcomes being 20% better than the control group (those not receiving preoperative instructions).

More recent studies conducted by Daltroy et al. (1998), Gammon & Mulholland (1996) and Martin (1996), have found that educational interventions significantly reduce anxiety among patients having orthopedic and general surgery. The results of Gammon & Mulholland (1996), need to be interpreted with caution as they did not discuss their power analysis and the information they used to calculate their sample population size (n= 30).

In a randomized control trial, Danino et al (2005), found a statistically significant difference in the state anxiety scores of the control group (n=40) and the experimental group (n=40). Patients who were about to undergo aesthetic breast reduction or abdominoplasty and watched the 10 minute CD-ROM were reported to have a mean STAI of 45 [38.2-46.3] versus that of the control group's STAI of 55 [49.9-63.8], with a p value by Mann-Whitney *U* test <0.001. Patients who watched the CD-ROM also scored higher in the knowledge questionnaire regarding the purpose and procedural details of surgery, although no statistically significant difference was found regarding the knowledge of the potential complications of the surgery. Patients' were blinded to the study, and the data interpretation (marked) was performed by a researcher who was

unaware of the randomization status of the participants and statistical analysis was done by an independent mathematical institute.

Preoperative anxiety was also been examined in a sample of 30 patients who visited a colorectal pelvic floor clinic and who had been given an opportunity to discuss their concerns with a physician versus those who received written information. While only 23% of patients who were given the information sheet experienced reduced anxiety, 10% of patients experienced increased anxiety. The clinic visit was found to be associated with a significant reduction (87%; $p \leq 0.001$) in anxiety (Coolen, 2005).

Morrell (2001) also found that there was a statistically significant difference between the state anxiety scores of the control group (n=20) and the experimental group (n=20) (with a t score of -2.17, $p<.004$). Power analysis was not discussed. This study used a pretest/posttest classical experimental design study examining the effect of structured preoperative teaching on anxiety level of patients scheduled for cataract surgery.

Lin & Wang (2005) also reported a statistically significant decrease in anxiety scores ($F=174.03$, $p<.001$). They go on to state that the decrease in anxiety levels in the experimental group was significantly affected by the preoperative pain education.

A clinical trial by Lin, Lin & Lin (1997) found no positive correlation between education and reduced anxiety. This study with an experimental group (n=30) and control group (n=30) found no statistically significant difference in anxiety scores as measured by the Spielberger State-Trait Anxiety Inventory (STAI) form. Power analysis was not discussed in the paper, and the intervention provider and researcher were not blinded to the assessments of the patients.

Anxiety and Pain

The anatomical and physiological systems that are involved in pain and anxiety are complex. Despite anxiety being one of the most extensively studied factors that exacerbates pain and predicts pain severity, it is still not completely understood (Syrjala & Chapko, 1995; Linton 2004). Clinically, preoperative anxiety has been found to influence patient's perceptions of pain by causing increased intensity of postoperative pain (Asmundson, et al., 1998; Gammon & Mulholland, 1996; Schwartz-Barcott, Fortin & Kim, 1993). Nakamura & Chapman (2002) noted that anxious patients had difficulty in separating pain from associated somatic symptoms such as paresthesias and anxiety.

Transmission of harmful stimuli to the brain is achieved through activation of the sensitive peripheral nerve endings of the primary afferent nociceptor by the process of transduction. The nociceptive message is then transmitted along the peripheral nervous system by A-delta and C-fibers to the dorsal horn of the spinal cord. The pain signal of the peripheral nervous system synapses with cells from the major ascending pain pathways, the spinothalalmic, spinoreticular, spinomesencephalic, spinocervical, and postsynaptic dorsal cord tracts (Giesler, Yezierski, Gerhart & Willis, 1981, as cited in Giordano, 2006; Willis & Westlund, 1997, as cited in Chapman & Okifuji, 2004). The nociceptive message is then transmitted to the thalamus and from the thalamus to several areas of the brain, primarily the somatosensory cortex of the cerebral cortex, and the limbic system. The somatosensory cortex processes memories and thoughts and the limbic system is responsible for emotional processing. One of the important brain structures of the limbic system responsible for emotional processing is the locus cereleus, with its projection (dorsal noradrenergic bundle), extending to many limbic and cortical

areas. Activation of this pathway tends to produce patient hyper-vigilance, negative emotional arousal and behavior consistent with anxiety and threat (Chapman & Okifuji, 2004).

The specification of pathways for nociceptive transmission is important, but its role is limited. Signals contribute to the perception of pain, "but they are not sensory experiences waiting for realization at the cortex" (Chapman & Okifuji, 2004, p. 4). Fields (1991) demonstrated the importance of higher order levels of processing nociceptive messages, particularly the role of the frontal cortex in the perception of nociceptive stimuli. He reported on cancer patients that had a frontal lobectomy, and found that the affective component of pain was completely blocked. Patients who had a frontal lobectomy still noted pain, but the sensation did not bother them.

Once the nociceptive message has been transmitted from the thalamus to the limbic system and the somatosensory cortex, inputs from the frontal cortex and the hypothalamus activate cells in the midbrain, which control spinal transmission cells via cells in the medulla. These inputs from the limbic system and the somatosensory cortex are part of the pain modulation network.

A biochemical theory of anxiety suggests that anxiety is the result of a neurochemical imbalance or a functional deficiency of essential neurotransmitters such as serotonin, norepinephrine, and dopamine. A common theory holds that pain and anxiety symptoms follow the same descending pathways of the central nervous system, and influence the pain modulation network. Although nociceptive fibers transmitting pain signals from the peripheral nervous system to the dorsal horn of the spinal cord to the medulla, midbrain, hypothalamus, thalamus, limbic cortical areas (anterior cingulated and

insular cortex), somatosensory cortex and posterior parietal cortex have been discovered and documented, there has been increasing interest in the neuroanatomy of a descending or "top down" system of pain modulation (Fields, 2000, as cited in Bair, Robinson, Katon & Kroenke, 2003). This system looks at how higher cognitive centers of the brain (particularly emotional and cognitive centers) modulate nociceptive impulses that have been transmitted from the peripheral nervous system. Increasing knowledge about the descending system allows researchers to achieve a better understanding of how pain is adjusted by medications and psychological methods that influence expectation, attention, distraction, and positive and negative affect (Bair et al., 2003).

Pain can be viewed as a signal that there is something wrong occurring in the body, until it reaches the emotional brain, where the brain interprets what we feel as pain (Hansen & Streltzer, 2005). Pain has emotional and cognitive features because it is the final product of the brains central processing, particularly the interdependent areas that produce emotion and cognition. Brain regions of the limbic system that are involved in the generation of emotion such as the prefrontal insular and anterior cingulated cortices, hypothalamus and amygdala, are also heavily involved with brainstem structures involved in pain modulation. Chapman & Okifugi (2004) state that "An investigator attempting to understand how humans experience emotions must remember that the brain not only recognizes patterns of arousal; it also creates them" (p. 15).

The brainstem structures that are involved in pain modulation are the periaqueductal gray (PAG), rostral-ventromedial medulla (RVM) and the dorsolateral pontine tegmentum (DLPT) (Giordano, 2006). The PAG is of central importance in the pain modulation system, being an anatomic relay centre from the limbic forebrain and

midbrain structures to the brainstem (Fields, 2000). The amygdala, hypothalamus and frontal neocortex all send fibers to the PAG, which connects with the relay systems located in the medulla and the pons. The relay systems of the medulla and the pons contain serotonergic neurons such as those in the RVM, as well as noradrenergic neurons such as those in the DLPT (Fields & Basbaum, 1999). The RVM directly connects with the dorsal horn, while the DLPT affects dorsal horn neurons indirectly by its neural interactions with the RMV and its direct inhibitory connection to the dorsal horn. The RVM has been found to have two different types of pain cells that are crucial in the transmission and perception of pain: the "on cells" which augments transmission of nociceptive stimuli; and "off cells" which reduces transmission of nociceptive stimuli (Fields, 2000, as cited in Bair et al., 2003). The overall net effect of these cells appears to suppress or augment the pain signal. These bidirectional on/off systems determine vigilance to either external threats or sensations coming from inside the body (Fields, 2000, as cited in Bair et al., 2003). The brains limbic structures, the PAG, and the "on" and "off" switches determine affect and attention to peripheral stimuli (Bair et al., 2003). Normally, this system has a modulatory effect, diminishing or suppressing peripheral nociceptive signals, so that attention can be focused on other external events (Stahl, 2002, as cited in Bair et al., 2003). When depletion of neurotransmitters such as serotonin and norepinephrine occurs, it can cause the brains limbic PAG and on and off switches to loose its modulatory effect, so that minor signals from the body are amplified and more attention and emotion are attached to them (Bair, et al., 2003). Depletion of neurotransmitters occurs in states of anxiety and depression and may help explain the

clinical studies that show patients that are anxious describe multiple pain symptoms, increased attention, focus, and negative affect (Bair et al., 2003).

Fields (2000, as cited in Bair et al., 2003) has demonstrated that regions of the brain such as the medial prefrontal insular cortex, and anterior cingulate cortex (ACC) hypothalamus, and amygdala are involved in the creation of emotions, and are interconnected with brainstem structures involved in pain modulation (PAG and RVM). Negative anticipation causes these key areas to activate, allowing the patient to focus on, attend to, and rate their pain as more severe. Using functional imaging studies Villemure & Bushnell (2002) showed that when pain reports were enhanced or reduced by suggestion, noxious stimuli induce increased or decreased activity in both the insular and the anterior cingulate cortices. Expectancy of hot painful stimuli has been shown to activate the ACC similar to that of when the human test subjects actually experienced hot painful stimuli (Simmons et al., 2006). How the message of suggestion and expectation affects areas that control pain transmission (such as the PAG or ACC) is unknown as stated by Fields (2004) “Obviously, language areas are required to interpret the message, but beyond the language decoding process we have no idea how the phrase “this is a powerful analgesic” influences pain transmission (p. 635).

The overlap between pain and anxiety in sharing common neuroanatomical and neurophysiological substrates has also been highlighted by research showing numerous shared pathways and mechanisms such as adenosine, cannabinoids, monoamines, gamma-amino-butyric acid (GABA), glutamate, putative endogenous benzodiazepine modulators, as well as other hormones, neuropeptides, cytokines, neurotrophins and other molecules (Charney, 2003). For example, serotonin and norepinephrine given

intrathecally, have been shown to block pain signals (Fields, 2000) and it is this physiological finding that shows how pain signals can be modulated by increasing serotonin and norepinephrine in key areas of the brain (Max, 1994, as cited in Gallagher & Verma, 2004).

Drugs such as benzodiazapines, anticonvulsants and antidepressants used in psychiatric treatment can have significant overlap in the use of pain control especially in treatment of neuropathic pain. Blier & Abbot, (2001) found that pain, anxiety and depression share a common neurochemical substrate in the serotonergic system Antidepressants used in the treatment of depression and anxiety as well as for their analgesic effect found in a meta-analysis that pain scores of those suffering from psychogenic pain or somatoform pain disorder, and treated with antidepressants differed significantly from that of placebo ($z = 5.71$, $p<.0001$), with an overall large effect size (mean .48) ranging from 0 to 0.91 (Fishbain, Cutler & Rosomoff, 1998). Antidepressants not only help treat associated anxiety or depression, but may also enhance the analgesic effects of opioid analgesics and may also have inherent analgesic properties on their own. There is also data showing promise of the use of antidepressants in the areas of neuropathic pain, cancer pain and chronic low back pain (Fishbain, Cutler & Rosomoff, 2000; Max, Lynch & Muir, 1992; Max, 1995).

Since pain is a complex sensory and emotional experience, dealing with patient pain must realize that cognition and affect are essential in the perception of pain, and cannot be separated from pain (Price, 2000). Because pain has an emotional component to it and since pain is commonly accompanied with anxiety, patients suffering from pain can benefit from a broad assessment and from interdisciplinary involvement in treatment

(Staats, 2002). In general, when anxiety exists, the person experiencing pain is more perceptive of the noxious event and the associated pain (Vlayen & Linton, 2000; Weisenberg, 1977, as cited in Eli, et al., 2003).

Porro, et al., (2002) found that expectation of pain contributes to the modulation of pain. Using functional magnetic resonance imaging, they demonstrated that learned anticipation of pain stimulated activity in the primary somatosensory cortex, even when there were no harmful stimuli. Further evidence of the relationship between pain and anxiety was provided by Casey et al., (1994) who demonstrated through positron emission tomography that the limbic system is activated in the same way by either emotional or pain stimulation. Jensen, Turner & Romano (2001) demonstrated that a patient's perception of their own control over pain were associated with reduced pain intensity, rates of disability and lower rates of depression. The release of pain killing endogenous opioids has been found to be closely related to the cognitive processing of harmful stimuli than that of actual pain intensity and duration (Grau, 1987, as cited in Flor & Hermann, 2004).

Since affective and cognitive components of the thalamic brain are involved in the interpretation of pain, the context of pain is highly involved in pain perception (Johansen, 2002). For example, positive emotions such as laughter or music that improves a patient's mood all contribute to less pain (Gelkopf & Kreiter, 1996; Schroeder-Sheker, 1994). The activation of the noradrenergic system in the brain is moderated by the contextual interpretation of the pain inducing event. The interpretation of the event also determines the accompaniment of cognitive-emotional reactions such as anxiety or depression. For example, pain in childbirth is not often accompanied by anxiety, while pain resulting

from a traumatic injury, with uncertain outcomes often does (Gallagher & Verma, 2004). Likewise, the feelings of anxiety such as tension, apprehension, and nervousness can lead to a heightened activation of the autonomic nervous system (Light, Kothandapani & Allen, 1998).

Pain also leads to physiological stress that can have a profound effect on the psychological and physiological state that may be mediated by the release of neuroendocrine stress hormones (Kehlet, 1989; Page & Ben-Eliyahu, 1997).There is a large body of evidence showing that noradrenergic brain pathways are major mechanisms of anxiety and stress (Bremner, Krystal, Sothwick & Charney, 1996). Surgical anxiety or pain activates the hypothalamic-pituitary-adrenal axis (HPA axis) and stimulates the sympathetic nervous system, leading to the bodies stress response characterized by increased catecholamine concentration, increased heart rate, elevated blood pressure and increased glucocorticoid levels (Gill, 1992; Kehlet, 1989; McGrady, et al., 1992; Page & Ben-Eliyahu, 1997). When surgical patients are confronted with potentially pain producing situations, their pain may be intensified and maintained by anxiety related sympathetic activation, and their muscle tension may also increase (Vlaeyen, Seelen & Peters, 1999). The sympathetic nerves stimulate the adrenal medulla, causing release of norepinephrine and epinephrine into the systemic circulation. Pain receptors begin to express adrenoreceptors after nerve tissue damage, and catecholamine's interaction with these adrenoreceptors help sensitize pain receptors and increase postoperative surgical pain (Devor & Jiang, 1981, as cited in Sandkuhler, 2000).

