AN INTEGRATIVE PROCESS: ACUPRESSURE TO PREVENT AND TREAT POSTOPERATIVE NAUSEA AND VOMITING IN PATIENTS UNDERGOING ABDOMINAL SURGERY

by

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DEDICATION

I would like to dedicate this scholarly project to my husband, Matthew Kinsler, and daughter, Clover Kinsler, who have supported me wholeheartedly through the tireless hours devoted to research and writing. To Matt; I would not have made it this far without your emotional support, home-cooked meals, and ear to hear my frustrations and excitement throughout this process. To Clover; I thrived from your free spirit to quell my stress in hard times and, even though this process took some of my time with you, I hope that I set an example for you that working hard for something you are passionate about is always worth it. I love you both more than anything and I am forever grateful to your sacrifices, which helped me to succeed.

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ABSTRACT

Problem Statement: Postoperative nausea and vomiting (PONV) continues to be problematic for surgical patients despite use of new-generation antiemetics. Purpose: This project was designed to bridge a knowledge gap for nursing staff by providing education on the implementation of acupressure at P6, assisting them in implementing this intervention, and analyzing the results. Methods: A survey of surgical nurses revealed an interest and lack of knowledge in acupressure implementation. Education for nurses was provided on the use of acupressure at P6 to prevent PONV. The implementation of acupressure by nursing staff was then assessed with a pilot study using a non-blinded, randomized controlled design. Jean Watson's Human Caring Theory and the Integrative Healthcare principles served as theoretical foundations for this project.

Surgical patients undergoing abdominal surgery at risk for PONV were randomized to either the acupressure treatment group (acupressure and routine antiemetics) or control group (routine antiemetics only). Nausea and vomiting were rated using the PONV intensity scale and a Verbal-Rating scale. Nurse and patient attitudes toward holistic health and complementary and alternative healthcare were assessed, as well as patient perceptions of nurses' level of caring using the Caring Factor Scale. Analysis: Statistical analysis included Welch's two-sample t-test, Wilcoxson's Rank Sum Test, repeated measures ANOVA, and descriptive statistics. Results: Participants who received acupressure experienced less PONV, but this was not statistically significant. Those who received acupressure required more antiemetic medications, which marginally increased their healthcare cost. Participants who received acupressure had a significant improvement in CAM attitudes, but there were no differences in how patients perceived the level of care from nursing staff between groups. Significance**:** The results of this study provide evidence for the feasibility of nurse-implemented acupressure for PONV, and clinically significant data to promote use of acupressure at P6 to prevent and treat PONV. Future qualitative research regarding patient and nurse experiences with acupressure would add to the already extensive quantitative data available.

INTRODUCTION

Background

Despite prophylactic, new-generation antiemetic use, it is estimated that 50% of surgical patients will experience postoperative nausea and 30% will experience postoperative vomiting (Apfel, et al., 2004; Gan, et al., 2014). In high-risk patients, the incidence of postoperative nausea and vomiting (PONV) can be as high as 80% (Apfel, et al., 2004; Gan, et al., 2014). One of the most common fears of individuals undergoing surgery is the nauseating effects of anesthesia. Importantly, patients often report more discomfort with PONV than with postoperative pain (Ezzo, Streitberger, & Schneider, 2006). Unresolved PONV can result in prolonged PACU and hospital stays that result in a significant increase in healthcare costs (Gan, et al., 2014; Shibli, 2013). Several hundreds of millions of dollars are spent annually in the US on PONV and related complications (Apfel, et al., 2012). Additionally, PONV is associated with worsened postoperative quality of life, where those with PONV rated quality of recovery at 49% vs. those without PONV at 94% (Parra-Sanchez, et al., 2012).

Problem Statement

Postoperative nausea and vomiting decrease patient comfort and satisfaction and may cause dehydration, electrolyte imbalances, aspiration, bleeding, suture dehiscence, and esophageal rupture (Apfel, et al., 2012). There are many antiemetics available to prevent and treat PONV, but they also put patients at risk for adverse effects that range from QT-prolongation, cardiac arrhythmias, sedation, extrapyramidal symptoms,

dyskinesia, dry mouth, visual disturbances, and increased risk of postoperative infection (Gan, et al., 2014). Postoperative nausea and vomiting also increase nursing staff workload because a considerable amount of time is spent supporting these patients, assessing and treating their symptoms, and cleaning up after emetic episodes (Hewitt & Watts, 2009).

To promote patient-centered care, the implementation of a noninvasive, safe, evidence-based intervention, such as acupressure, could be offered to all eligible patients, especially those at highest risk of experiencing PONV. Surgical patients are at risk for many adverse affects and complications, such as PONV, due to their exposure to chemical stimuli and painful procedures. Acupressure is known to be nearly free of side effects, although mild skin redness and irritation have been reported. This paper will focus on PONV in surgical patients and the role of acupressure stimulation at P6 with Sea-band® wristbands as an integrative intervention to prevent and treat PONV in conjunction with allopathic treatments.

The community hospital serving as the site of this scholarly project has a nursing protocol in place for the use of acupressure to treat nausea and vomiting. Nurses have expressed interest in implementing this intervention but have not done so because of a lack of education related to the acupressure protocol, which reveals a gap in knowledge.

Purpose of the Project

This project was designed to bridge a knowledge gap for nursing staff by providing education on the implementation of acupressure at P6, assisting them in

implementing this intervention, and analyzing the results. The data obtained from this scholarly project will be used to evaluate patient outcomes that resulted from the implementation of this intervention and further educate the nursing staff about the acupressure intervention. This project was inspired by the importance of best practice for patients and assisting nurses in this endeavor. The following clinical questions provided direction for this project.

Clinical Questions

- *Do surgical nursing staff perceive a benefit from acupressure education to prevent and treat postoperative nausea and vomiting for their patients?*
- *Did nursing staff show a knowledge increase from the acupressure for PONV seminar?*
- *How do surgical nurses perceive holistic health and complementary and alternative therapies?*
- *In patients undergoing abdominal surgery, does acupressure at P6, compared to routine care, decrease postoperative nausea and vomiting, antiemetic use, and the cost of care?*
- *Does acupressure, compared to routine care, affect how patients undergoing abdominal surgery perceive holistic health and complementary and alternative therapies?*
- *Does acupressure, compared to routine care, affect how patients undergoing abdominal surgery perceive how they were cared for by nursing staff?*

REVIEW OF LITERATURE

This literature review will address factors involved in determining a patient's risk of developing PONV, the pathophysiological understanding of nausea and vomiting, and the physiology of how acupressure affects the body. Acupressure, its origins from Traditional Chinese Medicine (TCM), and current evidence supporting the use of acupressure at P6 to prevent PONV will be discussed. Finally, cost considerations, the Integrative Healthcare model, and the theoretical foundation of this scholarly project will be presented.

PONV Risk Assessment

The use of a simplified risk score to assess patient risk for postoperative nausea and vomiting is suggested as a pre-anesthesia standard. One such score, developed by Apfel and colleagues (1999), provides a rational basis to determine who would benefit from prophylactic antiemetic therapy (see Figure 1). The Consensus Guideline for the Management of Postoperative Nausea and Vomiting (Gan, et al., 2014) suggests that the strongest anesthesia-related risk is the use of volatile anesthetics, followed by duration of anesthesia, postoperative opioid use, and nitrous oxide use. Type of surgery was also identified as a factor that increased risk of PONV, which included cholecystectomy, gynecological surgery, laparoscopic approach, and abdominal surgeries in general (Gan, et al., 2014). In addition, patients can have independent risk factors for developing PONV. These include (in order of strongest patient-specific predictor) female gender,

history of PONV, nonsmoking status, history of motion sickness, and age younger than 50 years (Gan, et al., 2014).

The consensus guideline recommends that, after assessing a patient's risk factors, the provider should consider cost, patient preferences, and reducing patient's baseline risk (Gan, et al., 2014). In patients with medium risk, one to two interventions should be used prophylactically. In those at high risk, more than two interventions should be implemented prophylactically in a multimodal approach (Gan, et al., 2014). The only nonpharmacological intervention included in the algorithm for management of postoperative nausea and vomiting is acupuncture, or stimulation of the acupoint P6 (Gan, et al., 2014).

Risk Factors	Points
Female Gender	1
Non-Smoker	1
History of PONV	1
Postoperative Opioids	1
Sum =	0 ... 4

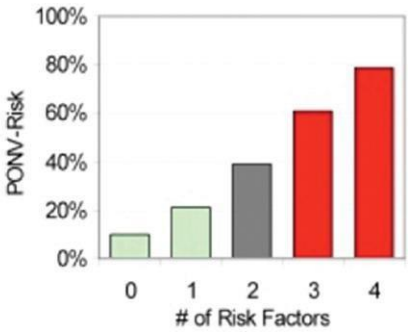


Figure 1. Apfel's Simplified PONV Risk Score (Gan, et al., 2014).

Pathophysiology of Nausea and Vomiting

Vomiting is mediated by afferent enervation, humoral factors, and somatic visceral musculature, which are coordinated by the emetic center in the medulla (Rhodes & McDaniel, 2001). Afferent impulses are created from four areas: cerebrocortical pathways, stimulated by learned associations; the chemoreceptor trigger zone (CTZ),

which is sensitive to chemical stimuli from cerebrospinal fluid and blood; the vestibular pathway, which is related to motion sickness; and the peripheral pathway stimulated by neurotransmitter receptors in the GI tract through the vagus nerve, which communicates with the emetic center (Rhodes & McDaniel, 2001). The CTZ is connected to the vomiting center by the fasciculus solitaries, which has abundant muscarinic, cholinergic, histaminic, and enkephalin receptors (Nunley, Watkim, & Guinn, 2008). Efferent signals are sent out to the salivary center, respiratory center, and the abdominal muscles, which coordinate to produce vomiting (Rhodes & McDaniel, 2001).

