

Running Head: PREOPERATIVE PATIENT EDUCATION

PREOPERATIVE PATIENT EDUCATION UTILIZING ADJUNCTIVE NONPHARMACOLOGICAL
PAIN MANAGEMENT INTERVENTIONS

By

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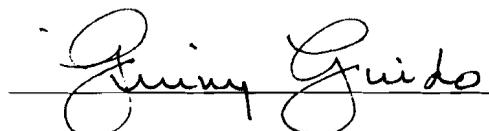
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To the faculty of Washington State University Vancouver:

The members of the Committee appointed to examine the project of MARVIN TOLENTINO find it satisfactory and recommend that it be accepted.

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Abstract

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Chair: Dawn Rondeau

Analgesics are not always effective in eliminating post-operative pain. Utilization of nonpharmacological interventions may assist in the alleviation of pain. Nurse Practitioners have an opportunity to assess the knowledge of their patients regarding the utilization of alternative therapies for pain management at preoperative visits. The education of patients preoperatively for adjunctive pain management interventions may include massage therapy, chiropractic therapy, ice therapy, music therapy, and guided imagery. Effective strategies for education might incorporate the use of printed materials or pamphlets about pain management. This paper seeks to describe the research for adjunctive or alternative therapies easily accessible to patients and to provide an educational tool that providers may use in the preoperative education of these patients.

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Preoperative Patient Education Utilizing Adjunctive Nonpharmacological Pain Management Interventions

Traditional Postoperative Pain Management

Maintaining individual health and quality of life is dependent upon many variables. One such variable is pain. Pain has been defined by the International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (IASP, 2011, para. 5). The presence of pain has been found to be a factor negatively affecting quality of life (Mason, Skevington, and Osborn, 2009). To alleviate pain quickly, many care providers will prescribe narcotic or non-narcotic analgesics. According to the National Institute on Drug Abuse (NIDA) (2005), 573,000 people were first time users of prescription pain relievers in 1990. By the year 2000, the number had increased to 2.5 million. Additionally, according to fact sheets provided by the United States Drug Enforcement Agency (2010), prescriptions for the narcotic hydrocodone, a component in medications such as Vicodin, increased from 88 million in 2000 to 130 million prescriptions by 2006. These figures reflect a noticeable increase in the use of narcotic pain medications.

Guidelines were published by the World Federation of Societies of Anesthesiologists (WFSA) (Charlton, 1997) for the treatment of acute postoperative pain utilizes an Analgesic Ladder. According to the WFSA Analgesic Ladder, strong opioids should be administered by injection or local anesthesia initially to control severe pain. As pain levels decrease, oral analgesics should be used. Finally, as pain levels further decrease, the prescription of weaker opioids or nonopioid analgesics may be initiated. For the purpose of this paper, opioid and narcotic terminologies are used interchangeably. In these guidelines, there is no mention of nonpharmacological methods for the treatment of acute or postoperative pain.

The prescription of narcotic and non-narcotic analgesics by healthcare providers for the treatment of acute and chronic pain has grown significantly in the last decade. Although helpful in the treatment of

pain, analgesics are not always completely effective in the elimination of pain and have known side effects (Kemper, 2002; Sauaia et al., 2005). Primary care providers have an opportunity to educate patients on alternative methods and treatments available to treat acute pain effectively. The integration of these strategies are particularly important during preoperative clearance or consultation. Patients have been shown to have improved satisfaction with pain management when provided with education preoperatively (Sauaia et al., 2005).

Ineffective treatment of postoperative pain has been shown to interfere with sleep, deep respirations and coughing, ambulation, mood, and performing general activities (Watt-Watson, 2004). For example, the risk for postoperative atelectasis has been shown to be decreased in patients who demonstrated greater inspiratory capability (Hulzebos et al., 2006). Hypoxemia or oxygen saturations less than 90% postoperatively have been identified as a risk factor for increased mortality and postoperative confusion (Bjorkelund et al., 2011). Early ambulation as part of a deep vein thrombosis (DVT) prophylactic regimen has been shown to provide significant risk reduction in DVT formation (Ragucci et al., 2003). In patients undergoing treatment for insomnia with hypnotic medications there is a correlation to an increased risk of falls, which may lead to injuries such as hip fractures (Avidan et al., 2005). Difficulty sleeping among hospitalized patients has been shown to lead to chronic insomnia after discharge (Griffiths & Peerson, 2005). Therefore, treating pain effectively can improve patients' recovery postoperatively. The purpose of this paper is to review current research for postoperative options for nonpharmacological pain management therapies, the effectiveness of providing therapy preoperatively, and the importance of providing this information in written format.

Why Supplement Analgesics?

Even though analgesics can be used in alleviating pain, they are not always completely effective in eliminating pain. In two studies conducted regarding pain management, postoperative patients were routinely prescribed morphine or other forms of opioid analgesic (Berard et al., 2006; Sauaia et al., 2005).