The finding that psychological perceptions influence pain outcomes has been demonstrated throughout the literature, particularly the effect of anxiety treatment such as

by providing psychological support (Carr et al., 2005; Croog, Baume & Nalbandian, 1995; Gammon & Mulholland, 1996; Kain et al., 2001; Keefe, Caldwell, & Baucom, 1996; Keefe et al., 2000; Logan & Rose, 2005, Maggirias & Locker, 2002; McCracken, et al., 1993; Schwarz-Barcott, Fortin & Kim, 1993; Sjoling et al., 2003; Turk & Rudy, 1988, as cited in Epker & Block, 2001; Van Dalfsen & Syrjala, 1990). Information about anxiety-related factors such as postoperative pain and postoperative symptoms is a common patient question (Lithner & Zilling, 2000). Psychological support has been advocated as one of the most effective interventions when the intervention is done at critical points in people's lives (NHS, 1997, as cited in Carr et al., 2005).

Anxiety is a significant predictor of post-intervention pain intensity and may interfere with the patients self control strategies and amplify pain anticipations when exposed to their significant situation (Eli, et al., 2003; Epker & Block, 2001; Kain et al., 2001; Klages et al., 2006; Lazaro, Torrubia, Caseras, Canellas & Banos, 2002; McCracken, et al., 1993; Munafo & Stevenson, 2001; Pud & Amit, 2005; Vossen, van Os, Hermens & Lousberg, 2006). In a review of presurgical psychological screening in back pain patients Epker & Block (2001) assessed numerous personality, cognitive, behavioral and historical factors and found that elevations of the Minnesota Multiphasic Personality Inventory scale associated with anxiety was one of the most significant factors on adverse surgical outcomes.

Quality of Life

There is little known about changes in quality of life among patients who have received preoperative education about pain and anxiety relating to their surgery. Over 70% of patients who have had thoracic surgery for early stage lung cancer survive over

five years, making QOL a major concern (Li et al., 2002; Mountain, 1997). While healthcare professionals may be primarily concerned with postoperative morbidity and mortality, patients are highly concerned about the possibility of long-term disability associated with their lung cancer resection (Cykert, Kissling & Hansen, 2000). Patients with lung cancer have been shown to have a significantly worse QOL in comparison to normal patients, patients who have been found to have benign intrathoracic diseases' and even in comparison to patients with other types and sites of cancer (Dales et al., 1994; Mydral et al., 2003; Schag, Ganz, Wing, Sim & Lee (1994), as cited in Paull et al., 2006). HRQOL is useful in helping identify patient outcomes in relation to post treatment recovery, identify the positive aspects of long term rehabilitation, and help identify likely anticipated problems and concerns that can be discussed with patients (Sarna et al., 2002).

HRQOL has also been found to be a useful indicator in determining patient survival, with those having a lower HRQOL having poorer survival rates (Svobodnik, et al., 2004). Thoracic surgery has been shown to negatively effect postoperative quality of life, particularly related to pain and anxiety. A six month follow-up of 139 patients who had lung cancer resection revealed a significantly worse VAS pain scale and overall decreased scoring on the Short-Form 36 Health Survey (SF-36) compared to preoperative values (Handy et al., 2002). In the patient subgroup that were followed over a 22.5 month (mean) period of time, 25% of patients scored on the Hospital Anxiety and Depression scale to be classified as having clinical anxiety (Myrdal, Valtysdottir, Lambe & Stahle, 2003). Five year follow-up of survivors of non-small cell lung cancer revealed 30% of patients having distressed mood, which was the most important single predictor of lower

HRQOL among study participants which is a potential target for intervention (Sarna et al., 2002).

Seven areas of well-being are commonly thought to influence HRQOL and include: physical, functional, emotional, family, and social wellbeing as well as treatment satisfaction and sexuality/intimacy (Kornblith & Holland, 1994). Both pain and anxiety have the ability to influence all areas of HRQOL, such as pain limiting normal daily activities or limiting participation and satisfaction in social roles and activities (Vlayen & Linton, 2000).

Forster et al., (2002) compared the QOL following lung resection between VATS and thoracotomy and found for the first four days short-term statistically significant improved QOL in VATS patients. Long term follow-up of QOL between VATS and thoracotomy have shown similar QOL at 12 months (Forster et al., 2002; Landreneau et al., 1998, as cited in Paull et al., 2006; Li et al., 2002).

Limitations of the Literature

This literature review has definite limitations. The first limitation is that the literature review covered only peer reviewed English-language studies. It is possible that large amounts of information were overlooked from journals that did not publish their results in peer reviewed English journals. Secondly, due to ethics and accepted standards of care, it is difficult to truly randomize patients in a true experimental design. It would be characterized as highly unethical to deny the control group the standard information about postoperative pain control in an effort to truly measure the difference in pain and anxiety between those that have no preoperative information and those that have been given preoperative information. Therefore, studies can only compare the patient

outcomes of standard education versus that of a particular intervention. The literature revealed that current preoperative education appears to have an impact on particular patient populations' anxiety, pain and knowledge level, while finding no difference among other populations (such as hip and knee arthroplasty patients). This may or may not be true within the lung surgery population, as information needs of lung cancer patients are extensive and may be different from those of other sample populations (Davidson, Brundage & Feldman-Stewart, 1999; Feldman-Stewart, Brundage & Hayter, 2000). Likewise, the educational teaching may not be as extensive and developed as that of other patient populations.

Unfortunately, the majority of the studies reviewed were lacking methodological details such as power analysis, and it is difficult to compare findings across populations that have different characteristics. These gaps decrease the strength of the findings in relation to outcome. The literature also lacked descriptions of the actual teaching intervention. It is quite difficult to state that preoperative education is successful if the intervention and control are not described in detail allowing comparison and contrast of the two groups. Preoperative education may or may not show differences in patient outcomes, depending on the control or intervention education quality (or lack of). Pain and anxiety educational interventions may also not be powerful enough to overcome and permanently change patient beliefs and knowledge regarding pain and anxiety, especially with only a one-time educational intervention. The last limitation of the literature is that of publication biases, which is related to the greater tendency for studies that have positive or statistically significant findings to be published by journals in comparison to negative trials (Bhandari et al., 2004; Egger & Smith, 1998).

Strengths of the Literature

It has been shown that education has a statistically significant effect regarding postoperative pain and anxiety. A major strength of the literature was that the majority of studies reported a statistically significant effect, and having a meta-analysis of the findings of preoperative education. A few of the studies performed after the most recent meta-analysis such as Lin & Wang's (2005) are statistically significant and very strong in design. The finding of the positive effects of education on the surgical patient is relevant to that of the thoracic surgery patient. Although the literature review did not discuss any studies looking at the effect of education among thoracic surgery patients', the results were similar among a variety of surgical patients (abdominal incisions, breast surgery, cancer surgery patients).

Summary

There is a need for further research into the effect of education on patient outcomes, particularly pain anxiety and health related quality of life. This is specifically true in relation to education and its effects among patients undergoing thoracic surgical procedures. Based on the literature review the purpose of this project will be to provide preoperative education regarding pain control to patients undergoing a thoracotomy.

CHAPTER 3

METHODS

The research questions, design, sample procedures and setting of the proposed study are presented. This is then followed by discussion of the instruments, study procedures and planned data analysis. The end of this chapter contains a description of pertinent ethical issues for this study.

Research Questions

The following research question will guide this study: Do surgical patients undergoing thoracotomy who are provided with routine preoperative education differ from patients assigned to routine preoperative education plus an additional educational intervention on self-reported measures of postoperative: 1) pain, 2) anxiety, and 3) quality of life.

Design

A randomized control trial (RCT) with two-groups undergoing a thoracotomy (standard education versus educational intervention) was used to address the research questions. The standard group served as the control group and received standard educational preoperative teaching, while the intervention group received the educational intervention as well as the standard educational preoperative teaching. The primary measured endpoints of postoperative pain among thoracotomy patients were measured on postoperative days one, two and three.

Setting and Sample

All patients who were referred to a large tertiary hospital for thoracic surgical (via a planned thoracotomy) were invited to participate in the study. Postoperative

thoracotomy pain data from a previous RCT study (Chia, Lui, Lui, Chang & Wong, 1998) and a clinically significant change in pain of 20% were used in calculating sample size (Cepeda et al., 2003; Felson, Anderson, Lange, Wells & LaValley, 1998, as cited in Cepeda et al., 2003; Hagg, Fritzwell & Nordwall, 2003). Correlation (Chia et al., 1998) between day one and two was assumed to equal correlation between day two and three (0.8). Correlation between day one and three was assumed to be 0.5. An alpha level of 0.05 (with a two tailed test of significance) and power of 80% were also used to determine the expected sample size, which was calculated to be 32 patients per group (confirmed by a statistician). This sample size is similar to other studies measuring postoperative pain and anxiety (e.g., Lin & Wang, 2005). Assuming a recruitment rate of 75% and an estimated one patient undergoing a thoracotomy per week, it was estimated that it would take 12 to 18 months to recruit 64 participants.

Study inclusion criteria were: 1) scheduled for an elective thoracotomy 2) at, or above the age of majority (age 18 plus), 3) able to speak and read English, 4) mentally competent, and 5) consent to partake in the study. Ochroch et al., (2005) found no statistically significant difference in pain scores among patients undergoing muscle-sparing thoracotomy (vertical, axillary, or wholly muscle-sparing) versus that of the modified posterolateral incision. Therefore patients undergoing thoracotomy (by axillary muscle sparing or modified posterolateral thoracotomy) with pneumonecotomy, lobectomy, bilobectomy, or segmentectomy were eligible for study enrollment.

Instrumentation

Four research instruments were used for data collection pre-operatively: participant information form (Appendix C), EORTC QLQ C30 (Appendix D) and pain control perceptions form (Appendix B). Additional research instruments were used to collect data postoperatively: participant information collected from hospital records (Appendix E), VAS (Appendix F at rest and with forced coughing), STAI (Appendix G) and EORTC QLQ C30 (Appendix D).

Measurement of Pain

Assessment of the patient's pain through verbal report, behavioral observation, or by physiological changes is at best an indirect snapshot of the patient's subjective experience of pain. The most common method of assessing pain intensity is to use a quantitative pain measurement scale that represents no pain and extreme pain at opposite ends (Agency for Health Care Policy and Research, 1992). The Visual Analogue Scale (VAS) was used to measure the sensation and distress related to postoperative thoracic surgery pain (at rest and with coughing). This tool was first used in the field of psychology by Freyd in 1923 (Freyd, 1923, as cited in Haedeli & Elfering, 2006) and is a simple and effective means of measuring pain intensity that has been widely used in pain research settings (Jensen & Mc Farland, 1993).

Reliability and Validity

The VAS has also been found valid and reliable when used in healthy older adults (Herr & Garand, 2001; Jensen, Karoly & Breaver, 1986; as cited in Haefeli & Elfering, 2006; Seymour, 1982). The use of the VAS has been well documented in numerous patient

populations (Chapman, Casey & Dunbar, 1985; Choiniere, Melzack, Girard & Rondeau, 1990; Hagg et al., 2003; Jensen & Karoly, 2001; Puntillo, 1990; Revill, Robinson, Rosen & Hogg, 1976), including patients with cancer (De Conno et al., 1994) and post-thoracotomy (Debreceni, Molnar, Szelig, & Molnar, 2003; Marret, et al., 2005; Ochroch, et al., 2002). The VAS is sensitive in measuring both pharmacological and non-pharmacological interventions and is an excellent measure to use before and after an intervention is done (Ohnhaus & Adler, 1975, as cited in Aubrun, Langeron, Quesnel, Coriat & Riou, 2003). The VAS highly correlates with the verbal numerical rating scale (Breivik, Bjornsson & Skoulund, 2000; Jensen, Karoly & Breaver, 1986; Ramsay, Savege, Simpson & Goodwin, 1974, as cited in Aubrun, et al., 2003).

Scoring and Administration

The vertical VAS consists of a 100-millimeter vertical line with two verbal anchors: one scale is labeled with “no pain” at the top and “worst pain imaginable” at the bottom. The line length of 100 mm has been shown to have the least amount of measurement error and was characterized as the most convenient length for respondents (Seymour, Simpson, Charlton & Phillips, 1985, as cited in Haefeli & Elfering, 2006). Administration of the VAS requires a brief verbal explanation of how to use the scale. Patients are directed to mark their pain level on a line between the two endpoints, pain and pain as bad as it can be. Measurements of postoperative pain are taken at rest and after the patient coughs. Pain at rest may relate to the patients ability to sleep and pain with active movement with coughing can determine if patient analgesia is sufficient for patient recovery. The VAS scale forces patients to translate a feeling of pain into a

measurement between 0 and 100 mm, and is sensitive to treatment change (Turk & Melzack, 1992).

The VAS is not recommended for patients with injuries to their dominant hand. The VAS scale that is photocopied numerous times in a clinic setting will also tend to grow in length, affecting the calculation of pain scoring. The researcher must also be aware that it has been reported that some patients may not understand the abstract nature of translating their pain experience into a measurement between 0 and 100 mm (Bondestam, Hivgten & Johansson, 1987; Carr & Thomas, 1997; Hancock, 1996).

Measurement of Anxiety

The gold standard for evaluation of anxiety is the State Trait Anxiety Inventory (STAI; Spielberger, 1983) that has been used in more than one thousand peer-reviewed studies in various clinical settings (Kindler et al., 2000); including individuals suffering from pain (Spielberger, 1972, as cited in Pud & Amit, 2005). The STAI was developed to measure state (Form X-1) and trait anxiety (Form X-2) and was developed in the context of the trait theory of anxiety. This theory looks at state anxiety as a provisional state or condition characterized by subjective feelings of tension and apprehension, coupled with activation of the autonomic nervous system. Trait anxiety is understood as a person's predisposition for anxiety, and as such has a tendency to perceive situations as potentially threatening, possibly leading to an increase in state anxiety.

Reliability and Validity

The STAI is a widely used measure of general anxiety, and has good consistency, with a median test–retest reliability coefficient for the trait version of 0.71–0.75

(Spielberger, 1983). Consistency is lower for the state version (0.34), but this is expected because this version is designed to reflect fluctuations in state anxiety. The measurement of alpha coefficient values for internal consistency ranged from 0.86 to 0.92 for the state subscale (Weintraub & Hagopian, 1990). The construct validity of the state portion of the STAI was determined by comparing military recruits at the beginning of a highly stressful military training program to college and high school students under conditions that were less stressful (Spielberger, 1983). Further validity of the state form was demonstrated by significantly higher scores among college students during exam time and significantly reduced scores to after relaxation exercises when compared to a normal class (Spielberger, 1983).

Median alpha reliability coefficients are 0.90 for the trait version and 0.93 for the state version. (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). Validity was examined by correlating the State Trait-Anxiety Scale with other measures of trait anxiety: the Taylor Manifest Scale, the IPAT Anxiety Scale and the Zuckerman Affect Adjective Checklist. Correlations between the State Trait Anxiety Scale and the Taylor Manifest Scale, the IPAT Anxiety Scale and the Zuckerman Affect Adjective Checklist ranged from 0.73 to 0.85. Spielberger concluded that "Since the correlations between the T-Anxiety scale and others scales approached the reliabilities of these scales, the three inventories can be considered, essentially, as equivalent measures of trait anxiety (Spielberger, 1983, pp. 32).