The emetic reflex is an autonomous defense in response to eliminating noxious agents (Kovac, 2004). There are many ways the emetic reflex can be triggered (see Figure 2), but in regards to surgery, the CTZ is stimulated by volatile anesthetics, nitrous oxide, and postoperative opioids circulating in the blood (Gan, et al., 2014; Kovac, 2004). Furthermore, mechanical stimulation from surgical interventions involving visceral organs, small intestine, and stomach stimulate the visceral afferents (vagus nerve, trigeminus nerve, and splanchnic nerves), which invoke nausea and emesis (Kovac, 2004).

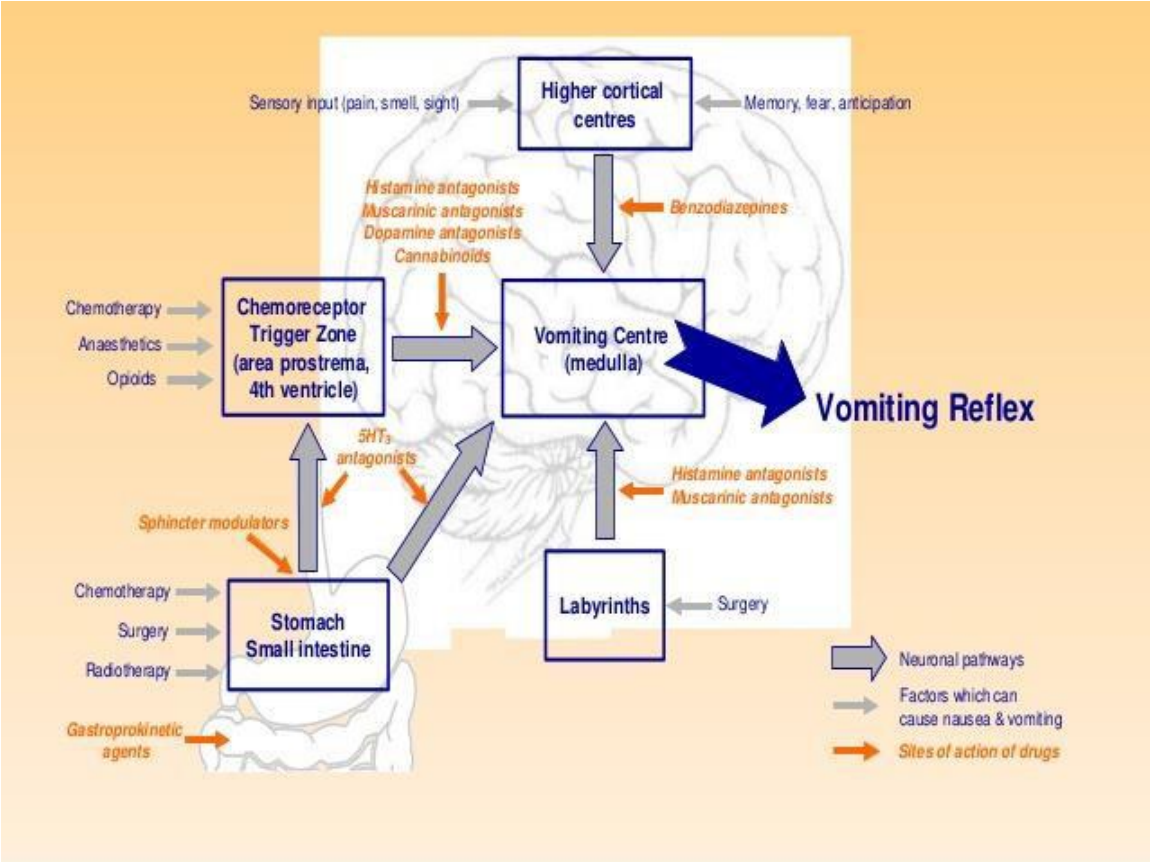


Figure 2. Factors Causing Nausea & Vomiting, Neuronal Pathways, and Sites of Drug Action. Retrieved from http://www.slideshare.net/raghuprasada/class-antiemetics-3

Physiology of Acupressure

Research suggests that acupressure prevents and reduces PONV through β-endorphins released in the cerebrospinal fluid or activation of serotonergic and noradrenergic fibers that release serotonin (Nunley, Watkim, & Guinn, 2008). During acupressure, afferent type I and II nerve fibers are stimulated, sending impulses to the spinal cord, resulting in a release of endorphins that block CTZ signals (Nunley, Watkim, & Guinn, 2008). Acupressure stimulates the midbrain to release encephalin, which stimulates the release of neurotransmitters, serotonin and epinephrine, and the pituitary

gland to excrete β-endorphins and adrenocorticotropic hormone into the bloodstream (Nunley, Watkim, & Guinn, 2008). This series of responses to acupressure restores the body's energy flow and calms the upper GI tract, decreasing PONV (Nunley, Watkim, & Guinn, 2008). The same action occurs when used as a preventative measure preoperatively.

Acupuncture and Acupressure

Acupuncture and acupressure originate from the practice of TCM, which has been practiced for thousands of years. Their use is based on the idea that life energy (Qi) flows throughout the body and organs through precise channels known as meridians (Cheung, Li, & Wong, 2001). The body is thought of as a system where everything is interconnected and, when there is a disruption of Qi, this causes an imbalance that leads to illness and disease (Abraham, 2008). Treatment to restore the flow of Qi focuses on stimulating specific points (acupoints) that are located all over the body on the skin surface (Birch & Felt, 1999). These acupoints are connected to meridians (see figure 3) that lead to organs and, once stimulated, result in homeostasis (Abraham, 2008). Acupoint selection depends on the patient's clinical diagnosis. Acupoint stimulation has been associated with controlling blood pressure, angina, pain, and nausea and vomiting (White & Ernst, 1999).

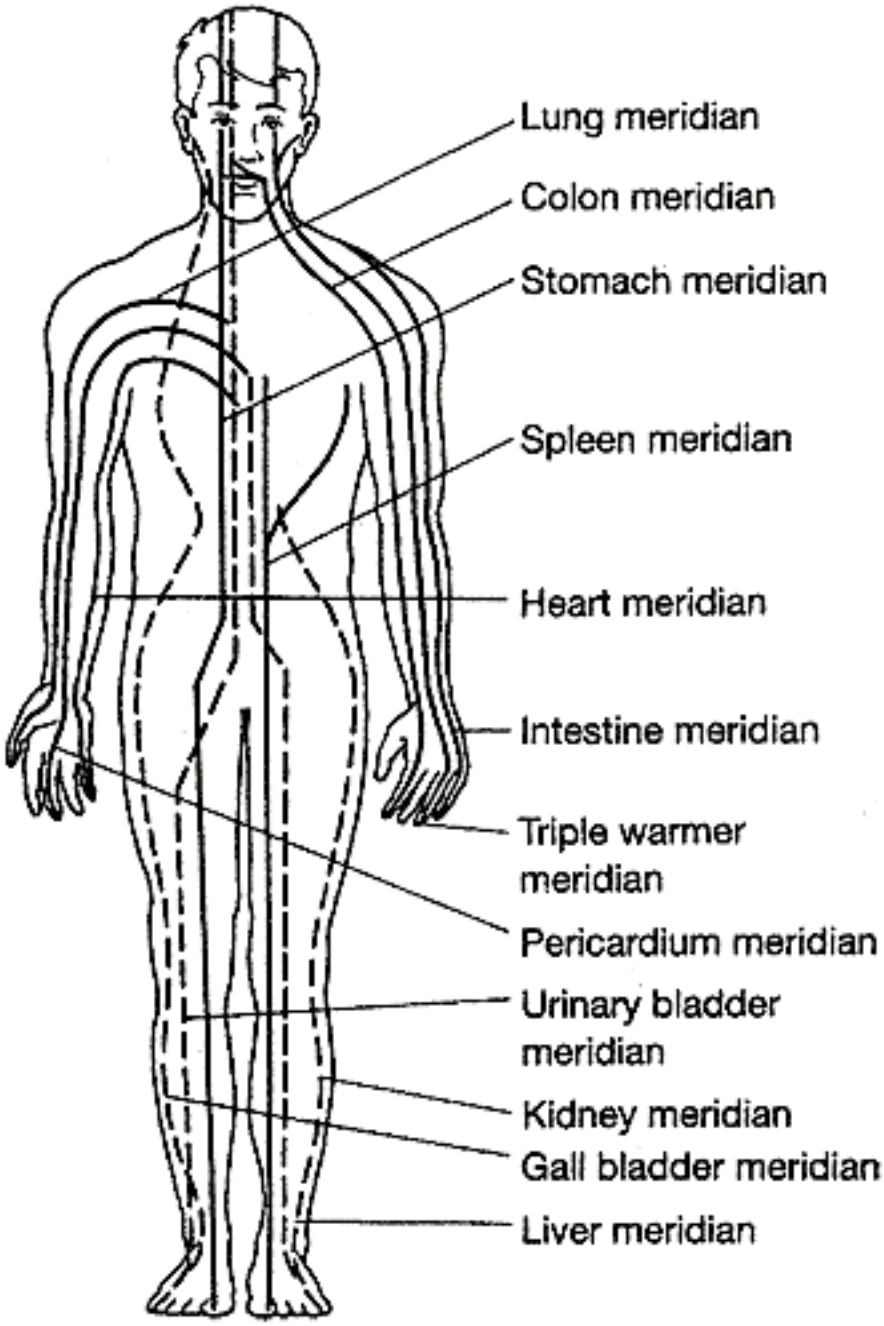


Figure 3. Meridian Pathways in the Body. Retrieved from http://www.urbanacupuncturecenter.org/what-is-acupuncture/

Acupressure at P6 and PONV

The interest in acupoint P6 first began in 1986 when an anesthesiologist, Dundee, reported his findings to the British Medical Journal that he had successfully used P6 to prevent postoperative nausea and vomiting (Ezzo, Streitberger, & Schneider, 2006). Since this first discovery, there has been a wealth of clinical trials with thousands of participants. The most recent Cochrane Review covers 59 trials involving over 7,000 participants (Lee, Chan, & Fan, 2015). This systematic review provided an update to knowledge that stimulation of acupoint P6 has equal efficacy to antiemetics, and more trials are needed to determine effects of P6 stimulation used in conjunction with antiemetics. A moderate quality rating was given to the evidence for the conclusion that P6 stimulation is comparable to antiemetics in preventing PONV (Lee, Chan, & Fan, 2015). The past 30 years have yielded many randomized controlled trials (RCTs), systematic reviews, and meta-analyses. This section will explore the additional evidence gained since Dundee's first discovery.