Sauaia and colleagues (2005) noted that patients still experienced severe pain, rated as 8 – 10 on a 10 point scale, despite the use of opioid analgesics, such as morphine, during their first 24 hours in the postoperative setting. Furthermore, patients can continue to experience pain 3 months or longer post discharge (Soler et al., 2010). Analgesics are known to have adverse or unwanted side effects.

Constipation and nausea were reported to be primary side effects experienced by patients taking narcotic analgesics (Watt- Watson et al., 2004). In addition to nausea and constipation, drowsiness is also noted to be a side effect (Kemper, 2002). Nonpharmacological pain management options may help to reduce or eliminate the need for analgesics, thereby reducing the risk of adverse or unwanted side effects. Further discussion of the correlation between use of nonpharmacological pain management and decreased consumption of analgesics shall be addressed below.

Alternative Pain Management Interventions

Alternative pain management interventions other than analgesics are available. These interventions are readily available to patients. In this paper, music therapy, massage therapy, chiropractic therapy, guided imagery or relaxation techniques, and ice therapy will be reviewed.

Music Therapy

Music therapy is the use of music, usually based on patient preference, which distracts the patients “away from negative stimuli to something pleasant and encouraging” as a way of alleviating pain (Ozer et al., 2009, p. 2). Lim & Locsin (2006) conducted a literature review of nine quantitative research studies performed in five Asian countries that utilized music as a nursing intervention for pain management. The results of the literature reviews were varied. Five studies indicated that reduction of pain was achieved with general and obstetric-gynecological post operative patients, open wound dressing changes, post operative following induced abortions, and active labor patients. The sixth study in the review involving pain with dressing changes did not see a reduction in pain levels up to 120 minutes after the dressing changes. The remaining three studies showed inconsistent results in the alleviation of pain.

Of the studies that showed improved pain relief with music therapy, the 15-45 minutes of music included choices that ranged from soothing instrumental, to patient preferred popular, and to classical music. This intervention occurred before, during, or after dressings changes, or at scheduled intervals after surgery, such as every 2 hours for 48 hours, or for 4 instances per day at the 6, 12, 24, and 36 hour while awake, or during the 3 hours of active labor.

In a quasi-experimental pretest-posttest study utilizing a convenience sample of 73 Korean women by Good and Ahn (2008), musical intervention was provided following gynecologic surgery. Fifty-nine percent of patients chose Korean music rather than Western music. Korean music played at a rate of 80-110 beats per minute, strong rhythm, and higher volumes versus Western music. Western music played at a rate of 60-80 beats, was sedating in nature, non-lyrical, and more melodic. The women listened to music for 15 minute intervals twice daily on the first and second postoperative days. The music group experienced 17-23% less pain than the control group on day 1, and 15% less pain on day two versus patients that used analgesics alone. Patients in both the control group and experimental group received an unspecified amount of analgesics during the study.

In a convenience study by Allred and colleagues (2010) of 56 patients, 25 men and 31 women, who underwent a total knee arthroscopy, the researchers randomly split the subjects into two groups to determine if pain and anxiety could be alleviated with music. Pain was measured using a Visual Analog Scale for Pain and Anxiety. The control group underwent 20 minutes of rest periods pre and post ambulation, while the experimental group listened to 20 minutes of non-lyrical easy listening music that was 60-80 beats per minute which occurred pre and post ambulation on post operative day one. Both groups were placed on equivalent doses of dilaudid or morphine loaded patient controlled analgesia (PCA) machines on the day of surgery. PCA infusions were then discontinued the first morning postoperatively. Within 6 hours after the experimental and control interventions, oral analgesics were administered to 93% of the experimental group and 86% of the control group. No statistical difference in

pain scores were found between the 2 groups. However, 84% of the experimental group found that music was helpful in letting the participants forget about their pain. Ninety two percent of the experimental group found that their general mood was improved with music therapy. Finally, 88% of the experimental participants found that music provided an enjoyable experience.

Good and colleagues (2010) conducted a 2x2 factorial designed randomized control study with 517 patients who underwent abdominal surgery utilizing music for relaxation and pain control. Sixty eight percent of the patients were women. The mean ages of the patients were 48.67 years old. The patients were divided into 4 experimental groups, those who underwent patient teaching on postoperative pain management only (PT), those who underwent relaxation and music therapy (RM) only, those who underwent a combination of PT and RM, and the control group. All therapy information was provided via recorded audio tape. Therapy information was provided before surgery to the RM and PT and RM group. Interventions were provided post transfer to the post surgical unit and at 10AM on postoperative day 1 and 2. RM therapy consisted of jaw relaxation techniques that involved jaw, lip, and tongue relaxation, slow breathing, and to stop thinking of words while sedating music played in the background. Music choices included synthesizer, harp, piano, orchestra, slow jazz, and inspirational music with no lyrics and played between rate of 60-80 beats per minute. PT therapy consisted of information on how to report pain, medication management, pain prevention, pain management with activity, attitude modification, and being involved in managing ones' own pain. Pain was measured using the Sensation and Distresses of Pain Visual Analogue Scales on a 100 mm horizontal line. All patients utilized patient controlled analgesia, intramuscular, intravenous, or oral opioids for primary pain control. On the day of surgery, all patients had similar mean pain scores after the variable pain interventions. However, patients who utilized RM and PT with RM experienced the larger post intervention drop in pain scores and had lower pain scores on postoperative day 1 and day 2.