Scoring and Administration

State-Trait Anxiety Inventory Form X-1 was designed to measure momentary or situational emotional states (state anxiety) by analyzing feelings on a four point Likert

scale with responses ranging from 1 (not at all) to 4 (very much). The STAI is an easily administered self-report tool in which 20 questions are scored from a score from 20 to 80, with higher scores indicating a higher level of state anxiety. In the present study, patients were classified in the high anxiety category if they scored ≥ 45 on the STAI which is the end point adapted by other studies examining anxiety (Carr, Brockbank, Allen & Strike, 2006; Kindler et al., 2000; Spielberger et al., 1983).

Measurement of Quality of Life

The general purpose of Quality of Life (QOL) assessment in clinical trials is to provide a more accurate evaluation of the well-being of individuals or groups of patients and of the benefits and side-effects that may result from medical intervention. The use of a specific HRQOL tool such as the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30, version 3.0) has an advantage over generic tools such as the SF-36 and is recommended as the tool of choice in lung cancer patients who commonly have a thoracotomy for surgical treatment of their disease (Montazeri, Gillis & McEwen, 1998).

Reliability and Validity

The reliability and validity of the EORTC QLQ-30 has been confirmed in numerous international lung cancer studies (Aaronson et al., 1993; Montazeri, Gillis, & McEwen, 1998; Zhao & Kanda, 2000), as well as used in thoracic surgery patient studies (Li et al., 2002). The reliability coefficients (Cronbach's alpha) for the multi-item scales ranged from 0.52 to 0.86 before treatment and ranged from 0.52 to 0.89 during treatment

(Aaronson et al., 1993). All of the interscale correlations were statistically significant, but moderate. Most of the functional and symptom scales clearly discriminated between patients' that had a differing clinical status and in some scales a statistically significant change in the expected direction for patients whose performance status had changed during treatment was demonstrated.

Scoring and Administration

The EORTC-C30 (version 3.0) is a self-rating questionnaire that is composed of 30 questions that includes nine multi-item scales: five functional scales (physical, role, cognitive, emotional and social), three symptom scales (fatigue, pain and nausea/vomiting), a global health/QOL scale and other single questions that assesses additional symptoms (dyspnea, sleep disturbance, constipation and diarrhea). A final question assesses the perceived economic consequences of the disease (Appendix F). The questionnaire takes approximately 11 minutes to fill out, with few patients needing any assistance in filling out the questionnaire (Aaronson et al., 1993). All scores of the EORTC QLQ-C30 were linearly transformed according to the administration manual, resulting in scales that range from 0 to 100. For the global health/QOL and functioning scales, higher scores (60-100) represent a higher level of functioning. Higher scores (60-100) on the symptom scale represent a greater extent of symptoms.

Preoperative and Postoperative Questionnaires

Preoperative Questionnaire

The demographic questionnaire (Appendix C) was designed to describe the study sample and allow the identification of possible confounding factors in terms of their influence on the dependant and independent variables. Basic information such as gender, age, weight and height (for calculation of body mass index), co-morbid medical disease, education level, smoking history and family support were collected. Patients were also asked if they had any information that they had that they wished to discuss with a healthcare provider. This question was designed to elicit any other pertinent information or concerns that may not have been addressed in the preceding questionnaire (such as a patient having other significant medical conditions that were not listed in the questionnaire).

The Preoperative Assessment of Pain Control Perceptions (Appendix B) is a questionnaire that was given to both groups of patients preoperatively after they had completed the standard education session. Both groups finished the questionnaire before they were randomized into either the standard educational group or the intervention group. Results of the questionnaire were not discussed with either group unless the patient inquired about the results. The purpose of this questionnaire was to evaluate common concerns and misconceptions regarding postoperative pain control (Brown & McCormack, 2006; Ward et al., 1993).

Postoperative Questionnaire

The post-operative data (Appendix E) was retrospectively collected from patient's charts after discharge from hospital. Information was collected to determine and rule out further confounding variables. Postoperative complications were identified to help determine the incidences and possible difference in occurrence between the standard and intervention groups. For example the American Society of Anesthesiologists (ASA) Classification (Wolters, Wolf, Stutzer, & Schroder, 1996) of patients undergoing operative anesthesia is routinely used to summarize the patient's co-morbid disease factors and stratify the risk of developing intraoperative/anesthetic complications. Other information was collected to evaluate interventions that have been found to have a direct influence on pain levels (narcotic use, epidural, local anesthetic, non-steroidal anti-inflammatory use, etc).

Procedures

Permission to access patients during the surgeon's clinical consultations, along with permission to access thoracic surgery patients was obtained from the tertiary care center chief operating officer (Appendix H) and the regional department of thoracic surgery (Appendix I). Ethical approval from the local Health Research Ethics Board (Appendix J) and the Northern Alberta Clinical Trials and Research Centre Letter of Approval (Appendix K) was also obtained before study commencement.

Patient Recruitment

Patients were recruited from a large tertiary care hospital that takes all regional referrals. At the time of their pre-operative assessment clinic visit, patients who were

scheduled for an elective open thoracotomy were briefly informed about the study by the primary researcher. This allowed patients to express their disinterest, without having feeling of pressure by other medical staff. Patients who indicated any interest in the study, met with the primary researcher who provided them with verbal and written information about the voluntary nature of their role in the study, how to contact the researcher for further information and how to withdraw from the study. Written consent from those willing to participate in the study was then obtained (Appendix L and M).

Pre-operative Data Collection

After the consent was obtained, patients were asked to fill out the EORTC QLQ-C30, personal demographics and pain perception form by the researcher. Patients were assigned to the control or intervention group by a computer randomized assignment and informed by the researcher of their randomization status after the patient consented to the study and completed the EORTC QLQ-C30, demographics information sheet and pain perception form. Although patients could not be blinded to the group assignment, discussion of the other group's intervention was kept to a minimum in an attempt to help blind the intervention group to the fact that they received extra education and prevent inadvertent or deliberate attempts to influence the study results.

Intervention

Patients usually come to the preoperative clinic the week preceding their surgery. These pre-surgical clinics are run by nurses, internal medicine specialists and an anesthesiologist, who together screen patients requiring anesthetics for surgical or other

procedures. The purpose of the clinic is to assess and maximize the general health of the patient, educate the patient regarding the perioperative experience, risk reduction (such as what medications to take preoperatively) and discuss postoperative recovery and pain control.

Both the control group and intervention group received the standard preoperative education for patients scheduled for thoracotomy. The standard education consists of a ten minute power point presentation with an experienced nurse answering any questions about pain control (Table 3-1).

Table 3-1. Basic Pain Management Education Content

1) **General Pain Overview:** Defining pain, understanding the causes of pain, pain assessment and use of pain-rating scales to communicate pain, using a preventative approach to communicate pain
2) **Pharmacologic management of pain:** Overview of drug management for pain, myths about addiction, controlling unpleasant side effects
3) **Non-pharmacologic management of pain:** Importance of non-pharmacologic interventions, use of non-pharmacologic interventions as an adjunct to analgesics, use of previously successful pain interventions, description of massage, relaxation, and distraction

After the preoperative assessment and standard educational session, patients randomized to the intervention group were shown an educational video and given an accompanying handout (Appendix N). Individual preoperative patients were shown the educational video in a comfortable, quiet room in the preoperative assessment clinic. The

teaching video and handout that was used for the intervention group is based on a 15 minute videotape that has been developed and tested for surgical patients. This provided a form of consistency and avoided vagueness in the content provided to the patients. The video and handout were professionally developed and tested in a recent study involving postoperative patients over the age of 65, resulting in greater pain relief and less pain interference on postoperative day one (McDonald, Thomas, Livingston, & Severson, 2005). The video's core teaching components (Table 3-2) were taken from previous studies (McDonald & Sterling, 1998) developed to help improve older adult's postoperative pain management, resulting in a small but significant decrease in postoperative pain on day one (McDonald, Freeland, Thomas & Moore, 2001; McDonald & Molony, 2004). The video is currently in use in several U.S. preadmission units (McDonald, personal communication, 2006). Permission to use this intervention was obtained (Appendix O).

Table 3-2. Pain Communication Education Content

Interpersonal control strategies
1) The person as the expert of his or her own pain experience
2) Responsibility for reporting pain and the response to treatment
3) Importance of teamwork in decreasing pain
Interpretability strategies
1) Describing your pain using the pain-intensity scales
2) Describing your pain using pain location
3) Describing your pain using pain sensation
4) Evaluating and describing changes
5) Determining if the health provider understood your message
Discourse management strategies
1) How to introduce the pain/pain management topic (ineffective pain relief, unpleasant medication side effects, use of complimentary pain treatments, pain goals)
2) Promoting an effective response by your health care provider
3) Actively participating in the pain management discussion
4) Efficient use of time during the pain management discussion
Approximation strategies
1) Some basics about how people communicate (speech rate, eye contact, nonverbal)
Adjusting the way you talk and the effect that may have on the other person

Information regarding perceptions of pain control (Appendix B) among all recruited patients was collected before randomization into the intervention or control groups. This information was collected to help evaluate the continued perceptions of patients in regards to pain control after their standard educational teaching. To address the potential wide range of patient questions that may be discussed after the educational video, the primary researcher collaborated with an experienced thoracic surgeon and preoperative nurses (by following them in their preoperative clinics) to help ensure that a

minimal amount of questions went unanswered. The handout (Appendix N) was given to help reinforce information discussed in the teaching video. After the video, individual concerns of patients were identified, and discussed. The researchers contact information was written on the handout to allow patients to clarify any information that patients may have had after the presentation.

Postoperative Data Collection

Pain and anxiety information was collected on postoperative days one, two and three. Data was collected by a paid research assistant who was blinded to the participant's group assignment and trained in the administration of the VAS and STAI measurement tools. The primary researcher collected data such as type of surgery, A.S.A (Wolters et al., 1996), operative time, staging of resected lung cancer and medication use from the patients chart after patient discharge. EORTC QLQ-30 data was collected at the patients discharge from hospital and on their first follow-up appointment (usually at 4 weeks). The patients identifying data and their postoperative pain, anxiety and HRQOL scores were coded and the data was inputted into the analysis software before identifying characteristics were revealed.

Data Preparation and Analysis

Data was coded and entered into a data file, using statistical software (Statistical Package for the Social Sciences for Windows, version 10.0). Accuracy of data was verified by re-checking all data entries manually and looking for outliers on data bar graphs. Outliers were manually checked against recorded demographics to ensure accuracy. The maximum percent missing value for all responses was 6.3% (STAI

Postoperative Day three) and in consultation with a statistician was felt to be a very low amount of missing data. Missing data was treated as missing at random (MAR) and was deleted from the analysis. Group equivalence was established by checking whether potential confounding variables (which have effect on the response variables), were equivalent between the two groups (educational intervention group vs. control group) by calculating Pearson chi square for categorical variables and using a logistic model for continuous variables. Statistical procedures were used to control for any non-equivalent variables related to the response variables.

Descriptive statistics were used to summarize the demographic and clinical characteristics of the sample and for the domain and total scores on the response variables (VAS, STAI and EORTC-QLC-30). Continuous data was summarized in mean, standard deviations and/or ranges while categorical data was summarized in frequencies and percentages. Descriptive statistics were collected to ensure adequate sample randomization and regression models (in consultation with a statistician) were used to check if there were any confounders between the education and pain response. A confounder was defined as an unconnected variable that could have a significant effect (either positively or negatively) on independent and dependant variables.

Four steps were taken to identify confounders before primary data analysis. First, personal variables were compared between the standard the intervention group using Pearson chi square (χ^2) and students t-test because the literature review demonstrated that certain personal variables (such as patient age, A.S.A. or smoking history) may have an effect on dependant and independent variables.

Secondly, the effect of 52 (Appendix D and Appendix E) postoperative patient variables on the dependant variables (Pain, Quality of Life and Anxiety) were checked to determine if there were any significant relationships. To determine the relationships, a linear mixed model was constructed to account for the correlation of the repeated measurement. Third, logistic regression was used to determine if there was a relationship between group assignment and any of the demographic and clinical variables. Finally, a linear mixed model was used to address the research questions. The level of significance was set at alpha = .05.

Ethical Issues

Protection of Human Rights

Ethical approval was obtained from the Health Research Ethics Board (Biomedical Panel), the Department of Thoracic Surgery, Royal Alexandra Senior Administration and the Northern Alberta Clinical Trials and Research Centre. The surgeon who consulted with the patient gave the patient the opportunity to enroll in the study, in absence of the researcher. If the study was mentioned by the surgeon, potential patients were asked to partake in the study in the preoperative clinic. Patient consent was obtained from patients eligible for and consenting to be involved with this study. Patients were informed that they did not have to give a reason for not consenting to be in the proposed study and that their consent regarding the study would not affect the given standard of care. Patients were aware that although risk of harm was minimal to non-existent, the benefits of the proposed study could also be minimal or non-existent. However, as there was personal data collected, strict patient confidentiality was maintained. Other health professionals involved in this study (such as research assistant)

were also be required to consent to patient confidentiality before collecting data. Data collected from this study was secured in a locked filing cabinet. While data was being analyzed on the computer, it was kept secure by password protection. The data was coded, and the list of coded numbers and associated names were kept separate from the actual data and only consulted during data analysis. Only the researcher and research assistant had access to the raw data and the data analysis reflects group information rather that individual information. Proposed future use of data in a different context will require individual ethical review. It is anticipated that findings of this study will be published in a peer reviewed journal.

Informed Consent

Study participants had the purpose of the study, risks/benefits and time constraints explained to them both a verbally and written format prior to patient recruitment.

CHAPTER 4

RESULTS

Brief descriptions of the demographic and clinical characteristics of the study participants are provided. This is followed by discussion of the study findings in relation to each of the study objectives. The study objectives were to determine if surgical patients undergoing a thoracotomy who are provided with routine preoperative education differ from patients assigned to routine preoperative education plus an additional educational intervention on self-reported measures of postoperative: 1) pain, 2) anxiety, 3) quality of life.

Baseline Demographic and Patient Clinical Characteristics

Study Participants

The majority of identified eligible patients (38/41; 92.6%) consented to enroll in the study. One patient declined because he/she felt too anxious to participate and the other two patients did not offer any reason for study refusal. Of the 38 recruited patients, six (15.8%) were withdrawn: two patients were determined inoperable, one underwent a different surgical procedure (Video Assisted Thoracoscopic Resection), one was diagnosed with acute post-operative delirium, one needed to be intubated and admitted to the Intensive Care Unit and one patient had did not have postoperative pain data collected. Data collection stopped immediately after it was determined that they would be withdrawn from the study and none of their collected data was analyzed. Of the remaining 32 patients, 16 were in the intervention group and 16 in the standard education group. The key preoperative characteristics of the sample by group (Appendix C) are summarized in (Table 4-1). The results of the analyses using a general linear model

showed that the standard and intervention groups did not significantly differ in regards to preoperative demographic and clinical factors (age, gender, body mass, marital status, number of co-morbid diseases, education or smoking history).