Systematic Reviews

In addition to the previously mentioned systematic review by Lee, Chan, & Fan (2015), two other systematic reviews were found to suggest the effectiveness of P6 acupoint stimulation for preventing PONV; one by Holmér Pettersson & Wengström (2012) and another by Cheong, Zhang, Huang, & Zhang (2013).

In the first review, Holmér Pettersson & Wengström (2012) looked at seven studies that included use of acupressure by transcutaneous electric stimulation,

acupressure using a non-invasive stimulation by wristband, and acupuncture. Three of the studies scored Level 1, the highest level of evidence; one was a Cochrane review and two were meta-analyses. Two found that stimulation of the P6 acupoint was superior to placebo in preventing PONV and the other found that acupuncture-point stimulation is just as effective in reducing PONV as medication. Two RCTs in this review showed no difference in acupuncture treatment from placebo, and the other two studies provided a significant reduction in PONV with acupuncture-point stimulation. The authors suggested that antiemetic acupuncture seems to be effective only when administered before induction of general anesthesia. This review concluded that all forms of acupoint stimulation at P6, invasive and noninvasive, prevent PONV with minimal side effects (Holmér Pettersson & Wengström, 2012).

The second review conducted by Cheong, Zhang, Huang, & Zhang (2013) was a systematic review and meta-analysis on 30 RCTs, 16 of which were specific to only P6. Of the 16, four showed high-quality evidence, nine showed moderate-quality evidence, and three demonstrated low-quality evidence. Meta-analysis revealed that P6 acupuncture, acupressure, and electro-acupoint stimulation significantly reduced PONV. There were mixed results on timing of acupoint stimulation, but a general consensus suggests earlier stimulation, within 0-6 hours postoperatively, provides greater prevention of PONV. The technique used with acupressure wristbands was reported as 30 seconds to 1 minute of stimulation of the “bead” imbedded in the acupressure band. Although safe and noninvasive, side effects from acupressure bands included redness, swelling, tenderness, and paresthesia in the hands. Studies in this review concluded that, although

unilateral and bilateral application of acupoint stimulation have similar results for preventing PONV, bilateral application had a more consistent, complete response (Cheong, Zhang, Huang, & Zhang, 2013). The systematic reviews mentioned above provide evidence for high-quality studies showing significant reduction in PONV with acupoint P6 stimulation, concluding that all forms of stimulation, including acupressure, decrease PONV, are comparable to antiemetics, and are generally safe and side-effect free.

Individual Trials

Additional review of available evidence yielded 18 double-blind RCTs and one quasi-experimental study over the past 16 years.

Type of Acustimulation. Of these trials, five used an unspecified acupressure band (Hoffman, Murray, & Beck, 2013; Gilbert, et al., 2015; Agarwal, Pathak, & Gaur, 2000; Agarwal, et al., 2002; Soltani, et al., 2011), seven used Sea-band® acupressure bands (Cooke, et al., 2015; Klein, et al., 2004; Schultz, Andrews, Goran, Mathew, & Sturdevant, 2003; Alkaissi, Evertsson, Johnsson, Ofenbartl, & Kalman, 2002; Turgut, et al., 2007; Nilson, et al., 2015; Kwon, Shin, & Juon, 2016), one used Pressure Right® acupressure bands (White, et al., 2012), two used Relief band®, an electrical acustimulation band (Coloma, et al., 2002; Ertas, et al., 2015), one used the Seoam Press Pellets #6 by Koryo (Kuam Co., Ltd.) acupressure beads (Hofmann, Murray, Beck, & Homann, 2016), and three studies used transcutaneous stimulation devices not worn by the patient (Kim, Kim, Lee, Shim, & Yoon, 2011; Carr, Johnson, Kenaan, & Welton,

2015; Yang, et al., 2015).

Surgical Procedures. These trials included six studies of patients undergoing laparoscopic hysterectomy or cholecystectomy (Coloma, et al., 2002; White, et al., 2012; Kim, Kim, Lee, Shim, & Yoon, 2011; Carr, Johnson, Kenaan, & Welton, 2015; Ertas, et al., 2015; Agarwal, et al., 2002), two with cardiac patients (Cooke, et al., 2015; Klein, et al., 2004), four with gynecological procedures (Turgut, et al., 2007; Schultz, Andrews, Goran, Mathew, & Sturdevant, 2003; Alkaissi, Evertsson, Johnsson, Ofenbartl, & Kalman, 2002; Yang et al., 2015), three did not specify what surgeries the participants underwent (Hoffman, Murray, & Beck, 2013; Gilbert, et al., 2015; Hofmann, Murray, Beck, & Homann, 2016), one study looked at strabismus surgeries (Soltani, et al., 2011), one looked at craniotomies (Nilson, et al., 2015), one examined thyroidectomies (Kwon, Shin, & Juon, 2016), and one investigated endoscopic urological procedures (Agarwal, Pathak, & Gaur, 2000). Seven of the 19 studies enrolled only female participants (Kim, Kim, Lee, Shim, & Yoon, 2011; Carr, Johnson, Kenaan, & Welton, 2015; Ertas, et al., 2015; Schultz, Andrews, Goran, Mathew, & Sturdevant, 2003; Alkaissi, Evertsson, Johnsson, Ofenbartl, & Kalman, 2002; Turgut, et al., 2007; Kwon, Shin, & Juon, 2016).

Results. Five studies compared acupressure to antiemetic drugs, and the remaining 14 compared acupressure to sham. Of the five comparing acustimulation to antiemetic drugs, two concluded that acupressure at P6 is equally effective as ondansetron in preventing PONV (Agarwal, et al., 2002; Soltani, et al., 2011), one study provided that, when used with ondansetron, the effects are greater than with either

acupoint stimulation or ondansetron alone (Coloma, et al., 2002), and one study displayed a significant difference in PONV when comparing dexamethasone with acustimulation to dexamethasone alone (Yang et al., 2015). When compared with metoclopramide, acupoint stimulation was more effective in preventing PONV (Soltani, et al., 2011). One study comparing acupressure bands to droperidol found no significant difference between groups, but stated that all the women who had the acupressure bands were more nauseated before surgery and used more opioids after surgery. The difference in pre-surgical risk factors and post-surgical opioid consumption exhibited groups in the study were not homogeneous and suggested a type II error (Schultz, Andrews, Goran, Mathew, & Sturdevant, 2003).

In the 14 studies comparing acupoint stimulation at P6 to sham, eight studies concluded that acupoint stimulation at P6 significantly decreased PONV compared to sham treatment (Turgut, et al., 2007; Alkaissi, Evertsson, Johnsson, Ofenbartl, & Kalman, 2002; White, et al., 2012; Hoffman, Murray, & Beck, 2013; Kim, Kim, Lee, Shim, & Yoon, 2011; Ertas, et al., 2015; Kwon, Shin, & Juon, 2016; Hofmann, Murray, Beck, & Homann, 2016). Of the six remaining sham studies, one showed a decrease in vomiting postoperatively, with no change in nausea between groups (Cooke, et al., 2015). One study concluded that short-term acupressure is not effective; this was used for only two hours in the PACU (Gilbert, et al., 2015). One of the studies looking at electrical nerve stimulation found a clinically meaningful change in PONV, although not statistically significant, concluding that larger studies are needed (Carr, Johnson, Kenaan, & Welton, 2015). Another study provided evidence that the acustimulation group had

lower levels of PONV, though not significant, and that acupressure was not effective when applied after general anesthesia induction (Agarwal, Pathak, & Gaur, 2000). One study did a subset analysis for female gender, where there was a greater proportion of female patients in the control group. This second analysis revealed a significant decrease in PONV for female patients undergoing cardiac surgery (Klein, et al., 2004). A recent study concluded that unilateral acupressure with Sea-band® applied postoperatively did not significantly decrease PONV in those undergoing craniotomy. (Nilson, et al., 2015).

Clinical Guidelines

The strength of evidence has translated into clinical practice guidelines. Both the American Society of PeriAnesthesia Nurses (ASPAN) and the Society for Ambulatory Anesthesiology recommend acustimulation at P6 for the prevention and treatment of PONV (American Society of PeriAnesthesia Nurses PONV/PDNV Strategic Work Team, 2006; Gan, et al., 2014). While these two societies endorse the use of acupressure for PONV, the Anesthesiologists Task Force on Post-anesthetic Care did not mention any non-pharmacologic interventions for PONV in their practice guidelines (Apfelbaum, et al., 2013).