Massage Therapy

Massage therapy involves the manipulation of soft tissue and body movement for the wellbeing and health of individuals (American Massage Therapy Association, 2011). Wang and Keck (2004) conducted a pretest-posttest single group convenience study of 18 surgical patients, 1 male and 17 females, who underwent gynecological (8 patients), gastrointestinal (3 patients), urological (3 patients), head and neck (3 patients), and plastic surgery (1 patient). The purpose of the study was to determine if foot and hand massage helped in alleviating the patients' surgical pain. Massage was applied to the patients' feet and hands for 5 minutes on the first postoperative day 1 to 4 hours after administration of an analgesic. Massage was applied by the study investigator. The massage technique of the hands involved utilizing a circular motion on the patient's palm, fingers, and hand outer surface. Foot massage involved utilizing circular motions on the patient's sole of the foot with the thumb. Next an up and down motion on the sole was performed utilizing the investigator's knuckle. Patients were noted to have mean pain levels of 4.65 pre intervention and 2.35 post intervention on a 10 point numeric rating scale. Furthermore, mean pain distress scores decreased from 4.00 to 1.88 on a 10 point numeric rating scale.

Buyukyilmaz and Asti (2011) conducted an experimental study and sought to determine if relaxation techniques and 10 minute back massages helped to reduce pain and anxiety in 60 Turkish patients who underwent total hip or knee arthroplasty. Patients were randomly placed into the experimental and control groups. All patients received similar medication based pain management including opioid analgesics administered via patient controlled analgesia machines and intramuscular (IM) nonopioid analgesics on day 1, IM nonopioid analgesics on day 2, and nonopioid analgesics and application of ice packs for 20 minutes at a time on day 3. The intervention groups were taught rhythmic respirations, muscle relaxation exercises, and were provided music as a portion of the relaxation techniques. The relaxation techniques and back massage were provided in the morning and evening on post operative days 1 through 3. Lanolin massage oil was used to reduce friction during the massage.

Massage to the back involved utilizing effleurage starting at the sacrum up to the scapular region. Petrissage was applied to the scapular and cervical muscles and subcutaneous tissue. Finally, slow stroking friction was applied to the upper cervical vertebrae and spine utilizing the middle fingers of both hands. Pain and anxiety scores on a 10 point visual analog scale and vital signs were obtained before intervention, immediately after intervention, 1 hour after intervention, and 2 hours after intervention. Pain and anxiety levels were significantly different between the experimental and control groups. Pain levels dropped from mean scores of 7.13 to 4.76 in the experimental group versus 7.20 to 6.56 in the control group. Anxiety levels dropped from 5.83 to 3.93 in the experimental group versus 5.99 to 5.79 in the control group. No statistical differences were found regarding vital signs in both groups before and after therapy interventions.

Taylor and colleagues (2003) conducted a prospective randomized control trial on the use of adjunctive Swedish massage and vibration therapy on short term postoperative outcomes on 105 women who underwent abdominal laparotomy to remove suspected malignant lesions. The women were randomly divided into 3 groups: usual postoperative care group; Swedish massage and usual postoperative care group; and vibration therapy plus usual postoperative care group. Usual postoperative care included ambulation, intravenous fluids, spirometry, clear liquid diet on postoperative day 1, deep venous thrombosis prophylaxis, and use of patient controlled analgesia machines during the 3 days of hospitalization. Massage therapy included “gentle pressure and hand-over-hand stroking of both the upper and lower body” (Taylor et al., 2003, p. 82) for up to 45 minutes per night postoperatively at bedtime for 3 consecutive nights by licensed massage therapists. The vibration therapy included use of a computer driven amplifier that was used for 20 minute increments sending vibrations through the mattress to the patient penetrating superficial and deep tissues. Patients were given instructions on how to change vibration intensity and could use the machine at anytime of the day. Vibration was set between 27 and 113 Hz, would change variably by the computer in amplitude and frequency for wide range of sensory

receptor stimulation and was inaudible to the patients. Massage was shown to be statistically more effective at treating affective pain ($p=0.0244$) and sensory pain ($p=0.0428$) than was postoperative care and vibration therapy ($p=0.0015$) postoperatively on the surgical day. Massage therapy was still more effective for relieving sensory pain than the standard postoperative care ($p=0.0090$) and vibration therapy ($p=0.0085$) on postoperative day 2.