Table 4-1. Preoperative demographic and clinical characteristics of the sample (Appendix C)

Demographics		Educational Intervention	Standard Education	p-value
Age (Mean and Standard Deviation)		58.25 (11.43)	61.25 (10.3)	0.69
Gender	Male	11 (58%)	8 (42%)	.2802
	Female	5 (38%)	8 (62%)	
Body Mass Index *	Not Obese	14 (54%)	12 (46%)	.3650
	Obese	2 (33%)	4 (67%)	
Marital Status	Spouseless	3 (50%)	3 (50%)	1.0000
	Spouse	13 (50%)	13 (50%)	
Medical Conditions	None	5 (42%)	7 (58%)	.4652
	One or more	11 (55%)	9 (45%)	
Education	High School or Less	6 (38%)	10 (63%)	.2725
	College	3 (50%)	3 (50%)	
	University or Higher	7 (70%)	3 (30%)	
Previous Smoker	Yes	13 (52%)	12 (48%)	.6689
	No	3 (43%)	4 (57%)	
Current Smoker	Yes	3 (38%)	5 (63%)	.4142
	No	13 (54%)	11 (46%)	

*Obesity was defined as a BMI > 30.

The Preoperative Assessment of Pain Control was administered after all participants received standard education and before randomization to either the Intervention or Standard Group. The frequencies (f) and percentages (%) of the participants who reported true in response to the eight questions in the Preoperative Assessment of Pain Control Perceptions are summarized in Table 4-2. The frequency and

percentages are reported for the standard (n=16) and the intervention education group (n=16).

Although all participants received the usual preoperative education which included information about postoperative pain control, a number of patients continued to have misconceptions about pain control. For example, 52% of all patients surveyed believed that it is common for people who take narcotics for pain to become addicted. Of the patients surveyed , 25% agreed with the statement that doctors and nurses will know that they are in pain even if they do not communicate their pain, 28% agreed with the statement that they should only ask for pain medication if their pain becomes unbearable, and 19% agreed with the statement that doctors and nurses have more important things to worry about than a patient's pain after surgery.

Table 4-2. Participants pain control perceptions after standard education by group

Pain Control Perceptions	True Response	
	I Group f (%)	S Group f (%)
I am concerned about pain after surgery	14 (88%)	13 (81%)
It is common for people who take narcotics for pain to become addicted	9 (56%)	7* (44%)
I will have to endure significant pain after surgery	12 (75%)	11 (69%)
I should only ask for pain medication if my pain becomes unbearable	4 (25%)	5 (31%)
I should regularly take pain medication to control my pain	13 (81%)	13 (81%)
I will be considered a 'bad' patient if I complain of pain after surgery	0 (-)	1 (6%)
The doctors and nurses will know if I am in pain even if I do not tell them I am having pain	2 (13%)	6 (38%)
The doctors and nurses have more important things to worry about than my pain after surgery	4 (25%)	2 (13%)

Note: I Group= Intervention group with enhanced education; S Group = Standard group received standard education; * = Missing one case value.

Data Preparation for the Primary Analyses

The result of initial analyses using a mixed linear model to identify possible confounders among 52 demographic and clinical characteristics of the sample (Appendix D and Appendix E) and the dependant variables (Pain, Quality of Life and Anxiety) showed 16 of the sample characteristics were significantly associated with one or more of the dependent variables. None involved the VAS measures for pain. As a second step to identify any confounding effects of the sixteen characteristics of the sample, a series of

logistic regressions were run. The results of that analysis showed no significant relationships between the control and intervention groups on any of the sample characteristics. Therefore, it was concluded that none of the demographic or clinical characteristics were confounding variables.

The results of a series of analyses using linear mixed method models to address each of the three research questions are described in the next three sections. The analyses tested the possible within and between group differences on any of the three testing occasions. The testing occasions were: post-operative day one, two and three for pain using the VAS at rest and with cough and; pre-operative, post-operative, and follow-up for measures of anxiety using the STAI and quality of life using the EORTC QLQ-C-30.

Pain

The mean scores and standard deviations on the VAS measured on postoperative days one two and three, under two conditions (at rest and with cough) are presented in Table 4-3. Over time the mean postoperative pain scores at rest and with cough for all groups (standard, intervention and combined group) showed a trend of reduction of pain scores across the three postoperative days. The mean VAS scores at rest were universally lower across all measurement times compared to the mean VAS scores with coughing. The mean VAS scores with coughing for the intervention group tended to be higher than the standard groups measured on the first and third postoperative day. However the two by three analysis using a linear mixed model showed no significant difference between group on the VAS scores at rest ($p = 0.5699$). Similarly, the result of two by three analysis on mean VAS scores with cough showed no significant difference between groups ($p = 0.1902$).

Table 4-3. Summary of scores on the Visual Analogue Scale by group

Pain	Postoperative Day One (n=32)	Postoperative Day Two (n=30)	Postoperative Day Three (n=30)
Intervention group VAS at rest	3.54 ± 2.90	2.16 ± 1.39	3.26 ± 2.07
Intervention group VAS with cough	6.13 ± 2.91	4.92 ± 1.91	5.70 ± 2.82
Standard group VAS at rest	3.43 ± 2.09	2.11 ± 1.65	2.29 ± 2.29
Standard group VAS with cough	5.17 ± 2.36	4.95 ± 1.28	3.89 ± 2.39

To further describe the perceptions of pain on postoperative day one, two and three, the patient pain scores on the VAS at rest and with coughing were categorized as mild (0-30 mm), moderate (31-66 mm) or severe (67 mm or greater) (Bird & Dickson, 2001). The number and percentage of participants assigned to each category for each testing occasion is reported for the intervention group (n=16) and the standard group (n=16) in Table 4-4. The standard group's data show a tendency for the frequencies (f) and percentages (%) in the mild category to increase over time and the f (%) of reports of moderate or severe pain to decrease or show little change. On the first postoperative day, the majority of the members of the intervention group (62.5%) and a minority of the standard group (43.75%) reported mild pain. By contrast on the third postoperative day a minority of the intervention group (36%) and a majority of the standard group (81%) reported mild pain.

Table 4-4. Category of pain at rest and with cough for three days postoperatively

Pain rating	Postoperative Day					
	Day 1 f (%)		Day 2 f (%)		Day 3 f (%)	
Intervention Group at rest						
Mild	10	(62.50)	11	(68.75)	5*	(36.00)
Moderate	2	(12.50)	5	(31.25)	8*	(57.00)
Severe	4	(25.00)	0	-	1*	(7.00)
Standard Group at rest						
Mild	7	(43.75)	12	(75.00)	13	(81.00)
Moderate	8	(50.00)	4	(25.00)	1	(6.00)
Severe	1	(6.25)	0	-	2	(13.00)
Intervention Group with cough						
Mild	3	(18.75)	4	(25.00)	3*	(21.00)
Moderate	5	(31.25)	9	(56.25)	4*	(29.00)
Severe	8	(50.00)	3	(18.75)	7*	(50.00)
Standard Group with cough						
Mild	3	(18.75)	1	(6.25)	7	(44.00)
Moderate	8	(50.00)	12	(75.00)	6	(37.00)
Severe	5	(31.25)	3	(18.75)	3	(19.00)

Note: * = 2 missing cases

Anxiety

The mean and standard deviations on the STAI measured on postoperative day one, two and three are presented in Table 4-5. Over time the mean scores for the

intervention (n=15) and standard (n=16) groups did not show any trend of improvement over the three postoperative days. The mean score on anxiety for the intervention group compared to the standard group was lower on day one and three. However, the results of a two by three analysis using a linear mixed model showed no significant within or between group differences on the STAI on postoperative day one, two or three ($p = 0.9695$).

Table 4-5. Summary of postoperative mean scores and standard deviation of State Trait Anxiety Inventory scores

Group	Postoperative Day 1	Postoperative Day 2	Postoperative Day 3
Intervention Group	40.87 ± 12.88	42.73 ± 12.50	40.79 ± 8.56
Standard Group	41.31 ± 11.88	40.88 ± 10.93	42.93 ± 12.16

To further describe patterns in the anxiety data across time patients were categorized as having clinically significant anxiety scores if their STAI scores were ≥ 45. A summary of the participants who exceeded the cut-off on day one, two and three are shown in Table 4-6. Over time, the frequency and percentage of patients in the intervention and standard group showed a trend of worsening STAI scores when comparing postoperative day one and three. There were higher frequencies of patients with clinically significant anxiety in the standard group on postoperative day one and three, with the same number of patients reporting clinically significant anxiety on postoperative day two (six patients per group). More participants reported clinically significant anxiety scores on postoperative day three compared to day one. On day one

and day three, more members of the standard group compared to the intervention group had clinically significant anxiety.

Table 4-6. Summary of f (%) of participants who had clinically important anxiety levels

	STAI ≥ 45 f (%)		
Group	Postoperative day one	Postoperative day two	Postoperative day three
Intervention Group	3 (20%)*	6 (40%)*	4 (29%)**
Standard Group	6 (38%)	6 (37%)	7 (50%)**

Note: *1 missing case; ** = 2 missing cases

Quality of Life

The means and standard deviations for the domains of the EORTC-QLC-30 over the three testing occasions (pre-operative, post-operative, follow-up) are presented in Table 4-7 and Table 4-8. All postoperative discharge functional domain scores were found to be below preoperative baseline scores, particularly for role functioning. Follow-up functional domain scores were still below baseline preoperative scores but there were improvements above baseline in emotional and cognitive functioning for the standard group.

Table 4-7. Summary of Scores on Functional Domains of EORTC-C-30

EORTC-C-30 Domain	Group	Pre- operative Mean	Pre- operative SD	Post- operative Mean	Post- operative SD	Follow-up Mean	Follow-up SD
Functional Scales							
Physical functioning	I	88.44	11.84	62.80	21.47	70.88	23.57
	S	81.94	16.84	56.53	27.53	69.56	21.36
Role functioning	I	75.63	25.67	16.67	23.62	55.25	37.08
	S	67.69	35.63	35.53	40.75	51.13	26.04
Emotional functioning	I	65.13	23.38	61.20	20.87	77.13	21.64
	S	69.25	21.47	59.93	27.22	78.13	26.37
Cognitive functioning	I	80.69	19.48	62.20	16.63	79.69	21.04
	S	73.56	28.44	55.53	30.86	80.19	27.16
Social functioning	I	73.88	32.32	35.60	35.89	51.13	32.01
	S	74.00	32.23	26.67	36.43	63.56	31.88

Note : I = Intervention education group; S = Standard education group

All postoperative discharge symptom domain scores were found to be below preoperative baseline scores with the exception of slight improvements in nausea/vomiting in the standard group and diarrhea in the intervention group. Follow-up symptom domain scores were still below baseline preoperative scores although there were improvements above baseline in insomnia (standard), nausea/vomiting (standard),

diarrhea (intervention), and financial difficulties (both groups). QOL was back to baseline in the standard group, but not in the intervention group.

Table 4-8. Summary of Symptom, General Health Status/Quality of Life Domain on EORTC-C-30

Domain	Group	Pre- operative Mean	Pre- operative SD	Post- operative Mean	Post- operative SD	Follow-up Mean	Follow-up SD
Symptom Scales							
Dyspnea	I	27.00	29.42	37.67	26.95	39.44	24.33
	S	24.88	22.06	57.87	31.05	29.06	28.60
Pain	I	25.06	30.08	72.20	27.63	50.94	26.81
	S	18.81	30.60	58.87	32.17	32.19	26.01
Fatigue	I	26.31	22.30	65.27	20.38	46.94	24.88
	S	30.56	25.88	68.07	27.31	41.25	27.45
Insomnia	I	24.40	25.80	64.29	36.72	35.19	14.41
	S	37.50	38.92	53.33	31.86	22.81	28.17
Appetite Loss	I	6.19	12.88	48.80	36.32	31.25	32.29
	S	20.75	23.22	44.47	33.81	22.81	28.17
Nausea/Vomiting	I	1.38	5.33	22.33	24.14	17.75	29.17
	S	16.69	27.63	13.40	15.12	6.25	20.24
Constipation	I	16.69	31.24	57.73	35.51	31.25	36.32
	S	14.50	20.26	35.53	39.42	18.63	26.20
Diarrhea	I	10.38	19.42	8.87	19.13	8.31	18.64
	S	2.06	7.99	26.67	32.73	4.13	10.91
Financial difficulties	I	20.88	33.15	26.73	34.95	20.75	28.55
	S	16.56	20.36	24.40	35.43	18.75	31.16
GHS/QOL	I	67.25	23.11	40.53	18.73	49.38	23.78
	S	56.69	23.81	37.13	20.34	55.69	22.70

Note : I = Intervention education group; S = Standard education group

There was no statistically significant difference between the intervention and standard education groups on any of the domains of the EORTC QLQ C-30 across the three measurement occasions with the exception of diarrhea (p=0.0028) and nausea and vomiting (p=0.0152).

Post hoc analyses of the data for diarrhea and nausea/vomiting scores were performed to determine where the differences were in terms of test occasions. The intervention group had a significantly lower mean (less self reported) score on diarrhea at discharge (mean = 8.87, SD = 19.13) compared to the standard group (mean = 26.67, SD= 32.73), p = .01. There were no statistically significant differences between groups on nausea and vomiting at discharge or follow-up (Table 4-9).

4-9. Analysis of statistically significant differences in Quality of Life scores (Alpha 0.05)

Outcome Variable	Estimate	Standard Error	Degrees of Freedom	T-value	P-value
Diarrhea					
Preoperative	8.3125	7.1486	65	1.16	0.2492
Discharge	-18.0494	7.3279	67.8	-2.46	0.0163
Follow-up	4.1875	7.1486	65	.59	0.5601
Nausea					
Preoperative	15.3125	7.9889	78.7	-1.92	0.0589
Discharge	8.7584	8.2329	80.4	1.06	0.2906
Follow-up	11.5000	7.9889	78.8	1.44	0.1540

To further analyze the EORTC-QLC-30 data, each participant's change in scores were examined for clinical significant change. A change of 10 points on any domain of the EORTC-QLC-30 was arbitrarily defined as a clinically significant change. Table 4-10 and Table 4-11 summarize the frequency and percentage of participants who showed clinically significant increases, decreases or no change from preoperative measurements in each of the domains on the EORTC-QLC-30 at discharge and four-week follow-up respectively. Table 4-10 showed clinically important improvement in at least 50% of all patients in four of the five functional domains of the EORTC-QLC-30. Of the functional domains, the highest frequencies of patients (77%) reported improvement in the domain of role functioning.. By contrast, at least 50% of all patients reported more problems with six of the nine symptom domains at discharge compared to preoperative measurements. The majority (67%) of all patients reported a clinically important improvement in their global health/quality of life domain.