Cost

An important financial consideration reported by Gan, et al. (2001) was that patients were willing to pay $100 in order to prevent PONV. This may indicate that patients are not as concerned with the cost associated with PONV prevention as their satisfaction with care provided. Para-Sanchez and colleagues (2012) found that one-third

of surgical outpatients experienced either PONV or post-discharge nausea and vomiting, and these patients spent one hour longer in the recovery room, which was associated with an adjusted incremental cost of $75 per patient.

The cost of Sea-band® wrist bands depend on the quantity purchased, but the advertised cost is $10 for a pair, which are washable and reusable. Contrasting this with average costs of medications given to prevent and treat nausea related to surgery per facility pharmacy, the price ranges from $7-$33 per dose. The pre-surgical antiemetic protocol at the community hospital involved in this study usually consists of ondansetron ($7) and dexamethasone ($33) given during the surgery, and, if the patient is at high risk, they are given a scopolamine patch ($29) prior to surgery. Additional medications are given postoperatively as needed for nausea and vomiting. This includes additional doses of ondansetron, metoclopramide ($11), prochlorperazine ($33), and promethazine ($11).

Why Integrative Healthcare?

The coupling of allopathic medicine and complementary therapies has become an accepted practice with the increasing prevalence of complementary therapy utilization in the U.S. (Harris, Cooper, Relton, & Thomas, 2012; Horrigan, Lewis, Abrams, & Pechura, 2012). The Integrative model of healthcare is more than involvement of complementary interventions; it promotes a patient-centered approach to healthcare delivery. This is important to mediate the healthcare crisis we are experiencing today, by not only providing excellent care that involves our patients, but promoting increased quality of life for those experiencing chronic diseased states. Providing effective treatment options that

are less invasive, less expensive, and are available to patients outside of the healthcare system, such as acupressure, can increase patient satisfaction, decrease healthcare costs, and promote patient self-care practices.

The University of Arizona's Center for Integrative Medicine is a leader in the field, using complementary interventions in conjunction with traditional healthcare delivery practices. The principles of integrative medicine are defined as follows:

- Patients and practitioners are partners in the healing process;
- All factors that influence health, wellness, and disease are taken into consideration, including mind, spirit, and community, as well as body;
- Appropriate use of both conventional and alternative methods facilitates the body's innate healing response;
- Effective interventions that are natural and less invasive should be used whenever possible;
- Good medicine is based in good science, it is inquiry driven and open to new paradigms;
- Ultimately the patient must decide how to proceed with treatment based on values, beliefs, and available evidence;
- Alongside the concept of treatment, the broader concepts of health promotion and the prevention of illness are paramount;
- Practitioners of integrative medicine should exemplify its principles and commit themselves to self-exploration and self-development (Maizes, Rakel, & Niemiec, 2009).

These principles align with the Institute of Medicine's call to action from their

report, “Crossing the Quality Chasm: A New Healthcare System for the 21st Century”, which indicated the current healthcare system’s deficiencies and the need to provide care that is safe, effective, patient-centered, timely, efficient, and equitable (Institute of Medicine, 2001). Integrative Healthcare has been shown to provide increased quality of life in patients with chronic disease, one of the largest costs in healthcare today (Kligler, et al., 2011). Additionally, the Integrative Healthcare Model increased positive patient outcomes in relation to disease control and prevention (Edelman, et al., 2006). More interestingly, patient satisfaction increased with this type of healthcare delivery, even in the midst of declining health conditions (Myklebust, Pradhan, & Gorenflo, 2008). As we move toward a more patient-centered approach, providing healthcare that satisfies patients’ needs and addresses all aspects of care will necessitate the adoption of such practices. Watson’s human caring theory provides a framework for putting these practices into motion.

Theoretical Framework

Human caring science is a complex theory that focuses on the role of nursing in the development of a transformational relationship between the nurse and others. Watson identifies “the nurse as the person and the nurse who holds a caring-loving consciousness and intentionality toward self and other that is manifest in specific responses, behaviors and informed actions” (Watson, 2012, p. 65). She goes on to relate the definition of the nurse or nursing to human caring where the “[nurse] attempts to protect, enhance, and preserve humanity and human dignity, integrity and wholeness, by helping a person find

meaning in illness, suffering, pain and existence and to help another gain self-knowledge, self-control, self-caring, and self-healing..." (Watson, 2012, p. 65).

Although the patient-practitioner relationship is essential in providing patient-centered care, additional relationships between all members of the interdisciplinary team who care for patients is necessary. Communication between the care team and willingness to learn about multimodal approaches are fundamental to integrating these into practice (Dossey, 2013). Nursing and nurse roles in human health-illness experiences are mediated by professional, personal, scientific, aesthetic, and ethical human care connections and relationships (Watson, 2012, p. 66). Watson's notions of transcendence of human existence contribute to the connection of the nursing discipline and the medical model. The increasing popularity and development of Integrative Healthcare acknowledge and answer the call of our current, failing healthcare model. Nursing theory and practice have been based in holistic methods that date back to Florence Nightingale who, ahead of her time, described the art of nursing and the need to explore the body-mind-spirit aspects of nursing (Dossey, 2013).

As we move toward a collaborative, interdisciplinary approach to patient care, the Integrative Healthcare Model utilizes nursing theory, possibly unknowingly so, identifying nursing's preeminent strides toward a more effective healthcare system. Jean Watson's caring theory tenets are akin to the principles of Integrative Healthcare. Integrative Healthcare was founded on:

- the patient-provider relationship;
- the patient's quality of life, needs, and wishes; and

- the integration of complementary therapies into an allopathic model (Maizes, Rakel, & Neimeic, 2009).

The theory of human caring complements the Integrative Healthcare tenets and provides a unique opportunity to explore how this theory and healthcare model are mirrored, allowing for the provision of excellent patient care.

Integrative Healthcare recognizes the importance of traditional and nontraditional healing practices and provides a platform to involve all interventions based in evidence known to help the patient (Maizes, Rakel, & Neimeic, 2009). It must be stated that nursing has always promoted an integrative and holistic approach, which is why this theory and project are important and are themselves complementary (The BirchTree Center, 2011).

Integrative Healthcare is partially constructed from the needs and wants of the population as evidenced by increasing demand for integrative therapies. By definition, Integrative Healthcare is a patient-centered approach (Ernst, 2000). One of the Integrative Healthcare principles states, “All factors that influence health, wellness, and disease are taken into consideration, including mind, spirit, and community, as well as body” (Maizes, Rakel, & Neimeic, 2009, p.7). This principle reflects one of Watson’s carative factors: “assisting with basic needs, with an intentional caring consciousness, administering ‘human care essentials,’ which potentiate alignment of mind-body-spirit, wholeness in all aspects of care” (Watson Caring Science Institute & International Caritas Consortium, 2010, p. 6-7).

Additionally, Watson identified that caring practices are usually noninvasive,

nonintrusive, natural, and human-energetic, environmental modalities (Galonzo, 2011). This idea is similar to the principle of Integrative Healthcare that states effective interventions should be natural and less invasive whenever possible (Maizes, Rakel, & Neimeic, 2009). Both the caring theory and the Integrative Healthcare model posit that the individual should ultimately decide how to proceed with their care and highlight the importance of incorporating other's values, beliefs, and what is meaningful to them into their plan of care (Maizes, Rakel, & Neimeic, 2009; Watson Caring Science Institute & International Caritas Consortium, 2010). Generally, Watson's theory of caring and the Integrative Healthcare model re-emphasize the patient-provider relationship. More specifically, these theories emphasize the importance of the caregiver being authentically present, viewing the person as a human being and not as an object to classify and treat (Watson Caring Science Institute & International Caritas Consortium, 2010). These two foundations for patient care provided strength and support for this graduate student's motivation to help nurses implement a safe and effective way to decrease PONV while increasing patient satisfaction. This theory and model have guided the development of this project, from educating nursing staff to validating nurses' efforts with evidence from patient outcomes

METHODS

Nursing Education

Given that PONV is a well-known, common side effect for surgical patients, surgical floor nursing staff were surveyed (see Appendix A7) to determine if they were interested in acupressure or needed education implementing this intervention into their practice to prevent and treat PONV. The survey results revealed nurses had not received education about this intervention, lacked knowledge related to the use of acupressure for PONV, were not aware that this procedure existed in the hospital's nursing resource, and were interested in learning about acupressure for PONV.

Once this knowledge gap was determined, the graduate student collaborated with a certified medical acupuncturist and the hospital's nurse educator to design a Montana Nurses Association (MNA)-approved education seminar that would provide the knowledge and skills needed for surgical nurses to implement acupressure at P6 into their daily practice. In order to discover if this intervention would be effective and beneficial to patients at this community hospital, a pilot study was designed and implemented following the nursing-education component of this project. Nurses in pre-op, PACU, and the surgical floor involved in the pilot study were required to pass the education seminar with a score of 70% or greater on the posttest and provide an effective return demonstration of locating acupressure point P6 and achieving deqi (adequate stimulation of the point).

The education was given twice a week over a month and offered at different hours

of the day to accommodate shift workers. The nurses administering the intervention (N = 40) included preoperative, PACU, OR, and surgical floor nurses. The education, provided by PowerPoint lecture, was created by the certified medical acupuncturist. This presentation focused on the origin of acupressure, how it works to treat symptoms and disease, and how to locate P6. The education was conducted by either the certified medical acupuncturist or the graduate student, who was present at all education seminars and additionally presented the project protocol and educated nurses on the tools they would be using related to this project.

One of the components of the education session that highlighted the transpersonal relationship between the nurse and patient involved the medical acupuncturist describing deqi, which is a unique sensation perceived by both the patient receiving the treatment and the acupuncturist administering the treatment. This has been described as *suan* (aching or soreness), *ma* (numbness or tingling), *zhang* (fullness, distention, or pressure), and *zhong* (heaviness) by patients, and as a tense, tight, and full feeling by the acupuncturist (Yang, et al., 2013). Importantly, TCM has related deqi to the clinical efficacy of acupoint stimulation, and the nurses had the opportunity to practice this technique with the educators (Yang, et al., 2013).