Degirmen and colleagues (2010) conducted a pretest-posttest randomized controlled experimental study using 67 post Cesarean Turkish women to determine if foot and hand massage was effective in controlling pain. Pain was rated on an 11 point Numerical Rating Scale and a 5 point Verbal Rating Scale. Patients were divided into a control group, the feet and hand massage group, or the foot massage group. Massage was applied to the feet and hands of the patients for 5 minutes to each extremity by the principal investigator during the first 24 hours of hospitalization. Pain measurements from the patients were done pre-intervention, immediately after intervention, and 60 and 90 minutes after intervention. Massage was administered within 2.5 hours post analgesic administration. The mean pain level of the control group pre-massage was 4.36 and 5.20 ninety minutes post massage. The mean pain level of the foot and hand massage group was 5.76 pre-massage and 3.64 ninety minutes post massage. The mean pain level of the foot massage group was 5.44 pre-massage and 3.76 ninety minutes post massage. Therefore, foot and hand massage was the most effective means of reducing pain.

Chiropractic Therapy

According to the American Chiropractic Association (2011), chiropractors provide care for the treatment of neuromusculoskeletal issues, including pain, with “hands on” and drug free methodology. Chiropractic therapies can be helpful for pain control for the long term rather than the immediate postoperative setting. In a single case study by Estadt (2004) of a 54-year-old Caucasian male who previously underwent lumbar microdiscectomy, the patient continued to complain of low back pain 2 months after surgery, despite the surgical intervention. Additionally, the patient was noted to have

decreased range of motion and a left sided foot droop. The patient was treated with strengthening and stretching techniques. The patient was advised to perform alternating arm and leg extensions, horizontal side bridges, abdominal hollowing which requires deep breathing while contracting the abdominal muscles in. The patient did 3 sets of 10 repetitions, increased to 15, twice daily for 4 weeks.

Hyperextension exercises were included during weeks 3 and 5. At week 3, the patient began performing "Super Mans" on a gym ball, which is lying on your abdomen on a gym ball while extending your arms and legs. Lateral flexion exercises were introduced at week 5. The patient was noted to be able to have full range of motion without pain, less disability with his activities of daily living, and was able to pass 85% of tests that determine nominal functional capabilities at the completion of supervised therapy.

Lisi and Bhardwaj (2004) presented a case study of a 35-year-old woman who presented to the chiropractor with complaints of continuous low back pain, mid back pain, buttock pain, saddle anesthesia, and bowel and bladder incontinence that persisted for 6 months post surgical intervention for chronic cauda equina syndrome. The surgical intervention was a right sided single-level laminectomy and discectomy at L5-S1. The patient was treated with side posture high volume low amplitude spinal manipulation and ancillary myofascial release during 8 chiropractic sessions. The side posture procedure involved pushing to the right of the L4-5 and L5-S1 facet joints and to the left of the sacroiliac joint. The patient reported complete elimination of buttock, low back, and mid-back pain after 4 sessions.

In a case presentation by DeSantis (2004), a 41-year-old female was presented who underwent arthroplasty of the left wrist capitate due to avascular necrosis. Subsequently, she underwent chiropractic postoperative rehabilitation. The rehabilitation occurred following cast removal after 9 weeks. She initially presented with pain levels of 4-6/10 at onset of therapy. Therapy was conducted for 9 weeks, 3 times per week. Initial therapy involved isometric resistive exercises at 1 set of 20 repetitions over six seconds. Home exercises involved flexion and extension routines performed against gravity. Further therapy involved pronation and supination of the wrist. The patient continued with stationary bike type

exercises which involved hand peddling and upper extremity ergometer exercises for 10 minutes. Hand strengthening exercises were conducted with grip, finger pinch, and adduction pinches with putty. Further exercises involved increased resistive exercises with dumbbells and resistive bands with wrist flexion, extension, pronation, supination, and circumduction. At the conclusion of therapy, the patient reported pain levels of 1-3/10. Furthermore, the patient was able to increase her range of motion of the left wrist from 20 degrees of flexion back to baseline of 60 degrees of flexion, and from 5 degrees of extension to 50 degrees of extension.

In a retrospective review study by Wyatt (2006) in 15 patients who had undergone plantar fasciotomy, pain was still noted up to 9 months after surgery. Patients were provided low velocity and high amplitude mobilization to the joints affected, ankle and mid foot articulation, high velocity and low amplitude manipulation and stretching therapies of the plantar fascia. Additionally, the patients were instructed on use of a tennis ball as a central pivot point to do full ankle and foot range of motion exercise 3 times per day. Patients were seen once a week for up to 8 weeks. Patients were noted to have significant improvement with a 90% or more reduction in pain on a verbal rating scale, moderate improvement with 50-90% reduction, and suboptimal improvement with <50% reduction. Two patients experienced significant improvement after 2 visits. Two patients experienced significant improvement after 4 visits. Four patients experienced significant improvement after 6 visits. Three patients experienced significant improvement after 8 visits. Three patients experienced moderate improvement after 8 visits. One patient experienced no change in pain levels.