Table 4-10. Frequency and percentage of participants with clinically significant changes in domain score at discharge

Domain	Clinically Significant Change in Domain Score at Discharge f (%)					
	Intervention Group n=15			Standard Group n=15		
	Decrease of score ≥ 10	Increase of score ≥ 10	No Change	Decrease of score ≥ 10	Increase of score ≥ 10	No Change
Physical functioning	13 (87)	0 (0)	2 (13)	9 (60)	1 (7)	5 (33)
Role functioning	14 (93)	1 (7)	0 (0)	9 (60)	1 (7)	5 (33)
Emotional functioning	6 (40)	5 (33)	4 (27)	8 (53)	3 (20)	4 (27)
Cognitive functioning	10 (67)	2 (13)	3 (20)	8 (53)	2 (13)	5 (33)
Social functioning	11 (73)	2 (13)	2 (13)	10 (67)	2 (13)	3 (20)
Symptom Scales/Items						
Dyspnea	2 (13)	8 (53)	5 (33)	1 (7)	10 (67)	4 (27)
Pain	1 (7)	12 (80)	2 (13)	1 (7)	11 (73)	3 (20)
Fatigue	1 (7)	13 (87)	1 (7)	2 (13)	13 (87)	0 (0)
Insomnia	2 (14)	10 (71)*	2 (14)*	4 (27)	8 (53)	3 (20)
Appetite loss	1 (7)	11 (73)	3 (20)	3 (20)	9 (60)	3 (20)
Nausea and vomiting	0 (0)	9 (60)	6 (40)	2 (13)	4 (27)	9 (60)
Constipation	2 (13)	10 (67)	3 (20)	3 (20)	7 (47)	5 (33)
Diarrhea	0 (0)	0 (0)	15 (100)	0 (0)	7 (47)	8 (53)
Financial difficulties	2 (13)	3 (20)	10 (67)	2 (13)	2 (13)	11 (73)
Global Health Status/QOL	11 (73)	0 (0)	4 (27)	9 (60)	0 (0)	6 (40)

Note: * one missing case

Of the functional domains, only the role functioning domain showed a majority of patients (63%) reported improvement in their QOL at four-week follow-up compared to preoperative measurements (Table 4-11). Of the nine symptom domains, at least 50% of all patients reported more problems with only two symptoms (pain, fatigue) at discharge compared to preoperative measurements.

Table 4-11. Summary of clinically significant changes in domain score on at four-week follow-up.

EORTC-QLC-30 Domain	Clinically Significant Change in Domain Score at follow-up f (%) Intervention Group n=16			Standard Group n=16		
	Decrease of score ≥ 10	Increase of score ≥ 10	No Change	Decrease of score ≥ 10	Increase of score ≥ 10	No Change
Functional Scales						
Physical functioning	5 (31)	0 (0)	11 (69)	9 (56)	3 (19)	4 (25)
Role functioning	10 (63)	4 (25)	2 (13)	10 (63)	4 (25)	2 (13)
Emotional functioning	4(25)	8 (50)	4 (25)	3 (19)	7 (44)	6 (38)
Cognitive functioning	4 (25)	5 (31)	7 (44)	4 (25)	7 (44)	5 (31)
Social functioning	9 (56)	4 (25)	3 (19)	7 (44)	4 (25)	5 (31)
Symptom Scales/Items						
Dyspnea	2 (13)	7 (44)	7 (44)	5 (31)	5 (31)	6 (38)
Pain	2 (13)	10 (63)	4 (25)	2 (13)	10 (63)	4 (25)
Fatigue	4 (25)	8 (50)	4 (25)	3 (19)	10 (63)	3 (16)
Insomnia*	3 (20)	6 (40)	6 (40)	7 (44)	3 (19)	6 (38)
Appetite loss	1 (6)	8 (50)	7 (44)	4 (16)	5 (31)	7 (44)
Nausea and vomiting	0 (0)	6 (38)	10 (63)	5 (31)	2 (13)	9 (56)
Constipation	4 (25)	6 (38)	6 (38)	2 (13)	4 (25)	10 (63)
Diarrhea	3 (16)	2 (13)	11 (69)	1 (6)	2 (13)	13 (81)
Financial difficulties	4 (25)	6 (38)	6 (38)	2 (13)	3 (19)	11(69)
GHS /QOL	9 (56)	1 (6)	6 (38)	4 (25)	5 (31)	7 (44)

* N=15, Note: GHS/QOL = Global health status and quality of life domain

CHAPTER 5

DISCUSSION

The intent of this study was to determine if patients undergoing a thoracotomy who were provided with routine preoperative education differ from patients provided with routine preoperative education plus an additional educational intervention on self-reported measures of postoperative pain, anxiety and quality of life. In this chapter the findings for each of the postoperative outcomes are interpreted in terms of previous literature and theory. Then the limitations of the study are highlighted and implications for practice and future research are suggested.

Pain

Standard preoperative education usually includes a general discussion of pain including definition, causes, assessment, use of pain rating scales, importance of prevention, drug management, addiction, and sometimes, use of nonpharmacologic management. Even with this basic education Ferrell, Rhiner and Ferrell (1993) found that patients in the education group reported significantly less pain than their cohorts in the control group. When information about patient responsibility to communicate pain was added to preoperative education, Clotfelter (1999) reported that oncology patients experienced significantly lower pain intensity than those in the control group.

More recently, McDonald et al., (2001) investigated whether there was a difference in post operative pain when orthopedic patients were exposed to basic pain management or basic pain management plus pain communication content. Communication content was based on Giles's (1973) communicative adaptive theory (Appendix A) that incorporates perception, evaluation and resulting communication

behaviors and proposes that the behaviors and motivations of people change within the context of a particular situation. The theory supports the importance of attuning strategies which include interpretability, discourse management, interpersonal control and approximation (Coupland, Coupland, Giles & Henwood, 1988, as cited in McDonald et al., 2001). The strategy of interpretability involves evaluating whether the other person understands the information, while the strategy of discourse management involves evaluating the social context of the communication. Interpersonal control strategy focuses on the relationship between the people communicating. The strategy of approximation involves attention to the other person's speech including rate, clarity, mannerisms and language. McDonald (2001) found that the communication group did not experience less pain overall than the control group. However, patients did experience significantly less pain from the day of surgery to postoperative day two. Furthermore, patients who were taught pain communication had a greater decrease in pain over time than did those who received basic pain management content only.

The mean average pain scores of the current study are consistent with other studies examining postoperative thoracotomy pain (Chia, Lui, Lui, Chang & Wong, 1998).The mean VAS on postoperative day one, two and three were similar for both groups with coughing and at rest. These findings are useful in reinforcing that the sample size was appropriately calculated and that any other major co-founders were ruled out. Although there was no significant difference in patient reports of pain between the basic management and basic management plus pain communication groups for pain at rest or pain with cough on postoperative day one, two or three, there was a trend for an over all decrease in pain from postoperative day one to three. The small increase in pain at rest on

postoperative day three may be attributable to increased activity on post operative days two and three and/or the routine switch from epidural to oral analgesia around postoperative day two.

The failure to detect significant differences may be a result of the small sample size since each group was only half the size of McDonald et al's groups. The lack of difference might also be attributed to the reason for surgery. It is likely that orthopedic patients undergoing surgery are usually expecting a positive outcome associated with less pain and an increased ability to mobilize and carry out normal activities of daily living. Contrary to Clotfelder's (1999) findings, it is possible that patients undergoing a thorocotomy to diagnose and/or remove a malignancy of the lung may experience a high degree of anxiety which could actually increase their perception of pain. Research suggests that high levels of anxiety contribute to changes in thinking such as catastrophizing, changes in working memory capacity, altered concentration, decreases in problem solving skills, and altered patient ability to cope with and decrease painful experiences (Arntz, et al., 1991; Sorg & Whitney, 1992; Vlayen & Linton, 2000). The finding that many in this study still had pain misconceptions after the standard education supports this interpretation.

The results of the survey of patient's perceptions regarding pain control (Appendix G) are consistent with other studies that measured pain control perceptions among patient populations. The number of patients in this study who did not want to bother the healthcare professionals about their pain is similar to that of other studies (McDonald, McNutty, Erickson & Weiskopf, 2000). This survey demonstrates that a significant percentage of patients are continuing to have pain misconceptions *after* receiving standard

education regarding pain control. For example, over half of all patients surveyed in this study felt that it was common for people who take narcotics for pain to become addicted even *after* specifically being informed that this was false. Oates, Snowden & Jayson (1994) also found that a majority of surveyed postoperative patients expressed mild to moderately concern about risk of addiction. A large minority of patients also still believed that they should only ask for pain medication if their pain become unbearable despite preoperative teaching that stressed that they should ask for pain medications before their pain became unbearable. While it is encouraging that only one patient believed that they would be considered a "bad patient" if they complained of pain after surgery, a quarter of patients still believed that the doctors and nurses would know that they were in pain even if they did not indicate that they are experiencing pain. Based on these continuing misconceptions, it is clear that there is still room for improvement in standard preoperative educational programs, especially in relation to pain control. Further research into ways of altering patient knowledge, perception and management of postoperative pain is warranted.

Anxiety

Mean anxiety scores were elevated on postoperative day one, two and three for both groups but there were no significant differences found between the standard and the intervention group on any testing occasion. The failure to detect differences may be as a result of the small sample size. However there are several possible alternative explanations for the lack of group differences on anxiety. The intervention may not reduce anxiety in patients scheduled for a thoracotomy, particularly for the removal of a malignancy. People with cancer compared to other underlying diagnoses have been

shown to have higher levels of pre-operative anxiety (Cassileth et al., 1984). As mentioned above, high levels of anxiety can interfere with memory capacity and concentration (Arntz, et al., 1991; Sorg & Whitney, 1992; Vlayen & Linton, 2000). So any anxiety reducing benefit from pre-operative teaching may be considerably blunted in patients in this study.

Another alternative interpretation of the results for anxiety is that the groups may not have been equivalent on anxiety at the outset. A lack of group equivalence could have been a confounding factor. However, the random assignment to groups should have ensured group equivalence on anxiety.

Neither the standard education nor the educational intervention included any specific content describing strategies for dealing with anxiety related to the cancer diagnosis. The significant rates of post-operative anxiety likely reflect a continuation of preoperative concerns typically associated with surgery in addition to the unique worries related to the diagnosis of cancer (Kindler et al., 2000). Many patients undergoing cancer surgery have significant worry regarding long term implications such as survival and or the need for further treatments (Lehto & Cimprich, 2009). Participant's responses to opportunities for questions following the standard education lend support for this interpretation. Of the few participants who had additional questions following the standard education sessions, none of the questions were in relation to postoperative pain control. Patient questions related to concerns such as spirituality, length of stay, type of procedure, surgical interventions, staging of lung cancer and what happens after the surgery.

Overall, clinically significant anxiety scores (STAI >45) were reported by more patients on POD two and three compared to POD one. The increased scores on anxiety for postoperative day two and three likely relate to routine increases in ambulation and the threat of pain associated with ambulation.

The proportions of patients with clinical anxiety found in this study (34%) are consistent with those reported in previous studies. Zabora, Brintzenhofeszoc, Curbow, Hooker & Piantodosi (2001) examined patients with 14 different types of cancer and found that the highest rates of significant distress/anxiety were among patients with lung cancer. Significantly elevated anxiety levels have been found among pre and postoperative surgical patients ranging from 20-60%, with higher rates among patients undergoing major surgery and the highest rate of anxiety among those undergoing thoracotomy (Grabow & Buse, 1990). There is a need for further research to determine the efficacy of routine screening and treatment for anxiety among patients scheduled for surgical treatment for lung cancer.

Quality of Life

There was no significant difference between the standard and the intervention group on quality of life reported before surgery, at discharge or at follow-up (about 4-weeks post-operatively), with the exception of diarrhea at discharge. The failure to detect differences on the majority of domains may be a result of the small sample size. Alternatively, it is possible that the intervention did not influence quality of life. This interpretation is supported by the lack of differences found between groups on pain, the target of the intervention and a variable known to be related to quality of life (Handy et al., 2002). Further, significant changes in post-operative quality of life compared to

baseline pre-operative levels may not become apparent in the short term post-operative period. Significant differences in pre and post-operative quality of life for patients with lung cancer have been reported at 6-months post-operatively (Dales et al., 1994; Handy et al., 2002).

Seven areas of well-being are commonly thought to influence HRQOL and these include: physical, functional, emotional, family, and social wellbeing as well as treatment satisfaction and sexuality/intimacy (Kornblith & Holland, 1994). Both pain and anxiety have the short and long term ability to influence all areas of HRQOL. For example, pain can limit normal daily activities or limit participation and satisfaction in social roles and activities (Handy, et al., 2002; Vlayen & Linton, 2000). Findings of clinically important alterations on QOL in this study are similar to those found in other studies. Moderate dyspnea on the Clinical Dyspnea Index (CDI) and a significant decrease in QOL on the Quality of Life Index in postoperative thoracotomy patients was reported at one month by Dales et al. (1994). In the same study, QOL was found to return close to baseline for dyspnea but still be significantly worse for QOL at nine months. In this study, similar proportions of patients overall (37.5%) reported worse dyspnea in comparison to baseline at one month using an arbitrary cut-off for clinically important changes in the quality of life domain.

There were statistically significant differences between diarrhea scores on discharge with the interventional group having less reported diarrhea. This finding is puzzling and likely is a spurious finding since diarrhea is traditionally not a specific concern clinically or one noted in a review of the literature associated with thoracotomy. An increase in the symptom of diarrhea in this sample could have been due to the

increased use of commonly prescribed medications such as the anti-nausea medication (metoclopramide) that also has pro-motility effects.

Clinically important improvements were evident at one month follow-up when compared to baseline in a number of domains: financial difficulties, insomnia, cognitive and emotional functioning. Improvement in these areas of QOL could be related to patients' recognition of the success of the surgery (such as "getting it all" when resecting lung cancer), not needing any further treatment (such as chemotherapy), ability to return to work and not dwelling on the upcoming surgery (catastrophizing). Further long-term follow-up would be needed to see if QOL would continue to be consistent with other studies that suggest QOL returns close to baseline from four to twelve months after surgery (Dales, et al., 1994; Sarna et al., 2008; Ziern et al., 1996). Long term chronic thoracotomy pain is a significant contributor to sleep disturbances among one-quarter of patients, while close to one-half of patients reported suffering and 40% of patients reported limitations in their daily activities (Maguire, et al., 2006; Perttunen, Tasmuth, & Kaslo, 1999).

Additional research is needed to more clearly delineate the effect of pre-operative education targeting pain control on quality of life.

Limitations of the Study

There are several key limitations of this study that are important considerations in evaluating the study outcomes. One of the major limitations of this study was the failure to sufficiently recruit adequate numbers of study participants to properly power the study. Traditionally all lung resections were carried out via a thoracotomy, however during the course of the study, new technology allowed surgeons to perform a significant majority of surgeries through video assisted thoracoscopic surgery. The small sample size significantly limits the generalizability of the study findings. In this regard, a larger randomized prospective study would be useful in determining the relationship between education and postoperative pain. Generalizability of the findings in this study also limited to patients scheduled for thoracic surgery at sites using similar pre-operative standard education. Unfortunately, there is no unifying consensus regarding essential elements of a preoperative education program, let alone having a standardized teaching program for education about postoperative pain. This allows for a large variability in the preoperative education given to patients. Other patient demographics such as culture, family support, age and co-morbid disease may differ significantly between geographical locations. Therefore, there may be significant potential confounders that may differ between other patient populations. Findings from this study should be generalized with caution to patients with characteristics similar to those in this study.