After the acupuncture education, the graduate student spoke with nurses about the theory of human caring and partnership between the nurse and patient. Nurses acknowledged their unique role in working with patients and the idea of an authentic presence was discussed as described by Jean Watson (Watson Caring Science Institute, 2010). Nurses admitted that the caring relationship is more beneficial to the nurse and

patient when he/she is authentically present, which promotes a trusting relationship. Nurses also engaged in discussion of the importance of caring for self and establishing a spiritual practice for one's self.

The education seminar included a pre- and posttest (see Appendix B1) to determine if learning was adequate, as well as a return demonstration of locating and stimulating P6. The nurses also completed the Holistic Complementary and Alternative Health Questionnaire (HCAMQ) (see Figure B2) to determine attitudes towards this type of intervention.

Pilot Study

The pilot study captured the translation of evidence into practice. Moving beyond nurse education by analyzing patient outcomes was meant to validate the use of this intervention and provide evidence to present to the facility on the value of acupressure implemented by nursing staff. The pilot study portion of this scholarly project used a non-blinded, randomized experimental design to analyze quantitative data from (1) postoperative nausea and vomiting scores, (2) patient attitudes related to the use of complementary therapies, (3) the level of caring from nursing staff as perceived by the participants, (4) antiemetic use, and (5) cost. The population for this scholarly project included two groups of surgical patients who had planned abdominal surgical procedures with admission to the surgical floor at a 99-bed community hospital.

Patient Characteristics

Inclusion Criteria:

- Over the age of 18 years
- Ability to communicate in English
- Caregiver/family member to fill out study-related paper work if illiterate
- At risk for PONV
- Planned admission to the surgical floor for an abdominal surgery

Exclusion Criteria:

- Currently using acupressure for nausea/vomiting
- History of lymphedema in upper extremities
- History of carpal tunnel syndrome
- Impaired skin integrity at the site of P6 on either forearm

Demographic Data

Demographic data collected from participants included gender, age, and BMI. Additional baseline data collected included surgery time, type of surgery, antiemetic medication given in pre-op and OR, and risk for PONV.

Sampling Procedure

The target population of this study were patients undergoing an abdominal surgery at risk for PONV, and it was assumed that all patients receiving general anesthesia were at risk for PONV. Two general-surgery clinics were involved in recruiting patients for this study. Nurses in the general-surgery clinics were educated on the study protocol and agreed to be responsible for enrolling patients by giving them the

protocol to review, obtaining and witnessing consent, and then administering two of the tools: the Apfel risk score (see Appendix B3) and the HCAMQ. Simple, randomized sampling and a computer-generated, randomized table were used for participant assignment. Each clinic received envelopes with numbers correlating to participant assignment into either the control or treatment group. The larger clinic received envelopes 1–40, and the smaller clinic received envelopes 41–60. Enrollment was ongoing and each participant who consented to be in the study received the next consecutive envelope. Only the graduate student was aware of which number correlated to the control or treatment group.

These documents were placed in the corresponding envelopes, collected weekly by the graduate student, and coded in an excel spreadsheet. All documents were then locked in a filing cabinet to ensure confidentiality. Participants were given no incentives or payments for participating, but those in the treatment group were able to keep the Sea-band® wristbands, and were aware of this at enrollment.

Ethical Approval

Verbal consent was obtained from the Director of Medical Records, the Director of Organizational Excellence, and the Vice President of Nursing to proceed with a retrospective chart review to gather data from participants. Written permission from the Ethics Committee and Corporate Compliance at the facility was obtained prior to submission to the Montana State University IRB committee. This scholarly project was approved by the MSU IRB on December 14, 2015. The Sea-band® acupressure wrist bands were funded by the graduate student.

Sample Size and Power

Initial sample size was set at 60, with 30 participants in each group. Convenience sampling was adopted and sample size and power calculations were not needed prior to initiating the pilot study.

Data Collection

The HCAMQ for nurses and a pre- and posttest evaluation of learned content (10 multiple-choice questions, necessary for CEU credits) were gathered at the end of the education seminar for nurses. The data from the Apfel risk score, Verbal Rating Scale (VRS) (see Appendix B4), PONV intensity scale (see Appendix B5), HCAMQ, and the Caring Factor Survey (CFS) (see Appendix B6) were collected from participants enrolled in the pilot project. The VRS and PONV intensity scale were recorded by the nurses and obtained from the Electronic Medical Record (EMR) on an ongoing basis with permission from the ethics committee and participants' informed consent. The HCAMQ was completed twice by all participants, initially at the pre-op clinic visit and at discharge. The CFS was filled out by all participants and collected at discharge only.

Instruments

Six tools were used throughout this project: (1) The pretest-posttest CEU learning assessments, which were created for the nursing education, did not have a reliability or validity rating and, therefore, are not reviewed below, (2) the HCAMQ, (3) the Nausea VRS, (4) the PONV intensity scale, (5) the Apfel score for risk of PONV, and 6) the CFS.

The HCAMQ assesses attitudes related to complementary therapies as well as their foundation in science. This is an 11-item scale with two subscales; the first is five questions pertaining to holistic health beliefs and the second is six questions addressing beliefs about the validity of CAM. This is scored on a 7-point Likert scale (1=*strongly agree*, 7=*strongly disagree*). Test-retest reliability for the total HCAMQ was measured at r=0.86, which indicates good internal validity (Hyland, Lewith, & Westoby, 2003).

The VRS for nausea is a verbal scale from 0–10, where 1–4 = *mild nausea*, 4–7 = *moderate nausea*, and 7–10 = *severe nausea* (Boogaerts, et al., 2000). The Spearman correlation coefficient for the VRS was r=0.796 and the mean weighted kappa indices for inter-observer reliability was 0.54 (Lara-Muñoz, et al., 2004). Boogaerts and colleagues (2000) found a high correlation coefficient between the highly rated Visual-Analog scale and the VRS at r=0.92, and an ordinal logistic regression analysis demonstrated a high degree of association between the two scales (86%). These two studies indicate the VRS is a useful measure of subjective nausea.

The PONV intensity scale was created through research with perioperative staff, patients, and patient families (Allen, Leslie, & Jensen, 2011). This scale determines the presence of clinically significant PONV through three domains: number of times the patient has vomited, if the nausea interferes with activities of daily living, and quality of nausea either constant or variable. This scale scores the level of PONV up to 72 hours in the postoperative period. The PONV intensity scale was validated as a clinical and research tool that can distinguish clinically important PONV, and properly correlates to patient changes (Allen, Leslie, & Jensen, 2011). Wengritzky et al. (2009) also found that

this was a reliable tool, with the interclass correlation coefficient (ICC) being highly rated at 0.99 when comparing 22 patients who used this scale. The PONV intensity scale scored above comparison scales with inter-rater reliability (Wengritzky, et al., 2009).

The Apfel risk score is used to predict the probability of PONV in patients preoperatively. This scoring system consists of four domains: gender, history of motion sickness or PONV, smoking status, and planned postoperative opioid treatment. This scoring system has a 58% and 70% sensitivity and specificity for scores of three or more. The area under the curve (AUC), which is an estimate of the outcome independent of the decision criteria, was 0.68, which was greater than independent risk factors alone (Apfel, Kranke, & Eberhart, 2004).

The Caring Factor Survey was created to scientifically measure the metaparadigm of caring as it related to any profession involved in loving kindness, but more specifically tailored toward nursing (DiNapoli, Nelson, Turkel, & Watson, 2010). The CFS was found to have high reliability using the Cronbach's alpha, which resulted in a score of 0.89 (DiNapoli, Nelson, Turkel, & Watson, 2010). This scale allows for the measurement of caring to take place in the clinical field in order to further explore and quantify the power of caring in relation to patient healing and satisfaction with care.

Project Design

Random Assignment

A randomized complete block design was implemented to determine the group assignment by numerical patient. Ten blocks of six were created. Each patient number

was randomly assigned to a block. Three patients within each block were randomly assigned to both treatment and control groups.

Statistical Methods

Data was analyzed by the Montana State University Statistical Consulting and Research Services using Welch's two-sample t-test, Wilcoxson's Rank Sum Test, and repeated measures ANOVA. A p-value <0.05 was considered to be statistically significant. Microsoft Excel Version 15.20 was used for data collection by the graduate student.

Procedure

Prior to the initiation of the pilot project, an EMR-charting tool (see Appendix C) was created collaboratively with an informatics nurse specialist, which contained the VRS and PONV intensity scale. These scales were to be added to the EMR on the day of surgery by the pre-op nurses to record pre- and post-interventional scores. The EMR charting also included a record of side effects related to the acupressure bands.

Intervention Group

Participants were given Sea-band® acupressure bands that were applied to each forearm by the preoperative nurse 30 minutes prior to general anesthesia induction. These bands were to be worn continuously until 24 hours after surgery, or at discharge if before 24 hours. Two important components of favorable outcomes for acupressure to prevent PONV included accurate point location and timing of stimulation (Agarwal, et al., 2002; Harmon, Gardiner, Harrison, & Kelly, 1999). Prior to application, the nurse assessed each

patient's skin integrity as caution should be taken with those who have skin conditions in the area to which the band is applied (Lau, 2011). If any skin disorder was present, the patient did not receive the intervention and was removed from the pilot study. The pre-op nurses had patients measure their own P6 point using the width of digits 2–4, which is equal to two cun (one cun is equivalent to the width of the interphalangeal joint of the patient's thumb) proximal from the distal wrist crease between the tendons of musculus flexor carpi radialis and musculus palmarus longus (see Figure 4).