Guided Imagery and Relaxation Techniques

Effective in the management of postoperative pain is the power of patients' own ability to relax or dissociate themselves from their current painful situation thereby reducing anxiety as well (Friesner et al, 2005; Gonzales et al., 2010). Guided imagery has been described as a method that utilizes various audio or visual stimuli to aid patients in reduction of anxiety and/or pain (Gonzales et al., 2010).

Gonzales and colleagues (2010) conducted a randomized, single blind study on 44 same day surgical patients split into two groups. The experimental group utilized specially created audio recordings on compact disks (CD) that instructed patients in relaxation techniques prior to induction by anesthesia. The CDs contained positive suggestions not specified in the research article. The CDs used for the study were “Preparing for Your Surgery” and “General Anesthesia and Conscious Sedation: 2 CD Set of Music and Suggestions” by Michael R. Eslinger of Healthy Visions. Following the instructions, patients would listen to rhythmic music that they selected earlier while performing the relaxation techniques. The two patient groups in this study required equal amounts of narcotic analgesics, but the experimental group was noted to report lower visual analog scale pain scores 1 and 2 hours postoperatively, 28.68 versus 41.18 on hour 1, and 20.00 versus 34.72 on hour 2.

In a convenience study conducted by Friesner, Curry, and Modderman (2005), 40 patients who underwent chest tube (CT) removal were treated with either opioid analgesics alone or opioid analgesics plus relaxation breathing techniques (RBT). RBTs included slow inhalations through the nose while slowly exhaling through pursed lips. Five minutes prior to chest tube removal, the patients began RBTs. Subjects were encouraged to relax and focus. Opioids were administered 15 – 60 minutes prior to CT removal. Mean pain scores prior to CT removal on a Visual Analog Scale (VAS) were 5.05 for the treatment group and 5.04 for the control group. Pain scores rose to 6.57 for the treatment group and 8.61 for the control group immediately after the removal of the chest tube. Pain scores dropped to 3.07 versus 5.57 for the treatment group versus control group 15 minutes after chest tube removal. Friesner and colleagues concluded that opioids alone were not sufficient to control pain during any point of the chest tube removal procedure. There was no significant difference in quantity of opioids required by the two groups.

Ice Therapy

Ice or cooling materials have been shown to reduce pain intensity in postoperative patients (Cheing, Wan, & Lo, 2005; Chou & Liu, 2008; Navvabi, Abedian, & Steen-Greaves, 2009). In a single blinded, randomized control study by Cheing, Wan, and Lo (2005), 83 subjects who sustained distal radius fractures were randomly assigned to three different groups. The patients initially underwent closed reduction with subsequent immobilization of their fractures in plaster of Paris casts. Therapies were initiated at 6 weeks following cast removal and included ice plus pulsed electromagnetic field, ice plus sham pulsed electromagnetic field, pulsed electromagnetic field treatment, or sham pulsed electromagnetic field treatments once daily for 5 consecutive days. Pulsed electromagnetic therapy is the “application of external electrical or mechanical energy to the area of injury” (Cheing et al., 2005, p. 37). The pulsed electromagnetic field system delivered the electromagnetic field at a rate of 50 Hz with an intensity of 99 gauss for 30 minutes to the wrist and hand of the affected extremity. Subjects receiving ice packs had ice packs placed on the affected distal forearm down to the fingers for 30 minutes. Utilizing a visual analogue scale to measure pain, ice plus pulsed electromagnetic field treatments was found to be most effective in reducing pain and post immobilization swelling versus ice or magnetic field treatments alone. No narcotics were used in these patients.

Orthognathic surgery is defined by Chou and Liu (2008) as jaw surgery used to correct jaw position and deformity. A quasi-experimental study on 48 patients status post orthognathic surgery, separated the population into two groups, reporting that moist cryotherapy versus dry cryotherapy has a higher degree of reduction in tissue swelling, reduction of heat to tissue, and reduction in pain sensation. A 10 point visual analog pain scale was used. Patients were divided into the moist versus dry therapy groups based on the hospital ward placement. Moist cryotherapy was described as using a 100% cotton towel soaked in an ice bath and dry cryotherapy was described as using ice cubes contained in plastic bags (Chou & Liu, 2008). Chou and Liu (2008) indicate that by placing a cold substance near the affected

surgical site, pain relief and swelling is reduced, along with muscle spasms. The therapies all applied to the patients jaw for 30 minutes at a time with a ten minute break over the course of the first 48 post operative hours. The mean pain scores of the moist cryotherapy group were 4.03 at 24 hours after surgery and 3.29 at 48 hours after surgery. The mean pain scores of the dry cryotherapy group were 4.53 at 24 hours after surgery and 5.07 at 48 hours after surgery. Use of analgesics was not mentioned or indicated in the research.