One of the other limitations was the lack of measurement of post teaching pain knowledge in the intervention group. This questionnaire was given before the educational intervention. It would have been beneficial to examine differences in patient group pain perceptions after the educational intervention to determine retention of educational

information. This is especially important in assessing the effect of alleviating misconceptions regarding pain control as anxiety has been shown to negatively influence working memory capacity, alter concentration and problem solving skills, and interfering with patient's natural ability to cope with and lessen painful experiences (Gallagher & Verma, 2004; Sorg & Whitney, 1992).

Implications for Practice and Future Research

Past research indicates that there is significant postoperative pain, anxiety and decreased postoperative QOL after a thoracotomy. This study represents the first attempt to quantify the effect of education targeting strategies to improve patients' communication about the need for pain control on perceived pain, anxiety and QOL following thoracotomy. Given the small study sample, there is a need for replication of this study using a larger sample and a longer follow-up period to confirm findings in the short and long term for patients following a thoracotomy for lung cancer.

Further research is needed to determine the most effective content and timing for educational interventions for patients undergoing a thoracotomy. The finding that patients continue to have false perceptions regarding pain control following standard preoperative education that includes misconceptions about pain control supports the need for further research. It is not clear how these perceptions relate to postoperative pain, QOL or anxiety.

It is important that clinicians are aware that patients undergoing a thoracotomy are at a higher risk for having clinically significant anxiety during their hospitalization. Further, there is a need for increased awareness of the possible influence these patients'

degree of anxiety can have on their ability to benefit from pre-operative education and its relationship with their perceptions of pain. Patients may benefit from formal screening and referral for diagnosis and treatment of anxiety and research is needed to test the impact of early diagnosis and treatment on the incidence of chronic pain. Routine evaluation of patients' misconceptions and the need for post-operative reinforcement among patients about the importance of pain control in terms of short and long term recovery is required.

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Appendix A
Description of Educational Intervention

The educational intervention is based on the premise that teaching people how to communicate their pain may result in more accurate pain assessment by health care professionals. The finding that patients do not properly communicate their pain to healthcare professionals (McDonald, McNulty Erickson & Weiskopf, 2000), has lead to the development of a professionally developed teaching interventions that teach pain management communication skills and pain management information. One of these teaching interventions has been developed and tested among surgical patients, resulting in statistically significant less reported postoperative pain from the day of surgery to postoperative day two (McDonald, Freeland, Thomas & Moore, 2001), statistically significant less sensory pain on postoperative day one (McDonald & Molony, 2004) and reported greater pain relief and less pain interference on postoperative day one (McDonald, Thomas, Livingston & Severson, 2005).

The theoretical framework used to develop the teaching intervention in both studies was communication accommodation theory (CAT). CAT was developed by Giles (1973) who discusses perception, evaluation and resulting communication behaviors and proposes that the behaviors and motivations of people change within the context of a particular situation. A change in context, results in adjustment in communication in order to meet their needs and the perceived behavior of others (Giles, Coupland & Coupland, 1991, as cited in McDonald et al., 2001). CAT also contains the concepts of attuning strategies which includes interpretability, discourse management, interpersonal control and approximation (Coupland, Coupland, Giles & Henwood, 1988, as cited in McDonald

et al., 2001). The strategy of interpretability involves evaluating whether the other person understands the information, while the strategy of discourse management involves evaluating the social context of the communication. Interpersonal control strategy evaluates the relationship between the people communicating. The strategy of approximation evaluates the other person's speech, such as speech rate, clarity, mannerisms and language.

McDonald et al., (2001) outline the importance of attuning strategies and discuss the usefulness of interpretability strategies in health professionals treating pain by increasing the understanding of a particular situation. For example, patients experiencing pain may need to communicate in the language of health care providers, such as in using the VAS scale (my pain is a 8/10) when attempting to discuss their current experience. Discourse strategy evaluates the social context of communication and examines the social behaviour and context of discussing topics such as constipation that may be deemed embarrassing or inappropriate. Examining the social context is important in the treatment of postoperative pain as new methods may need to be taught to patients, such as new methods to introduce and discuss aspects of their care that may be distressing, such as inadequate analgesia or side effects such as constipation. Interpersonal strategies are important, especially as patients are the expert on their pain experience. Patients should be aware of their responsibility to report pain if they are aware that they are the experts and that the healthcare provider needs their input to properly manage pain. The strategy of approximation is also important. By properly evaluating their own or the other person's speech or nonverbal behavior, the speaker may choose more appropriate

methods to communicate, such as plain simple language with out any medical jargon to assure understanding between those communicating.

The pain management educational content of the video and handout was adapted from Ferrell, Rhiner & Ferrell (1993). The content included: defining pain, understanding causes of pain, pain assessment and the use of pain rating scales to communicate pain, using a preventative approach to controlling pain, an overview of drug management of pain, discussion of overcoming fears of addiction and drug dependence, talking to a healthcare provider about pain, controlling related symptoms, the use of non-drug modalities (such as imagery, massage, relaxation), and the demonstration of relaxation and imagery (McDonald & Molony, 2004). Patients viewing the video will also have time to practice the application of information; specifically communicating previous pain by scaling it on a VAS. The professionally developed video and handout were also evaluated by a focus group and an expert in pain management (McDonald et al., 2005). The handout was designed specifically for teaching postoperative pain management and communication and was developed at a fourth grade Flesh-Kincaid reading level.

Appendix B

Preoperative Assessment of Pain Control Perceptions

1. I am concerned about pain after surgery	True	False
2. It is common for people who take narcotics for pain to become addicted	True	False
3. I will have to endure significant pain after surgery	True	False
4. I should only ask for pain medication if my pain becomes unbearable	True	False
5. I should regularly take pain medication to control my pain.	True	False
6. I will be considered a “bad” patient if I complain of pain after surgery	True	False
7. The doctors and nurses will know if I am in pain, even if I do not tell them I am having pain	True	False
8. The doctors and nurses have more important things to worry about than my pain after surgery	True	False

Appendix C
Subject Information Form

I.D. #_____

1. What is your gender?
□ Male
□ Female

2. Age: _____

3. What is your current height? _____

4. What is your current weight? _____

5. Marital Status
□ Married or Living Common-Law
□ Widowed, Living with Children
□ Widowed, Living Alone
□ Single, Never Married
□ Divorced, Living Alone
□ Divorced Living with Children
□ Other (please specify) _____

6. Please check the box if you have any of the following medical conditions
□ Diabetes
□ Complications of Diabetes
□ High Blood Pressure
□ Have you ever had a heart attack
□ Angina
□ High Cholesterol
□ Previous lung surgery
□ Chronic Obstructive Pulmonary Disease (COPD)

7. Highest level of education completed
□ High School or less
□ High School Graduate
□ Some College or Trade School
□ Diploma or certificate from College or Trade School
□ Some University
□ University Degree
□ Post-graduate Degree

8. Have you ever smoked?
□ Yes
□ No

9. Are you currently smoking?
□ Yes
□ No

10. How many years have you smoked? _____

11. How many packs of cigarettes did you or do you smoke per day? _____

12. Who will come with you to the hospital on the day of your surgery?
□ With a family member
□ With a friend
□ With a relative
□ By myself

13. Is there any information that you would like to talk about with a health care provider? Please use the following space below.

Thank-you for completing this form. All information about you will remain secure and confidential.

Appendix D

EORTC QLQ-30

EORTC QLQ-C30 USER'S AGREEMENT

The EORTC Quality of Life Group grants permission to Mr James Veenstra to employ the EORTC QLQ-C30 in an academic quality of life study entitled:

The effects of preoperative education on the surgical lung cancer patient

The Group will supply Mr James Veenstra, with: (1) the QLQ-C30 in the currently available languages; and (2) the standard algorithms for scoring the QLQ-C30. Use of the EORTC QLQ-C30 in the above-mentioned investigation is subject to the following conditions:

1. Mr James Veenstra confirms that this study is being conducted without direct or indirect sponsorship or support from pharmaceutical, medical appliance or related, for-profit health care industries.

2. Mr James Veenstra will grant the EORTC Quality of Life Group limited access to the trial database. Access will be limited to the following: (a) the EORTC QLQ-C30 and module data; and (b) additional data will be made available to the EORTC at the sole discretion of Mr James Veenstra as deemed appropriate for the purpose of validation of the QLQ-C30.

3. Mr James Veenstra will not modify, abridge, condense, translate, adapt or transform the QLQ-C30 or the basic scoring algorithms in any manner or form, including but not limited to any minor or significant change in wording or organization of the QLQ-C30.

4. Mr James Veenstra will not reproduce the QLQ-C30 or the basic scoring algorithms except for the limited purpose of generating sufficient copies for its own use and shall in no event distribute copies of the QLQ-C30 to third parties by sale, rental, lease, lending, or any other means. Reproduction of the QLQ-C30 as part of any publication is strictly prohibited.

5. Analysis and reporting of QLQ-C30 data by Mr James Veenstra should follow the written guidelines for scoring of the QLQ-C30 as provided by the EORTC Quality of Life Group.

6. This agreement holds for the above-mentioned study only. Use of the QLQ-C30 in any additional studies of Mr James Veenstra will require a separate agreement.

Signed and dated by: April 18th, 2007

Mr James Veenstra
University of Alberta (Faculty of Nursing)
114 St - 89 Ave
Alberta
T6G 2E1
Canada

Please return this User's Agreement form to :

EORTC Data Center, The Quality of Life Unit
Avenue E. Mounier 83 bte 11
1200 Brussels, Belgium.

Appendix D
EORTC QLQ-C30 (Version 3.0)

ENGLISH

EORTC QLQ-C30 (version 3)

We are interested in some things about you and your health. Please answer all of the questions yourself by circling the number that best applies to you. There are no "right" or "wrong" answers. The information that you provide will remain strictly confidential.

Please fill in your initials: |_|_|_|

Your birthdate (Day, Month, Year): |_|_|_|_|_|_|_|_|

Today's date (Day, Month, Year): 31 |_|_|_|_|_|_|_|_|

	Not at All	A Little	Quite a Bit	Very Much
1. Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?	1	2	3	4
2. Do you have any trouble taking a long walk?	1	2	3	4
3. Do you have any trouble taking a short walk outside of the house?	1	2	3	4
4. Do you need to stay in bed or a chair during the day?	1	2	3	4
5. Do you need help with eating, dressing, washing yourself or using the toilet?	1	2	3	4

During the past week:

	Not at All	A Little	Quite a Bit	Very Much
6. Were you limited in doing either your work or other daily activities?	1	2	3	4
7. Were you limited in pursuing your hobbies or other leisure time activities?	1	2	3	4
8. Were you short of breath?	1	2	3	4
9. Have you had pain?	1	2	3	4
10. Did you need to rest?	1	2	3	4
11. Have you had trouble sleeping?	1	2	3	4
12. Have you felt weak?	1	2	3	4
13. Have you lacked appetite?	1	2	3	4
14. Have you felt nauseated?	1	2	3	4
15. Have you vomited?	1	2	3	4
16. Have you been constipated?	1	2	3	4

Please go on to the next page

ENGLISH

During the past week:	Not at All	A Little	Quite a Bit	Very Much
17. Have you had diarrhea?	1	2	3	4
18. Were you tired?	1	2	3	4
19. Did pain interfere with your daily activities?	1	2	3	4
20. Have you had difficulty in concentrating on things, like reading a newspaper or watching television?	1	2	3	4
21. Did you feel tense?	1	2	3	4
22. Did you worry?	1	2	3	4
23. Did you feel irritable?	1	2	3	4
24. Did you feel depressed?	1	2	3	4
25. Have you had difficulty remembering things?	1	2	3	4
26. Has your physical condition or medical treatment interfered with your family life?	1	2	3	4
27. Has your physical condition or medical treatment interfered with your social activities?	1	2	3	4
28. Has your physical condition or medical treatment caused you financial difficulties?	1	2	3	4

For the following questions please circle the number between 1 and 7 that best applies to you

29. How would you rate your overall health during the past week?

1	2	3	4	5	6	7
Very poor						Excellent

30. How would you rate your overall quality of life during the past week?

1	2	3	4	5	6	7
Very poor						Excellent

ENGLISH

EORTC QLQ - LC13

Patients sometimes report that they have the following symptoms or problems. Please indicate the extent to which you have experienced these symptoms or problems during the past week. Please answer by circling the number that best applies to you.

During the past week :		**Not at All**	**A Little**	**Quite a Bit**	**Very Much**
31.	How much did you cough?	1	2	3	4
32.	Did you cough up blood?	1	2	3	4
33.	Were you short of breath when you rested?	1	2	3	4
34.	Were you short of breath when you walked?	1	2	3	4
35.	Were you short of breath when you climbed stairs?	1	2	3	4
36.	Have you had a sore mouth or tongue?	1	2	3	4
37.	Have you had trouble swallowing?	1	2	3	4
38.	Have you had tingling hands or feet?	1	2	3	4
39.	Have you had hair loss?	1	2	3	4
40.	Have you had pain in your chest?	1	2	3	4
41.	Have you had pain in your arm or shoulder?	1	2	3	4
42.	Have you had pain in other parts of your body?	1	2	3	4
	If yes, where _____				
43.	Did you take any medicine for pain?				
	1 No 2 Yes				
	If yes, how much did it help?	1	2	3	4

Appendix D

A summary of items included in the 15 dimensions of the EORTC QLQ-C30.

	Scale	Number of Items	Item Range*	Item Numbers	Function scales
Global Health Status/QOL	QL2	2	6	29,30	
Functional Scales					
Physical functioning	PF2	5	3	1 to 5	F
Role functioning	RF2	2	3	6,7	F
Emotional functioning	EF	4	3	21 to 24	F
Cognitive functioning	CF	2	3	20,25	F
Social functioning	SF	2	3	26,27	F
Symptom Scales/Items					
Fatigue	FA	3	3	10,12,18	
Nausea and vomiting	NV	2	3	14,15	
Pain	PA	2	3	9,19	
Dyspnea	DY	1	3	8	
Insomnia	SL	1	3	11	
Appetite loss	AP	1	3	13	
Constipation	CO	1	3	16	
Diarrhea	DI	1	3	17	
Financial difficulties	FI	1	3	28	

***** Item Range is the difference between the possible maximum and the minimum response to individual items; most items take values from 1 to 4, giving range = 3.