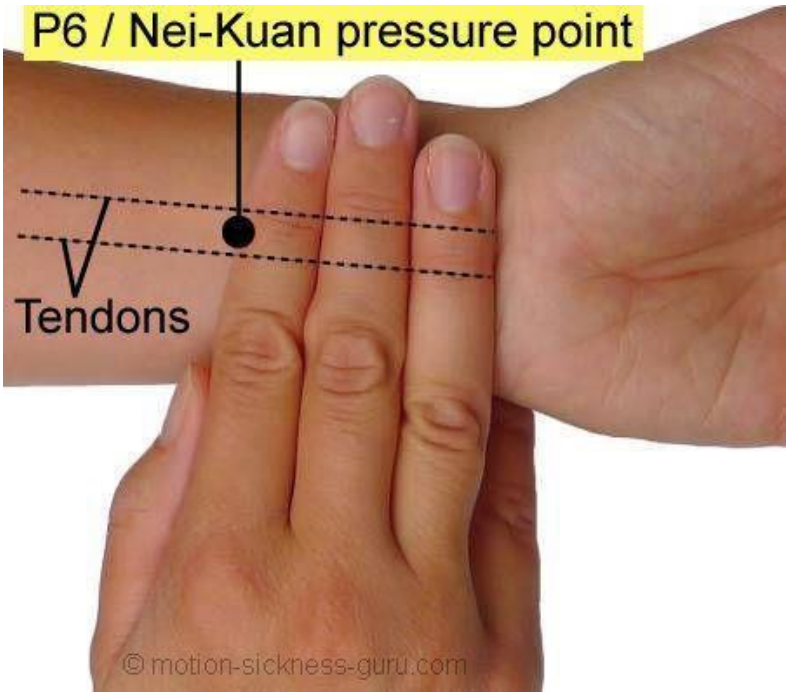


Figure 4. Location of Acupoint P6 for Acupressure. Retrieved from http://www.motion-sickness-guru.com/acupressure-wrist-bands-and-bracelets.html

Nurses then marked the location of the acupressure point P6 with a surgical skin marker (Rusy, Hoffman, & Weisman, 2002). This guided placement of bands if they were removed for any reason during the study. To ensure that the bands were not too

tight the nurse assessed the blood flow to both upper extremities using pulse oximetry (Agarwal, et al., 2002). Additionally, the nurses administered further acupressure-point stimulation using gentle pressure to the band for 3 minutes in each care area: one treatment prophylactically in pre-op prior to anesthetic induction, one in the PACU, and one after arrival to the surgical floor, and then as needed for the duration of their stay. The acupressure intervention provided an opportunity for the nurse and patient to connect and develop the transpersonal caring relationship (Watson Caring Science Institute & International Caritas Consortium, 2010).

The nurses checked the placement of the acupressure band as well as patient's skin integrity and level of discomfort with the band in PACU, again once they reached the surgical floor, and thereafter every 6 hours to ensure safety of the intervention and monitor for side effects until discharge. The skin and band assessments were recorded in the EMR along with the nausea Verbal-Rating Scale and PONV intensity scores. The participants could remove the acupressure band for 30 minutes every 2 hours if they were having discomfort (Alkaissi, et al., 2002). In addition to the acupressure bands, the intervention group was also eligible for routine care with antiemetic medications.

Control Group

The control group received routine care with antiemetic medications and had smiley face paper wrist bands placed bilaterally to identify them as control. Their VRS for nausea and PONV intensity score were measured in pre-op, PACU, again once they reach the surgical floor, and thereafter every 6 hours until 24 hours after surgery, or at discharge if before 24 hours.

Discharge Protocol

Upon discharge, all patients in this study, control and experimental groups, completed the HCAMQ and the CFS. Surgical floor nurses were responsible for collecting these two scales at discharge. The HCAMQ and CFS were stored in a locked box in the medication room, which required an employee badge to enter. The graduate student collected these forms weekly to be coded and stored in a locked filing cabinet.

RESULTS

Nursing Education

Do surgical floor nursing staff perceive a benefit from acupressure education to prevent and treat postoperative nausea and vomiting for their patients?

Twelve of the 19 surgical floor nurses (63%) responded to a voluntary survey left in their break room. The survey revealed 100% (n=12) of respondents knew what acupressure was, but their knowledge was minimal. Eighty-three percent (n=10) stated they were interested in learning about acupressure treatments to incorporate into their nursing practice. One hundred percent of respondents thought incorporating CAM therapies into their practice would benefit their patients, and 83% thought CAM therapies in general would benefit their nursing practice, also agreeing that their facility would benefit from a CAM department. Interestingly, 92% (n=11) of respondents stated they did not know if CAM therapies are approved nursing interventions by the Montana State Board of Nursing. As one nurse stated, "I'm unsure if it is within my scope of practice to make suggestions for alternative therapies." No nurses were aware that the facility's nursing procedures included a protocol for acupressure to treat nausea and vomiting.

Did surgical nursing staff show a knowledge increase from the acupressure for PONV seminar?

Forty nurses from the Same Day Surgery/Preop area, PACU, OR, and Surgical Floor participated in the education seminar conducted during January, 2016. The effectiveness of the education seminar was measured using a pre- and posttest design. All

nurses scored 100% on the posttest, which was an increase in learning from the pretest (see Figure 5). Using a paired t-test, it was determined that the absolute value of the computed paired *t*-statistic was 13.793, which is greater than the critical value of 2.024, so it can be concluded that the knowledge score after taking the education seminar was significantly higher than the knowledge score before receiving education. Eighty-five percent of nurses who completed the post-learning evaluation agreed that this seminar closed a gap in their knowledge and practice.

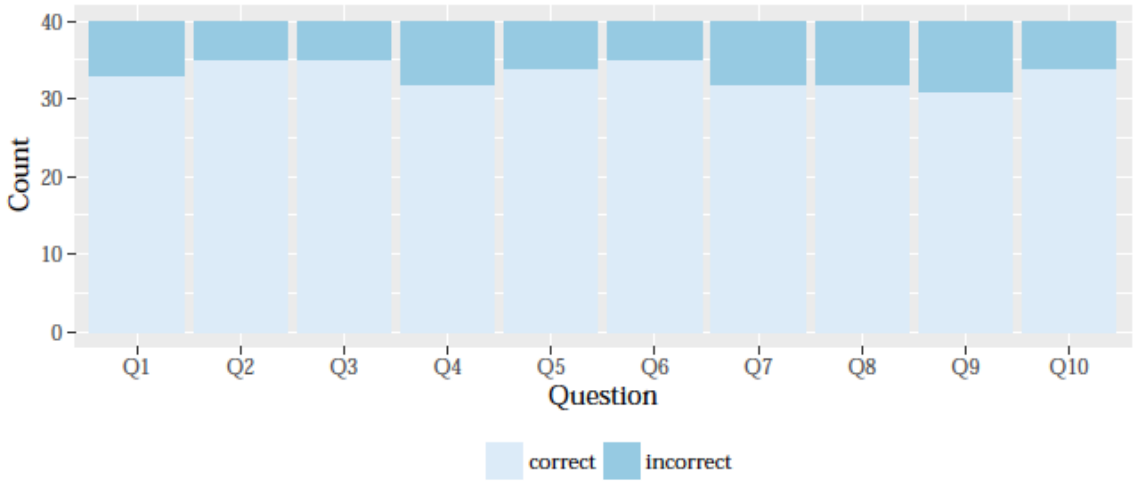


Figure 5. Surgical Nurse Pretest Scores Prior to the Acupressure Education Session.

How do surgical nurses perceive holistic health and complementary and alternative therapies?

Nurses who participated in the education seminar were also given the HCAMQ, which revealed that 64% (n=25) of nurses had positive holistic-health attitudes and negative CAM attitudes while 26% (n=10) had positive holistic-health and CAM attitudes (see Figure 6). Only one nurse had a negative holistic-health and positive CAM

attitude, and no nurses had negative holistic-health and CAM attitudes.

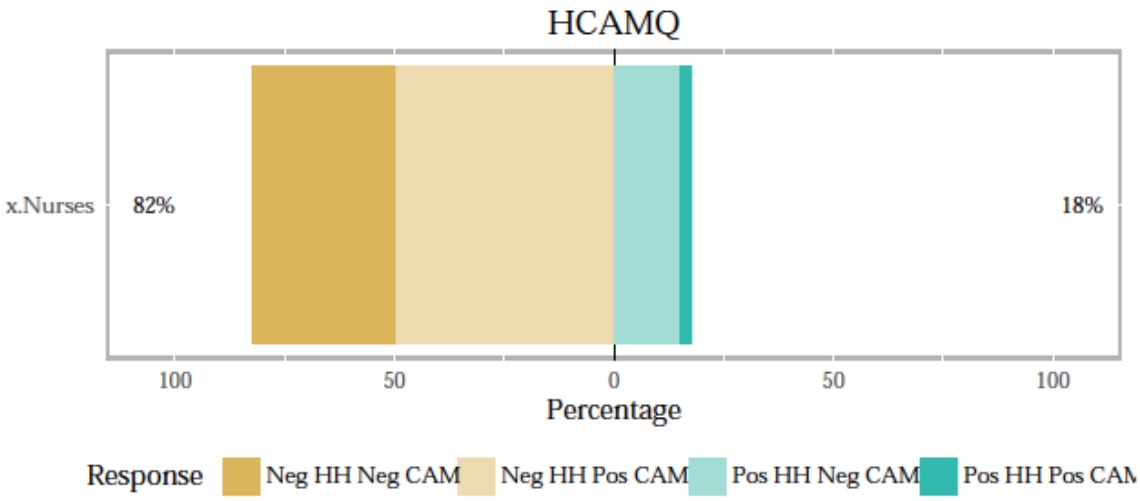


Figure 6. Nurse HCAMQ Scores Obtained During the Education Session.