Navvabi, Abedian, and Steen-Greaves (2009) conducted a randomized control trial with 110 primiparous women following episiotomies regarding pain relief using standard pain relief methods (oral acetaminophen) without use of localized cooling versus the addition of localized cooling treatments. Localized cooling treatments included the use of ice packs and a cooling gel pad. No further descriptions were provided of the exact type of ice pack used. No specific cooling gel pad was listed. The women were divided into three groups, analgesics only (36 patients), analgesics and cooling gel pad (35 patients), and analgesics and ice pack (35 patients). The treatment options were administered to the women in the various groups at 4 hours after episiotomy repair and as needed per the patients discretion at home. Women were noted to experience less pain, improved wound healing, and less usage of analgesics, and higher satisfaction with treatment from those who used cooling gel pads versus ice packs. The gel pad group used a mean number of 8.33 tablets of acetaminophen, ice pack group used 12.84 tablets, and the analgesics only group used 17.22 tablets in a 10 day period. Using a 10 point numeric rating scale, the mean pain scores of the gel pad group on day 1, 2, and 5 respectively were 4.07, 2.97, and 2.8. The ice pack group mean pain scores on the same days were 3.84, 3.83, and 3.17. The analgesics only mean scores were 4.42, 4.36, and 3.83. Temperature variables between the two cooling treatments were not noted.

A randomized controlled trial was conducted by Shin and associates (2009) to determine if cryotherapy is an effective treatment for pain, eyelid edema, and facial ecchymosis following surgical

craniotomy. Ninety-seven Korean patients were randomly assigned to either a control group of 48 patients or an experimental group of 49. Cryotherapy was provided by using a 9 inch round shaped ice bag that was filled 2/3 full of ice chips with the remaining air removed and cold gel packs. Ice bags were applied to the surgical wound with the patients maintaining their head with 30 degrees of elevation while lying in a supine position. The gel pack, which is in the shape of glasses, was attached with Velcro to the periorbital area. Application of ice packs and gel pads with the experimental group lasted 3 days for 20 minutes per hourly session starting 3 hours postoperatively with no application from 10P.M. – 7A.M. Patients or their caregivers were given instructions on how to apply the cold applications and would self apply the ice bags and gel pads. Pain was measured on a 100mm Visual Analog Scale. Mean pain scores for the cryotherapy group and the control group 3 hours post op were similar at 57.9 and 58.7 respectively. Mean pain scores reported in the study at day 3 indicated lower pain scores for the experimental group at 17.6 versus 26.5 for the control group. No specific analgesics are listed, but the experimental groups mean usage was 70.8 micrograms of opioids and 70.9mg of NSAIDs versus 110 micrograms of opioids and 84.2mg of NSAIDs. Furthermore, it was noted that the experimental group had less ecchymosis and facial edema.

Forty patients who underwent thoracotomy with chest tube placement were subjects of a randomized, single blind study by Kol and colleagues (2010) regarding the use of ice to control pain from chest tube irritation. Both groups were given diclophenac 75mg IM daily and tramadol 30mg intravenously. Frequency of the tramadol was not provided. Silica gel cooling pads were utilized to provide the cooling in this study and stored at -12.2 to -9.4 degrees Celsius. The gel cooling pads were applied to the experimental group at the chest tube insertion site for twenty minutes at scheduled intervals of 24, 28, 36, and 40 hours postoperatively. The gel pad group was noted to require significantly less analgesics on the second and third post operative day. The control group required 375mg of diclophenac

and 270mg of tramadol on the second day. The experimental group required 75mg of diclophenac and 90mg tramadol and had lower reported pain scores.

Insurance Coverage of Alternative Treatments

Access to alternative therapies can be cost prohibitive and may be dependent on insurance coverage, financial, or physical ability to obtain the additional adjunct therapies. Cleary-Guida and colleagues (2001) surveyed 43 major insurance companies in New York, New Jersey, and Connecticut via telephone to determine insurance coverage of adjunctive therapies. Chiropractic therapy has been noted to be covered by nearly all insurance. Massage therapy had less coverage with 16/43 companies and was usually covered during physical therapy. Additional therapies; ice therapy, guided imagery, and massage therapy performed by the patient, a loved one, or caregiver are estimated to be minimal in cost and easy to access.

Patient Education Methods

The educational needs of patients are dependent on the patients' own ability to identify the severity of their pain, and their level of understanding about pain management options (Kastanias, 2009). Studies have shown that patients experiencing pain have been found to achieve greater pain control when provided with detailed and empowering information regarding pain management options, use of analgesics, use of nonpharmacological interventions, how to self assess and document pain intensity, and strategies to improve communication between the health care provider and the patient (Kastanias et al., 2009; Reynolds, 2009; Sauaia et al., 2005; Soler et al., 2010; Tasso et al., 2004; Watt-Watson, 2004). Providers must be able to provide information in an efficient and timely manner as time limits of office visits can be constricting. Patients should have the ability to refer back to this information as needed, independently, and on their own timeframe that is convenient to them. As such, it has been identified that providing patients with written material regarding pain management issues can be an effective way in educating patients (Watt-Watson et al, 2004).