Appendix E
Post-Operative Data Collection Form

I.D. #_____

1. American Society of Anesthesiologists (ASA) Classification
□ ASA 1
□ ASA 2
□ ASA 3
□ ASA 4
□ ASA 5
□ Other (please specify) _____

2. Type of Surgery
□ Open thoracotomy with lobectomy
□ Open thoracotomy with lobectomy and wedge resection
□ Open thoracotomy with pneumonecotomy
□ Open thoracotomy with bilobectomy
□ Open thoracotomy with segmentectomy
□ Thorascopic lobectomy
□ Thorascopic lobectomy and wedge resection
□ Thorascopic wedge resection
□ Thorascopic pneumonecotomy
□ Thorascopic surgery converted to thoracotomy (please specify type of initial surgery i.e. lobectomy or pneumonectomy) _____
□ Open Paraesophageal hernia repair
□ Diaphramatic Repair
□ Other (please specify) _____

3. Primary Anatomic Distribution of Surgeries Performed/Resected
□ Right upper lobectomy
□ Right middle lobectomy
□ Right lower lobectomy
□ Right pneumonectomy
□ Left upper lobectomy
□ Left lower lobectomy
□ Left pneumonecotomy
□ Hiatus
□ Not applicable
□ Other (please specify such as area of wedge resection) _____

4. Length of Surgery (from cut to closure in minutes)
□ Start time _____
□ Closure time _____

5. Number of Chest Tubes
□ None
□ 1
□ 2
□ 3
□ ≥4
□ Other (please specify) _____

6. Length of Time before **ALL** Chest Tube(s) Removed

□ No Chest Tube	□ 5 Days	□ Unable to assess
□ 1 Day	□ 6 Days	
□ 2 Days	□ 7 Days	
□ 3 Days	□ Other _____	
□ 4 Days		

7. Length of Hospital Stay (Postoperative)

□ 1 Day	□ 6 Days	□ 11 Days	□ Deceased
□ 2 Days	□ 7 Days	□ 12 Days	
□ 3 Days	□ 8 Days	□ 13 Days	
□ 4 Days	□ 9 Days	□ 14 Days	
□ 5 Days	□ 10 Days	□ Other (specify) _____	

8. To where was the patient discharged?
□ Home
□ Nursing Home
□ Rehabilitation Hospital
□ Other(please specify) _____

9. Did the patient receive a paravertebral block?
□ Yes
□ No

10. Did the patient receive an epidural? (If epidural was found to not be working within first 12 hours, please check no)
□ Yes
□ No

11. Did the patient receive any local anesthetic to the incision site or intercostal nerves?
□ Yes (please specify the type, amount and location of local anesthetic infiltration)
_____
□ No

12. Length of time (in postoperative days) patient received epidural (or parvertebral block)

□ 1 Day □ 4 Days
□ 2 Days □ ≥ 5 Days
□ 3 Days □ Other (please specify) _____

13. Post operative narcotic (i.e. Morphine) consumption. Please list drug, dosage, route and amount over admission (up to one week).

□ Day one_____

□ Day two_____

□ Day three _____

□ Day four _____

□ Day five _____

□ Day six _____

□ Day seven _____

14. Post operative NSAID use. Please list drug, dosage, route and amount over admission (up to one week).

□ Day one_____

□ Day two_____

□ Day three _____

□ Day four _____

□ Day five _____

□ Day six _____

□ Day seven _____

15. Post operative Tylenol use. Please list drug, dosage, route and amount over admission (up to one week).

□ Day one_____

□ Day two_____

□ Day three _____

□ Day four _____

□ Day five _____

□ Day six _____

□ Day seven _____

16. Clinical Staging of Patient

□ T1N0M0 □ T3N0M0 □ T4AnyNM0
□ T2N0M0 □ T3N1M0 □ Any T Any N M1
□ T1N1M0 □ T1-3 N2M0
□ T2N1M0 □ Any T N3M0
□ Unable to assess
□ Not applicable
□ Other (please specify) _____

Formatted: French (Canada)

17. Pathologic staging of resected lung cancer (TMN)

□ T1N0M0 □ T3N0M0 □ T4AnyNM0
□ T2N0M0 □ T3N1M0 □ Any T Any N M1
□ T1N1M0 □ T1-3 N2M0
□ T2N1M0 □ Any T N3M0
□ Unable to assess
□ Other (please specify) _____
□ Benign
□ Not Applicable

Formatted: French (Canada)

18. Pathologic Analysis of Resected Tissue
I. Non-small cell lung cancer
□ Adenocarcimona
□ Squamous Cell Carcinoma
□ Large Cell Carcinoma
□ Other (please specify) _____
□ Carcinoid

II. Small Cell Carcinoma
□ Small Cell Carcinoma
□ Non Small Cell with Small Cell Carcinoma

III. Secondary pulmonary malignancy
□ Colorectal
□ Sarcoma
□ Lymphoma
□ Melanoma
□ Renal
□ Breast
□ Other (please specify) _____

IV. Benign Conditions
□ Granuloma
□ Bronchiectasis
□ Aspergilloma
□ Benign nodule
□ Bullous disease
□ Hamartoma
□ Fungal
□ Other (please specify) _____
□ Not applicable

19. Tumor size (mm)
□ Please write in size of tumor (if available) _____
□ Not Applicable

20. Morbidity and mortality

□ Operative Mortality
□ Mortality at 30 days
□ CVA
□ Myocardial infarction
□ Atrial Fibrillation
□ Supra Ventricular Tachycardia
□ Pneumonia
□ Respiratory failure
□Re-intubation after initial extubation
□ Reinsertion/Insertion of new chest tube
□ Prolonged air leak > 5 days
□ Chylothorax
□ Postoperative bleeding requiring re-operation
□ Sepsis
□ Pulmonary Embolism
□ Postoperative Blood Transfusion (#units) ____
□ Postoperative Intubation (# of days) ____
□ Re-operation
□ Urinary Tract Infection
□ Other (please specify)
□ None

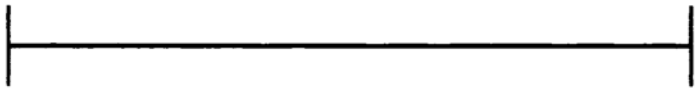
21. Preoperative Pulmonary Function Testing (please indicate if not available)

□ FEV1 (Percentage of predicted) _____
□ DLCO (Percentage of predicted) _____
□ Not Applicable/Not Available

Appendix F

Visual Analogue Scale

Mark the scale to show how much pain you have right now.



No Pain **Pain as bad as it can be**

Appendix G

STAI (Form S-1)

Spielberger State Trait Anxiety Scale

STATE-TRAIT ANXIETY INVENTORY FOR ADULTS

SELF-EVALUATION QUESTIONNAIRE, FORM S-1

USAF SCN 06-007, Expiration 30 June 2007

Please provide the following information:

Name_____Date:_____S_____

Age_____Gender (Check) ___M ___F T_____

DIRECTIONS

A number of statements which people have used to describe themselves are given below. Read each statement and then check the appropriate value to the right of the statement to indicate how you feel **right now**, that is, at this moment. There is no right or wrong answers. Do not spend too much time on any one statement, but give the answer that seems to describe how you generally feel.

1. I feel calm
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

2. I feel secure
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

3. I feel tense
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

4. I feel strained
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

5. I feel at ease
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

6. I feel upset
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

7. I am presently worrying over possible misfortunes
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

8. I feel satisfied
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

9. I feel frightened
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

10. I feel comfortable
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

11. I feel self-confident
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

12. I feel nervous
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

13. I am jittery
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

14. I feel indecisive
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

15. I am relaxed
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

16. I feel content
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

17. I am worried
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

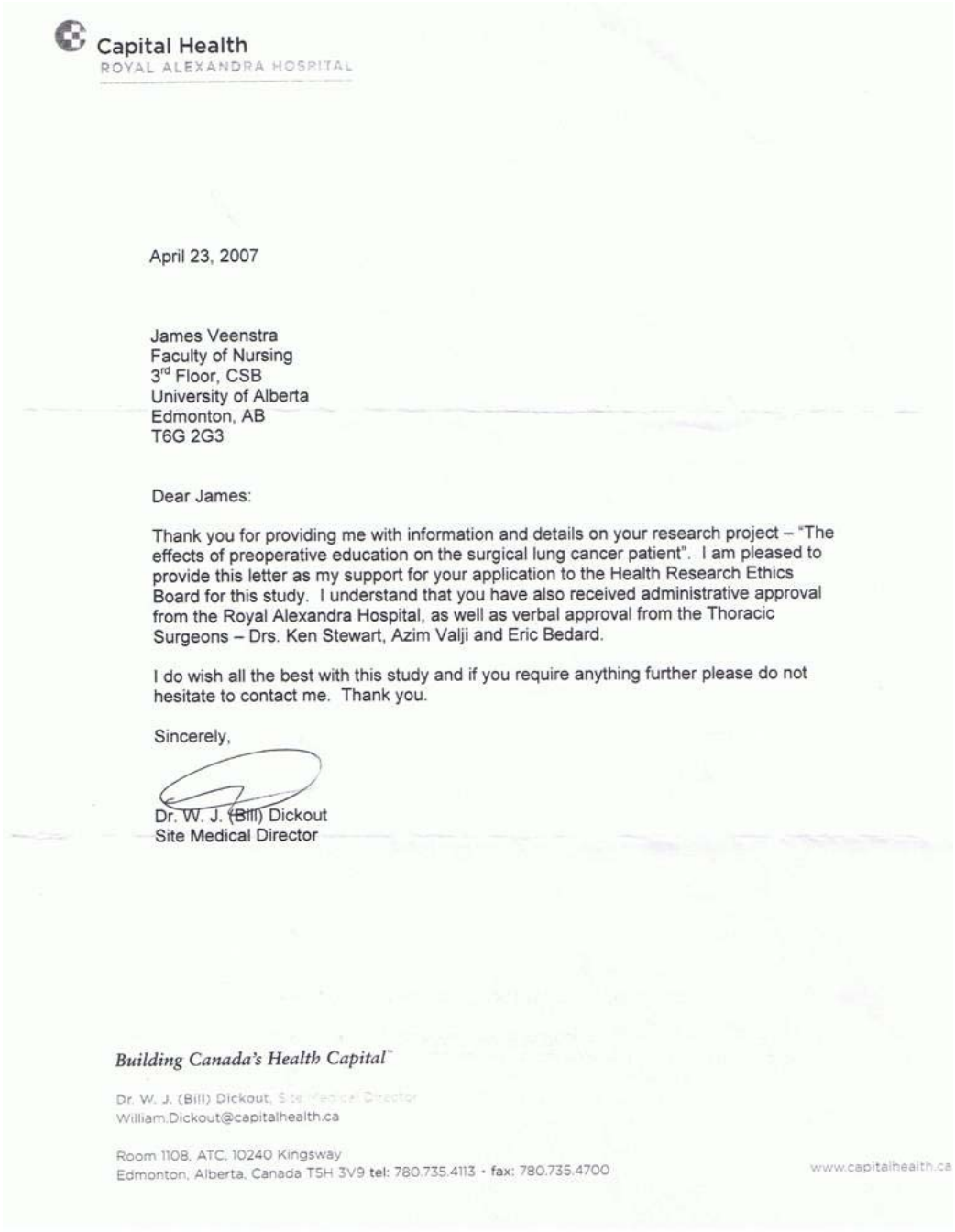
18. I feel confused
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

19. I feel steady
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

20. I feel pleasant
__ 1) Not at all
__ 2) Somewhat
__ 3) Moderately so
__ 4) Very much so

Appendix H

Letter of Medical Administrative Support from the tertiary care hospital



Capital Health
ROYAL ALEXANDRA HOSPITAL

April 23, 2007

James Veenstra
Faculty of Nursing
3rd Floor, CSB
University of Alberta
Edmonton, AB
T6G 2G3

Dear James:

Thank you for providing me with information and details on your research project – "The effects of preoperative education on the surgical lung cancer patient". I am pleased to provide this letter as my support for your application to the Health Research Ethics Board for this study. I understand that you have also received administrative approval from the Royal Alexandra Hospital, as well as verbal approval from the Thoracic Surgeons – Drs. Ken Stewart, Azim Valji and Eric Bedard.

I do wish all the best with this study and if you require anything further please do not hesitate to contact me. Thank you.

Sincerely,

Dr. W. J. (Bill) Dickout
Site Medical Director

Building Canada's Health Capital™

Dr. W. J. (Bill) Dickout, Site Medical Director
William.Dickout@capitalhealth.ca

Room 1108, ATC, 10240 Kingsway
Edmonton, Alberta, Canada T5H 3V9 tel: 780.735.4113 • fax: 780.735.4700

www.capitalhealth.ca

Appendix I

Letter of Support from the Thoracic Surgical Group

Ken C. Stewart
Thoracic, Esophageal and Pulmonary Transplant Surgery, Royal Alexandra Site,
Capital Health, Department of Surgery, Faculty of Medicine and Dentistry
University of Alberta
417 CSC – Royal Alexandra Hospital
10240 Kingsway Avenue, Edmonton, Alberta, Canada T5H 3V9
Telephone: (780) 735-4243 Fax: (780) 735-4245

April 20, 2007

James Veenstra
Faculty of Nursing
3 rd Floor, CSB
University of Alberta
Edmonton, Alberta
T6G 2G3

Dear Mr. Veenstra: James

Re: The effects of preoperative education on the surgical lung cancer patient

Thank-you for submitting your research proposal to the department of Thoracic surgery located at the Royal Alexandra Hospital. I am pleased to inform you that your proposal study has received consensus support among the RAH thoracic surgery group. We are aware of and supportive of your particular research needs, particularly access to the patient population, finances, creation of a data base, research assistance and our own discussion about the study to surgical patients.

I wish you success in your study. Should you have any questions or concerns, please do not hesitate to contact me through my office at the Royal Alexandra Hospital

Sincerely,

Ken Stewart MD, FRCSC
Thoracic Surgeon, Royal Alexandra Site

Appendix J

Health Research Ethics Board (Biomedical Panel) Letter of Approval

Health Research Ethics Board

213 Heritage Medical Research Centre
University of Alberta, Edmonton, Alberta T6G 2S2
p.780.492.9724 (Biomedical Panel)
p.780.492.0302 (Health Panel)
p.780.492.0459
p.780.492.0839
f.780.492.7808

January 2, 2008

File #B-181207

Dr Beverly Williams
Faculty of Nursing
3rd floor CSB

Dear Dr Williams:

RE: The Effects of Preoperative Education on the Surgical Lung Cancer Patient

Thank you for your submission of the above-mentioned study. Your approval form is attached.

Next year, a few weeks prior to the expiration of your approval, a Progress Report will be sent to you for completion. If there have been no major changes in the protocol, your approval will be renewed for another year. All protocols may be subject to re-evaluation after three years.

For studies where investigators must obtain informed consent, signed copies of the consent form must be retained, and be available on request. They should be kept for the duration of the project and for a minimum of seven years as per University of Alberta policy.

Approval by the Health Research Ethics Board does not encompass authorization to access the patients, staff or resources of Capital Health or other local health care institutions for the purposes of research. Enquiries regarding Capital Health administrative approval, and operational approval for areas impacted by research, should be directed to the Capital Health Regional Research Administration office, #1800 College Plaza, phone 407-1372.

Sincerely,

Georgie Jarvis
Senior Administrator
Health Research Ethics Board (Health Panel)

enc.

UNIVERSITY OF ALBERTA

Capital Health
Edmonton and area

CARITAS HEALTH GROUP

Health Research Ethics Board

213 Heritage Medical Research Centre
University of Alberta, Edmonton, Alberta T6G 2S2
p.780.492.9724 (Biomedical Panel)
p.780.492.0302 (Health Panel)
p.780.492.0459
p.780.492.0839
f.780.492.7808

HEALTH RESEARCH ETHICS APPROVAL FORM

Date: December 2007

Name of Applicant: **Dr. Beverly Williams**

Organization: **U of A**

Department: **Nursing**

Project Title: **The effects of preoperative education on the surgical lung cancer patient**

The Health Research Ethics Board (HREB) has reviewed the protocol for this project and found it to be acceptable within the limitations of human experimentation. The HREB has also reviewed and approved the subject information letter and consent form.