Pilot Study

Recruitment

Participant recruitment began in February, 2016, after the education seminars were concluded, and lasted until the end of October, 2016. All patient data was obtained prior to patient discharge from the hospital; thus no follow-up was needed.

Participant Flow

The study was designed to recruit patients from two clinics, 40 from one clinic, and 20 from the other, with treatments randomized. The clinic that was given 20 envelopes only returned one participant (#41) and, due to this lack of representation and the possibility of differences in patients seen at the two clinics, as well as study protocol

at the two clinics, this patient was removed from analysis. Two other participants were excluded (#1 & #2) because of the large amount of missing data, one was insufficiently screened and had carpal tunnel syndrome (#5), and one was an outpatient surgery, who should not have been enrolled (#22). All listed patients were removed from the analysis. The final sample included 14 in both the treatment and control groups (see Figure 7).

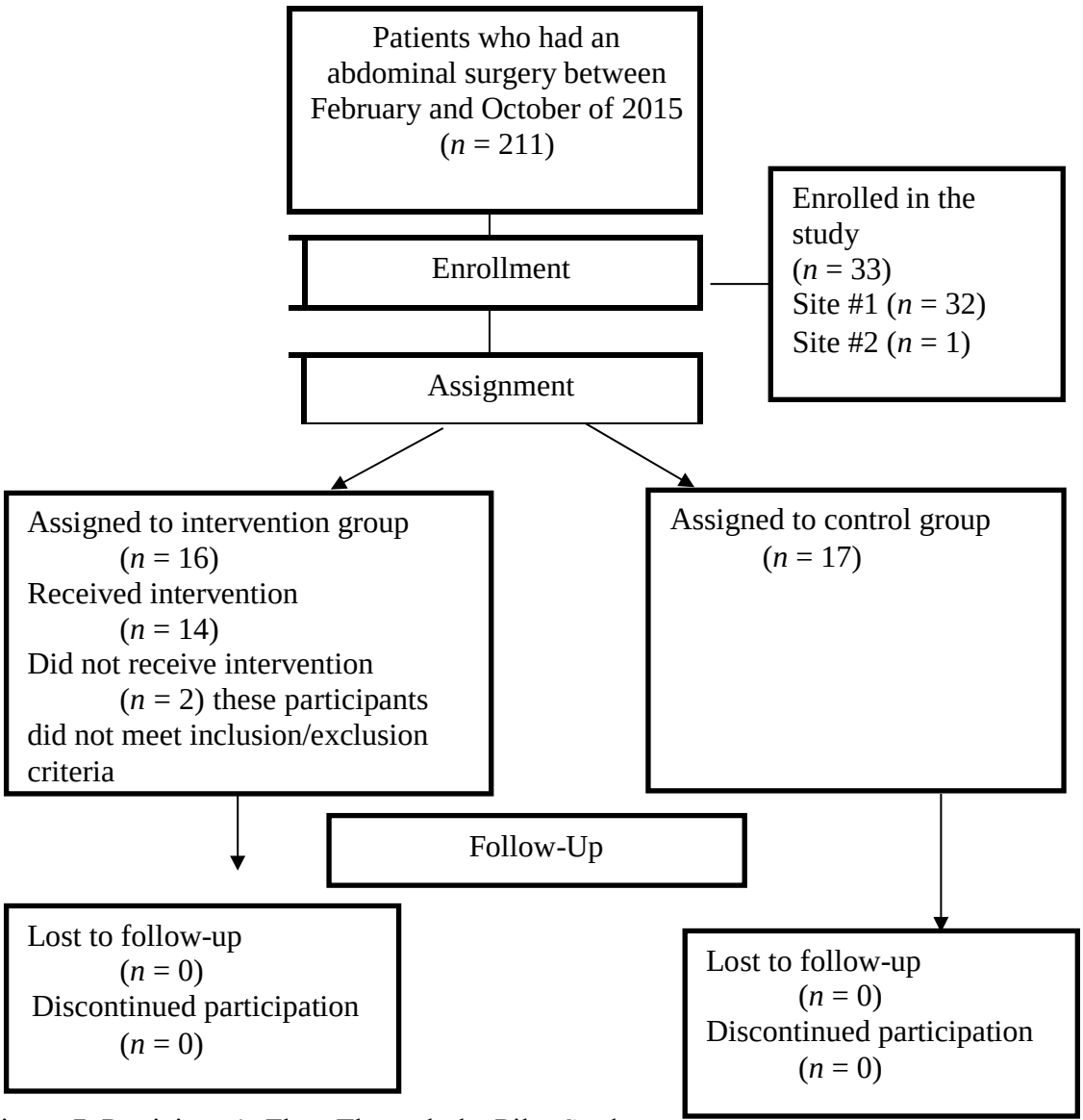


Figure 7. Participant's Flow Through the Pilot Study.

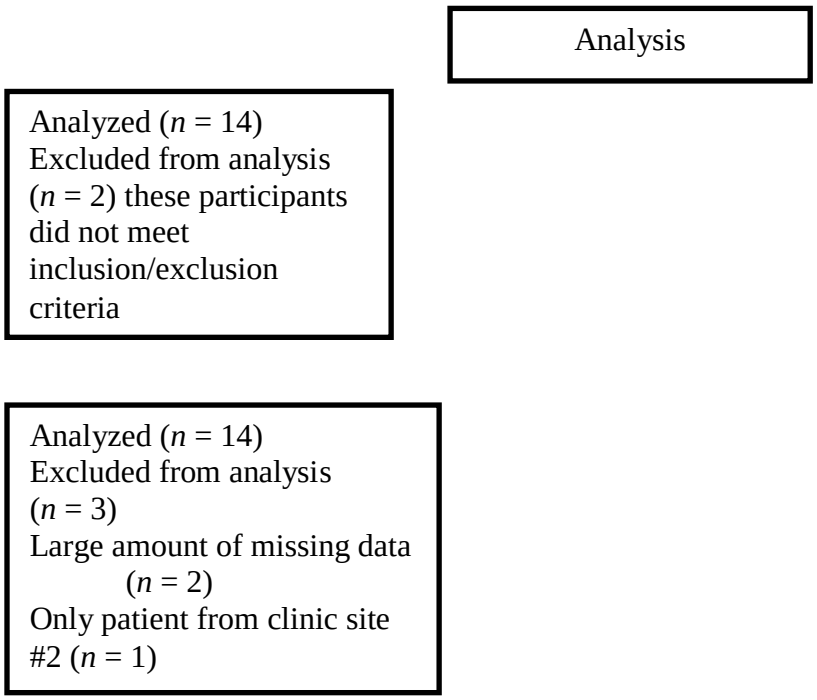


Figure 7. Participant's Flow Through the Pilot Study, Continued.

Intervention Fidelity

Data obtained from the EMR entered by surgical nursing staff indicated that the acupressure bands remained at the marked P6 spot for those in the treatment group throughout the study. All nurses were educated by either the certified medical acupuncturist or the graduate student on locating and stimulating P6. Four patients in the treatment group did not receive the additional pressure to P6 in PACU, and one of these patients also did not receive the additional pressure to P6 when arriving to the surgical floor.

Baseline Data

Demographic data, including gender, age, and BMI, were not significantly different between the treatment and control groups. Additionally, there were no significant

differences in surgery length, type of surgery, antiemetic use in pre-op and during surgery, and risk for PONV. The ratio of males to females was roughly 1:3, with gender represented fairly equally in both treatment and control groups (see Figure 8).

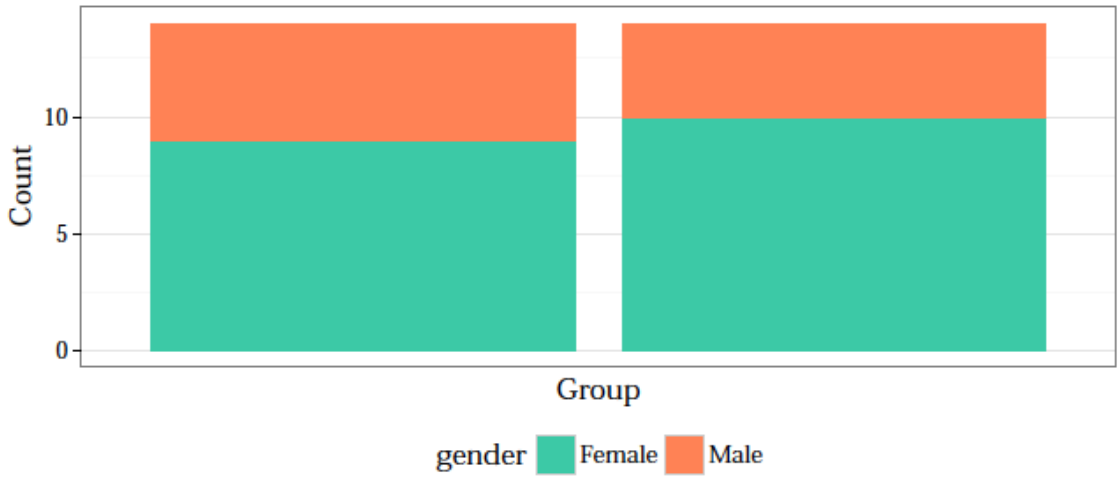


Figure 8. Gender Differences Between the Treatment and Control Group.

The median age for the control group was about five years less than that of the treatment group. The distribution of ages in both groups was symmetrical (see Figure 9).