Kastanias and colleagues (2009) conducted a descriptive quantitative and qualitative study via telephone survey of 150 postoperative patients within 72 hours of discharge to identify the types of information needed by preoperative adult patients regarding pain and pain management. It was found that patients were most interested in information regarding pain management, discussion of their pain management plan, particularly the use of pain medications, and what types of pain or the duration of pain that could be expected. Furthermore, a correlation was found with patients who had long standing chronic pain prior to surgery with wanting more information on how to manage pain in addition to using pain medications. Therefore, patients have multiple pain education needs that can and should be addressed prior to surgery to provide them with a better quality of life during the recuperation phase.

Soler and colleagues (2010) conducted a longitudinal, prospective, and observational design study over 3 months post discharge evaluating 83 post surgical and medical patients' perception of the effectiveness of discharge instructions, the need for continuity of care post hospital discharge, and the presence of pain post discharge. Forty-eight of these patients underwent orthopedic, trauma, and vascular surgery. One reported finding was that patients were satisfied with discharge education up to 24 hours after discharge. However, one-third of the study participants began to express doubts regarding the management of their health, which included pain and mobility after the first 24 hours. These doubts plateaued in 55% of the sample at 1 month. It was noted that half of the patients with doubts waited a full week before seeking further medical care. Furthermore, Soler and colleagues (2010) found that around 50% of the surgical patients still experienced pain up to 3 months after discharge and concluded that patients need adequate control of pain both during hospitalization and post discharge. Additionally, they concluded that written education on pain management is also needed and should be provided to both patients and their caregivers or family members.

In a randomized controlled trial study on pain management education by Watt-Watson and colleagues (2004), 406 patients were divided into a control group and an experimental group, after

undergoing coronary artery bypass grafting (CABG), and patients were provided additional education via a booklet. The booklet contained additional information on pain relief and prevention of complications, methods for communicating pain, and pharmacologic and nonpharmacological pain management. It was found that the patients with additional education had less interference from pain with their daily activities, however, no difference in pain levels were noted. Furthermore, eighty-two percent of the patients who received the booklet found it helpful, more so by women than men.

A prospective cohort study was reported with postoperative pain management in the elderly across 8 urban hospitals utilizing 322 postsurgical patients aged 65 or older by Sauaia and colleagues (2005). Patients surveyed 24-48 hours postoperatively were found to have higher satisfaction with pain management when they were provided with large amounts of educational information preoperatively. However, when surveyed, patients reported having higher pain levels while hospitalized versus what was documented in their medical records. Additionally, patients were not able to recall all of the preoperative information provided regarding pain education and nonpharmacological treatments. Patient education was discussed with the patients; however, there was no mention of providing patients with written pain management information.

In a convenience sampling study of 137 medical, orthopedic, and oncology patients conducted by Tasso and Behar-Horenstein (2004), a semi-structured questionnaire was utilized to determine patients' perceptions of their pain level, use of nonpharmacological and pharmacological pain treatments, and overall satisfaction with their pain management regime. Seventy-seven percent of the patients expected pharmacological treatment as the method of choice for pain control. Nonpharmacological pain management options were also offered, but used by only one-third of the patients. The top three nonpharmacological pain management therapies used by the patients was distraction, such as watching television or reading, physical therapy, which ranked second, and use of cold packs which ranked third. Tasso and Behar-Horenstein (2004) concluded that providers should educate themselves on the available

options of complementary alternative medicine (CAM) therapies to better care for and educate their patients.

Limitations of the Literature Review

The research studies on nonpharmacological therapies were based on and limited to immediate postoperative patients. Analgesics were still used as the main therapy for treating pain and it is uncertain as to the extent the medications contributed to the reduction of pain levels. Not all studies included specific details on the use or consumption of analgesics by the patients. Follow up in post hospital discharge settings regarding the continued use of the adjunctive therapies listed above were not done or noted in the research studies on the research subjects. No therapy was actually specifically presented for patients to use in the home setting postoperatively except for some exercises by chiropractic therapy in case studies with very few patients. Furthermore, these chiropractic therapies described have not been in the immediate postoperative setting.

Implications for Practice

As nurse practitioners (NP), the embodiment of holistic care and focus on preemptive education can be thought of as a separating factor from care provided by other health care providers. As such, patients can turn to NPs for guidance and information to help them be better prepared to maintain and augment their health and quality of life. Therefore it is imperative that NPs be knowledgeable in more than just the use of medications for treating their patients.