The approval for the study as presented is valid for one year. It may be extended following completion of the yearly report form. Any proposed changes to the study must be submitted to the Health Research Ethics Board for approval. Written notification must be sent to the HREB when the project is complete or terminated.

Special Comments: The Research Ethics Board assessed all matters required by section 50(1)(a) of the Health Information Act. Subject consent for access to identifiable health information is required for the research described in the ethics application, and appropriate procedures for such consent have been approved by the REB Panel.

Glenn G. Griener

Dr. Glenn Griener, PhD
Chair of the Health Research Ethics Board
(B: Health Research)

JAN - 2 2008
Date of Approval Release

File Number: B-181207

UNIVERSITY OF ALBERTA

Capital Health
Edmonton and area

CARITAS HEALTH GROUP

Appendix K

Northern Alberta Clinical Trials and Research Centre Letter of Approval

NACTRC
The Northern Alberta Clinical Trials and Research Centre

Suite 1800, 8215 – 112 Street
Edmonton AB T6G 2C8
p: 780.407.6221 f: 780.407.8021
www.clinicaltrials.ualberta.ca

January 24, 2008

James Veenstra
Nurse Practitioner
Faculty of Nursing, university of Alberta

RE: Research Project: The Effects of Preoperative Education on the Surgical Lung Cancer Patient

Dear James:

Please retain the attached Capital Health Administrative Approval for the above referenced study for your records. Thank you for your cooperation with providing this office with the required information prior to granting you administrative approval.

The original approval was mailed to Dr. Williams as is our policy.

Good Luck with your study, if you require further assistance from this office, please contact me at 407-6041.

Best Regards,

S. Maharaj

Shanie Maharaj
Research Administration

Appendix L

University of Alberta

RESEARCH INFORMATION SHEET

Title of Project: The effects of preoperative education on the thoracic surgical patient

Protocol Number: B 181207

Investigator(s): James Veenstra, RN, Masters of Nursing Candidate
Faculty of Nursing
University of Alberta
Phone: (780) 735-6702

Co-Supervisors: Dr. Beverly Williams
Associate Professor
Faculty of Nursing
University of Alberta
Phone: (780) 492-8054

Dr. Carolyn Ross
Associate Professor
Faculty of Nursing
University of Alberta
Phone: (780) 492-4894

Dr. Ken Stewart
Assistant Professor
Faculty of Medicine
University of Alberta
Phone: (780) 735-4243

SITE(S): Royal Alexandra Hospital. Edmonton, Alberta

STUDY-RELATED
PHONE NUMBER(S): (780) 735-6702

PURPOSE OF THE STUDY

Many people about to have thoracic surgery feel worried about surgery and their pain after surgery. Some people may have a lot of pain after surgery but not talk to anyone about their pain. The purpose of this study is to see if teaching patients before surgery how to talk about their pain improves their pain and worry after surgery.

PROCEDURES

If you want to be part of this study you may be put into a group that is taught about how to manage pain. You will be informed before surgery telling you which group you are in. You will have an equal chance of being in the group that receives extra teaching before surgery. This teaching will involve watching a 20 minute video. Patients will be able to ask questions after the video.

Before your surgery, you will be asked to fill out some forms. They will take about 20-30 minutes to complete. The forms will include some personal information and some of your beliefs about pain.

After your surgery, a pain research nurse will ask about your pain and anxiety. The research nurse will visit you once a day, for three days. When you leave the hospital and when you return for your post-operative follow-up visit you will be asked to complete a questionnaire. The questionnaire asks about how your surgery has affected your quality of life. These questions will also take about 20-30 minutes to complete. You may refuse to answer any questions you don't want to. Information will be kept in a locked filing cabinet. No personal identifying information will be used.

RISKS AND BENEFITS

There are no risks to this study. You should not experience any distress or discomfort during the interviews. If you feel anxious while filling out the forms or discussing your pain and anxiety, please talk with the researcher. You may need a short break or to discuss your situation with others.

By being a part of this study, you might be better able to discuss and relieve your pain. This will help decrease your anxiety about pain. There are no charges for the teaching.

PARTICIPATION

Taking part in this study is voluntary. You will not be paid for taking part. You do not have to take part in this study to be treated for your pain or anxiety.

CONFIDENTIALITY AND PRIVACY OF STUDY INFORMATION

The researcher may need to access your personal health records for health information such as test results. This information will be kept confidential unless release is required by law or by professional code of ethics. It will only be used for the purpose of the research study. By signing the consent form you give permission to the researchers to access personally identifiable health information. Personal information will be kept confidential. Any research information collected about you during this study will not identify you by name. Your name will not be shared outside the research study. Any report published as a result of this study will not identify your name.

The information gathered in this study may be used in the future to help answer other study questions. To do so the ethics board will review the request to ensure the information is used properly.

If you think you have an injury or illness related to this study, contact the study staff right away. The study staff will treat you or refer you for treatment. The treatment will be given at no cost to you.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Being in this study is voluntary. You may decide not to take part or you may leave the study at any time. Your decision will not affect your surgical care.

If you have any concerns about your rights as a study participant, you may contact the Patient Relations Office of Capital Health, at 407-1040 (or if you have any concerns about any aspect of this study, you may contact the Caritas Research Centre at (780) 930-5274. This office has **NO** affiliation with the study investigators.

Please contact any of the individuals identified below if you have any questions or concerns: James Veenstra R.N., M.N. (candidate), at (780)735-6702.

I have read the information letter and have been given a copy of it. I agree to take part in this study.

_____
Printed name of participant

_____ _____
Signature of participant Date

_____
Printed Name of Researcher Signature Date

Appendix M
Consent Form

Title of Project: The effects of preoperative education on the thoracic surgical patient
Protocol Number: B 181207
Investigator(s): James Veenstra, RN, Masters of Nursing Candidate
Faculty of Nursing, University of Alberta Phone: (780) 735-6702

Co-Supervisors:

Dr. Beverly Williams	Dr. Carolyn Ross	Dr. Ken Stewart
Associate Professor	Associate Professor	Assistant Professor
Faculty of Nursing	Faculty of Nursing	Faculty of Medicine
University of Alberta	University of Alberta	University of Alberta
Phone: (780) 492-8054	Phone: (780) 492-4894	Phone: (780) 735-4243

Do you understand that you have been asked to be in a research study? Yes No

Have you read and received a copy of the attached information sheet? Yes No

Do you understand the benefits and risks involved in taking part in this research study? Yes No

Have you had an opportunity to discuss and ask questions about the study? Yes No

Do you understand that you can withdraw or refuse to participate in the study at any time? Yes No

Do you understand that the study is confidential? Yes No

Do you understand who will have access to your personal healthcare information? Yes No

This Study was explained to me by: _____

I agree to take part in this study.

_____

Signature of Participant Date Witness

_____ _____

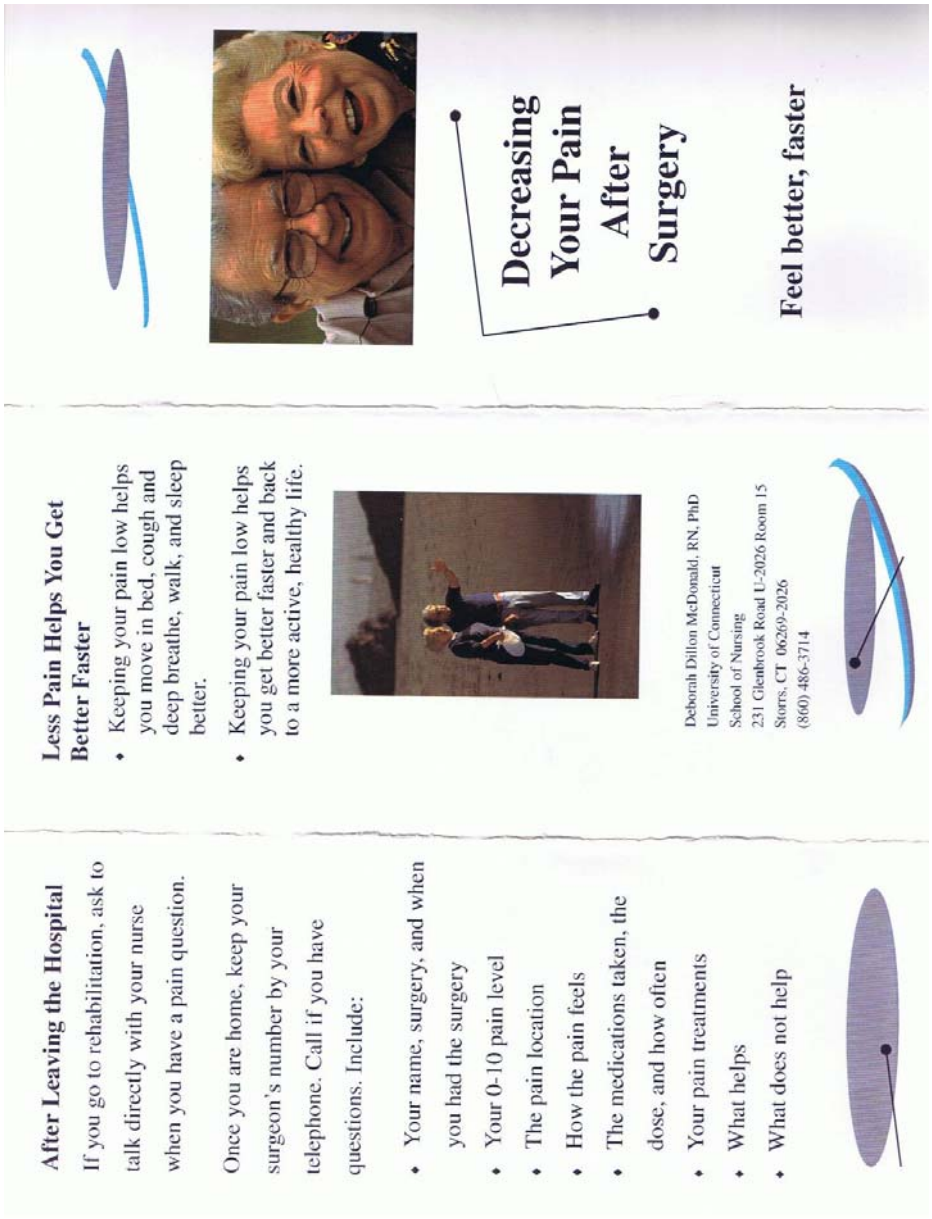
Printed Name Printed Name

I believe that the person signing this form understands what is involved in the study and voluntary agrees to participate.

Researcher:_____ Printed Name: _____

Appendix N

Preoperative Handout



Decreasing Your Pain After Surgery

Feel better, faster

Less Pain Helps You Get Better Faster

- Keeping your pain low helps you move in bed, cough and deep breathe, walk, and sleep better.
- Keeping your pain low helps you get better faster and back to a more active, healthy life.

After Leaving the Hospital

If you go to rehabilitation, ask to talk directly with your nurse when you have a pain question.

Once you are home, keep your surgeon's number by your telephone. Call if you have questions. Include:

- Your name, surgery, and when you had the surgery
- Your 0-10 pain level
- The pain location
- How the pain feels
- The medications taken, the dose, and how often
- Your pain treatments
- What helps
- What does not help

Deborah Dillon McDonald, RN, PhD
University of Connecticut
School of Nursing
231 Glenbrook Road U-2026 Room 15
Storrs, CT 06269-2026
(860) 486-3714

Your pain is what YOU say it is and occurs when YOU say it does.

Pain Medication

- Use pain medication to lower your pain after surgery.
- Narcotics such as Morphine and Tylox block the pain message in the brain.
- NSAID's (like Aspirin and Motrin) lower redness, swelling, and pain at the site.
- Using narcotics along with NSAID's can lower pain even more.
- Addiction is rare when taking drugs for surgical pain.
- Take pain medication **before** pain increases
- Take pain medication at regular times

More Ways to Lower Pain

- You can lower your pain even more by also using relaxation, massage, and distraction.

- **Relaxation** – Take slow, deep breaths in through your nose, and out through your mouth. As you breathe more slowly and deeply, begin to relax the muscle tension in each part of your body.

- Some of the ways that you lower your pain at home may help lower your pain after surgery.

Tell Your Nurses and Doctors

It is up to you to tell your nurses and doctors about your pain.

- Do not stay in pain waiting for your nurses and doctors to stop by. Use your call light.
- Let your nurses and doctors know you need to talk about your pain when you first begin to talk.
- Tell where your pain is, how it feels, and how it has changed.
- Use the 0-10 Pain Scale to tell your nurses and doctors about your pain.

10 – Worst Pain
9
8
7
6
5
4
3
2
1
0 – No Pain

Appendix O

Letter (e-mail) of Approval for use Teaching Video and Pamphlet

James,

I would be delighted to share my preoperative teaching material with you. I highly recommend using the 15 minute videotape that we developed and tested for surgical patients. The video was professionally developed and tested in a more recent study (McDonald, D., Thomas, G., Livingston, K. & Severson, J. (2005). Assisting older adults to communicate their postoperative pain. Clinical Nursing Research, 14, 109-126.)The slide show was the first rendition. The video, that I will be happy to give you a free copy of, is currently being used in several hospitals throughout the U.S.

Give me your mailing address and I will send you a copy, along with a copy of the handout that we gave each person as part of the study.

Deborah Dillon McDonald, RN, Ph.D.
Associate Professor
University of Connecticut
School of Nursing
231 Glenbrook Road
Storrs, CT 06269-2026
(O) 860-486-3714
(FAX) 860-486-0001

-----Original Message-----

From: jv5@ualberta.ca [mailto:jv5@ualberta.ca]

Sent: Friday, October 13, 2006 12:50 PM

To: McDonald, Deborah

Subject: Preoperative pain teaching

Dear Dr McDonald:

My name is James Veenstra. I am currently enrolled in the second year of the Masters of Nursing program at the University of Alberta (Canada). My thesis work involves looking at the effect of preoperative teaching on postoperative pain and anxiety among patients that have had a thoracotomy for lung cancer.

I am writing to you to see if I could look at, and possibly use your 20 minute slide show in which you taught patients a combination of pain management and pain communication skills. If the 20 minute slide show was used, it would potentially be slightly modified for lung cancer surgery patients. I would also give you and the co-creators of the information slide show full credit for your work.

The patient population would primarily be elderly, be of mixed ethnicity, and mixed gender (although I suspect that based on the

demographics of smokers, male Caucasians would compose a majority of patients). I am looking at having 30 patients in the intervention group, and 30 patients in the control group.

If you have any questions please do not hesitate to contact me via e-mail or by phone (780) 491-0554, or contact one of my thesis supervisors at: beverly.williams@ualberta.ca or carolyn.ross@ualberta.ca

Thank-you for your consideration;

James Veenstra