As noted above, pain cannot always be controlled with pain medications. Pain can affect healing and quality of life. Therefore, NPs should have as many tools in their toolbox as possible to provide better care and information to their patients who will be undergoing surgical procedures. It is important for patients to receive adequate amounts of information preoperatively so as to enable them to better prepare for the forthcoming postoperative recovery period. As noted above, the use of preprinted informational booklets or pamphlets on pain management are efficient and helpful for patients and their family

members as reference tools. Additionally, during the postoperative office visit, patients and/or family members should be encouraged by the NP to be open with their care providers if pain medications are ineffective and also what alternative pain therapies have or have not been effective so that further interventions can be explored. Additionally, at both the preoperative and postoperative office visit, emphasis should be placed that pain medications are not always the only answer to pain relief.

Patient perception may be an impediment in implementing use of nonpharmacological pain management therapies as a primary and/or adjunctive therapy. As mentioned earlier, pain medications have been accepted as a staple for pain management. Patients may view use of ice, music, guided imagery or massage to be not worth trying, may not be quick enough to alleviate pain, or not have long lasting pain control effects. Thus, they may request stronger analgesics or more frequent use of analgesics. Additional research is needed to clarify and broaden the scope of information on nonpharmacological therapies. Utilizing broader and larger patient populations will help to enable the generalization or the specificity of these therapies. Furthermore, research is needed that focuses on the transition period post discharge from hospital and the time period during the length of recovery. Additionally, it may be important to identify if it would be beneficial to include topics of nonpharmacological pain therapies in the university setting when NP students are developing their knowledge base.

Conclusion

In conclusion, NPs and other primary care providers are important and vital resources for patients to gain necessary information pertaining to their health. As pain management can be difficult to manage, having options available to educate patients is important. Adjunctive or nonpharmacological therapies for the treatment of pain has been shown to be potentially helpful through the use ice therapy, guided imagery, massage therapy, chiropractic therapy, and music therapy. It is important for care providers to assess the needs of their patients and their understanding of pain management prior to surgical procedures. Written information has been found to be efficient and effective methods of conveying

information to patients. Such information includes but is not limited to topics on pain management plans, use of pharmacologic and nonpharmacological methods for controlling pain, how to describe pain, and when to communicate with the care provider about pain issues. Methods of nonpharmacological pain control have been discussed and potentially may assist in patients' ability to carry on daily activities and reduce pain alone or in conjunction with pain medications. A summary of applicable interventions that can be taught to patients can be found in the appendix. Furthermore, follow up with patients should be conducted to ensure that there is adequate pain control, not only postoperatively, but post discharge. The challenge for NPs is to incorporate nonpharmacological interventions into patient teaching. Additionally, research should be conducted with larger patient populations and various other surgical procedures to gauge effectiveness of these interventions generally.

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Appendix

Recommendations: Postoperative Nonpharmacological Pain Management Interventions

- Information should be provided preoperatively.
- Please note these therapies can be provided with or without the use of oral analgesics.
- Written information on the variety of pharmacological and nonpharmacological pain management interventions may improve patient retention and utilization of information and satisfaction.
- Therapies may be performed by the patient when possible or by a loved one or caregiver.

Music Therapy

- Start music shortly in the postoperative setting.
- Allow patients to choose music preference.
- Utilize music that is soothing, non-lyrical, and plays at 60-80 beats per minute.
- Patients should listen to music for at least 20 minute intervals at least every 2 hours.

Massage Therapy

- Begin shortly in the postoperative setting.
 - Do not massage surgical incision areas.
 - Use massage oils when possible to reduce friction.
 - Apply massage to hands and feet for at least 5 minutes utilizing a circular motion over the palm, fingers, and outer hand surface. Apply firmer pressure to the soles of the feet in an up and down motion utilizing the massager's knuckles.
 - Apply massage to lower back working way up to cervical spine and scapular region for at least 10 minutes.
 - Apply gentle stroking pressure and increase to firmer, deeper pressure on the muscles and tissue as tolerated by patient.
-

Chiropractic Therapy

- Utilize chiropractors in the outpatient setting shortly after discharge primarily for neuromuscular or musculoskeletal pain issues.
- Utilize light weight and heavy weight muscle strengthening exercises.
- Utilize active and passive range of motion joint exercises.
- May take multiple treatments over the course of days to weeks.

Guided Imagery and Relaxation Techniques

- Begin shortly in the postoperative setting.
- Relax lips, jaw, and tongue.
- Perform slow inhalations through the nose and exhalation via pursed lip breathing.
- Focus on positive outcomes versus pain.
- Listen to relaxing music.
- Provider may need to invest in specialty guided imagery CDs or DVDs

Ice or Cryotherapy

- Begin shortly after surgery.
- May use ice packs or cooling gel pads.
- Moistened ice packs may provide better pain relief versus dry ice packs.
 - To moisten ice pack, wrap ice pack in towel that has been dipped into ice water.
Lightly wring out the excess water.
- Apply ice on or near surgical site for 20-30 minutes per session hourly while awake.