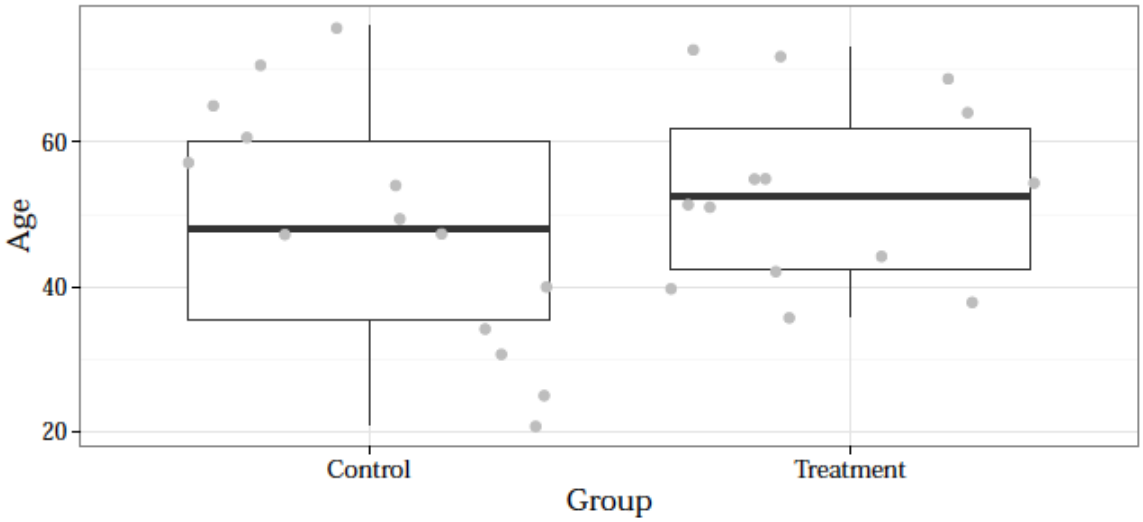


Figure 9. Age Distributions Between Treatment and Control Group.

One person in the treatment group had a BMI of 48.4 and was an outlier. The median BMI in the treatment group was higher than the control group by 2.1 units (see Figure 10).

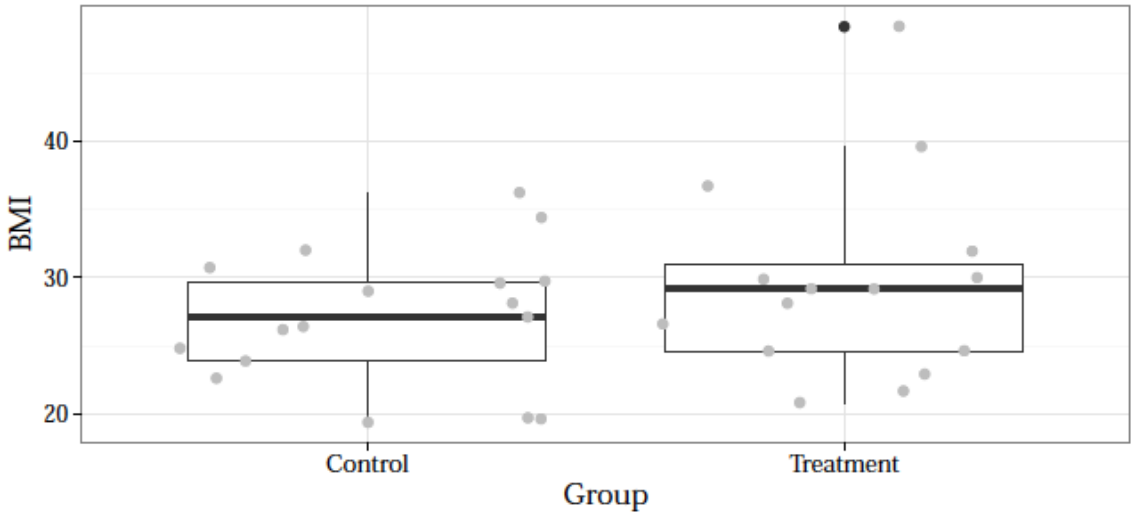


Figure 10. Distribution of BMI Between Treatment and Control Groups.

The median surgery length in the treatment group was 16 minutes longer than that of the control group (see Figure 11). There was not a strong relationship between age and surgery length.

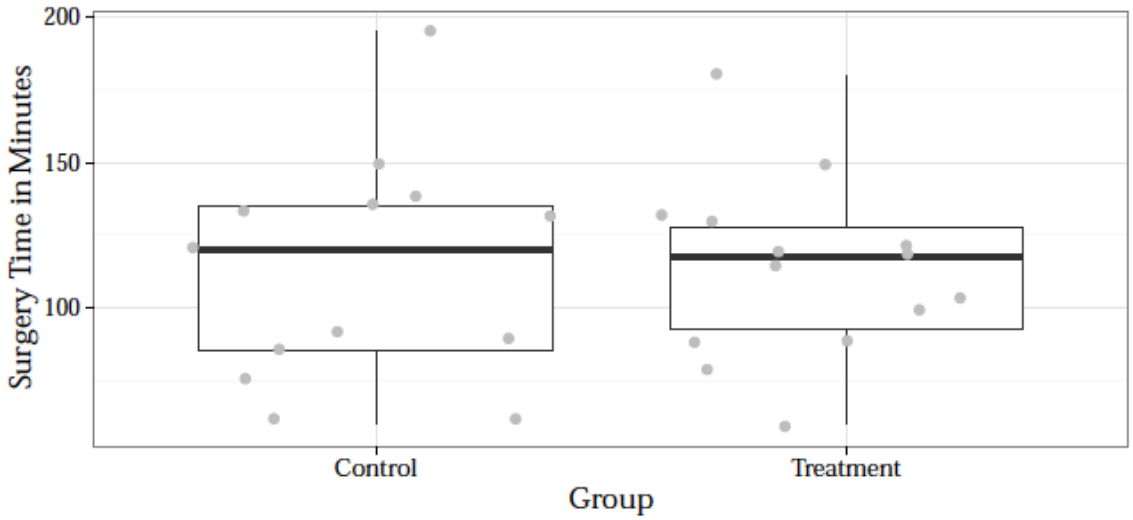


Figure 11. Surgery Length Distribution Between Treatment and Control Groups.

Most participants had a laparoscopic cholecystectomy with a fairly equal representation in both the treatment and control groups. The second-most common procedure was a laparoscopic sigmoid colectomy with an equal representation in each group (see Table 1).

	Control	Treatment
APR	1	0
colectomy w diverting colostomy	1	0
lap chole	8	7
lap partial colectomy	0	1
lap sigmoid colectomy	2	2
lap ventral hernia repair	0	1
LAR	1	0
low ant colon resection	1	1
R hemicolectomy	0	1
ventral and umbilical hernia repair	0	1

Table 1. Distribution of Type of Surgery Between Treatment and Control Groups.

In both groups, 50% of participants were given more antiemetic medications in the operating room than at pre-op (see Figure 12). Because the distributions in both groups are skewed, the Wilcoxson Rank Sum Test was used to assess evidence for a difference in the sum of the ranks in the control and treatment groups. Based on a test statistic of 130.5 and associated *p*-value of 0.63, there is no evidence of a difference in change in antiemetic use between the treatment and control groups.

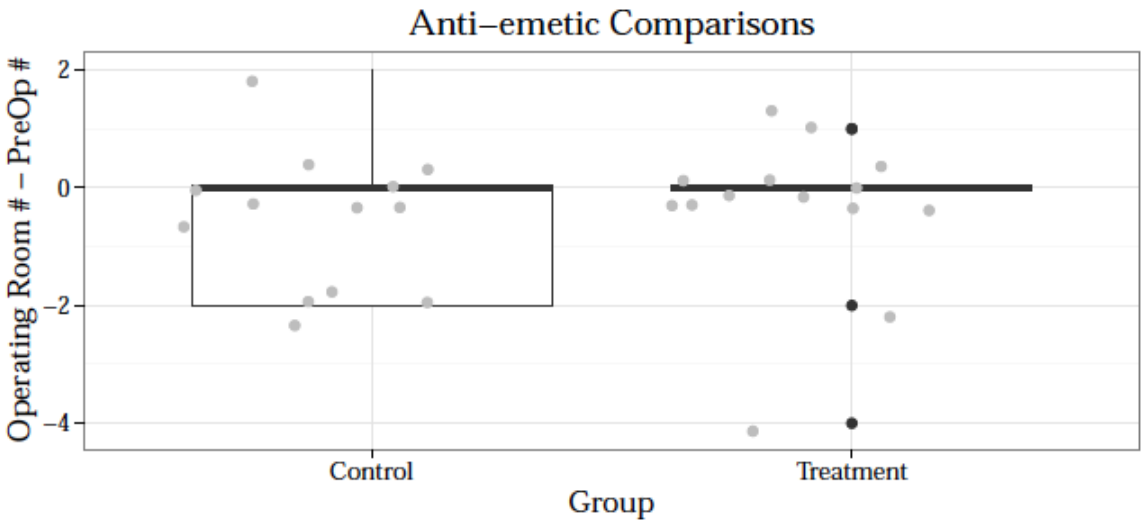


Figure 12. Comparison of Antiemetic Use Between Groups in Pre-op and the OR.

Based on the Apfel Risk Score, no participant had a 10% risk, more people in the control group were at 21% risk for PONV, and more people in the treatment group were at 39% risk for PONV. The counts in the 61% and 79% risk categories were similar in both the treatment and control groups (see Figure 13). A permutation distribution of X^2 test statistic based on 10,000 permutations was created. The observed X^2 test statistic was

5.8666667, which resulted in a *p*-value of 0.1143. There is no evidence of a relationship between Apfel scores in the treatment and control groups.

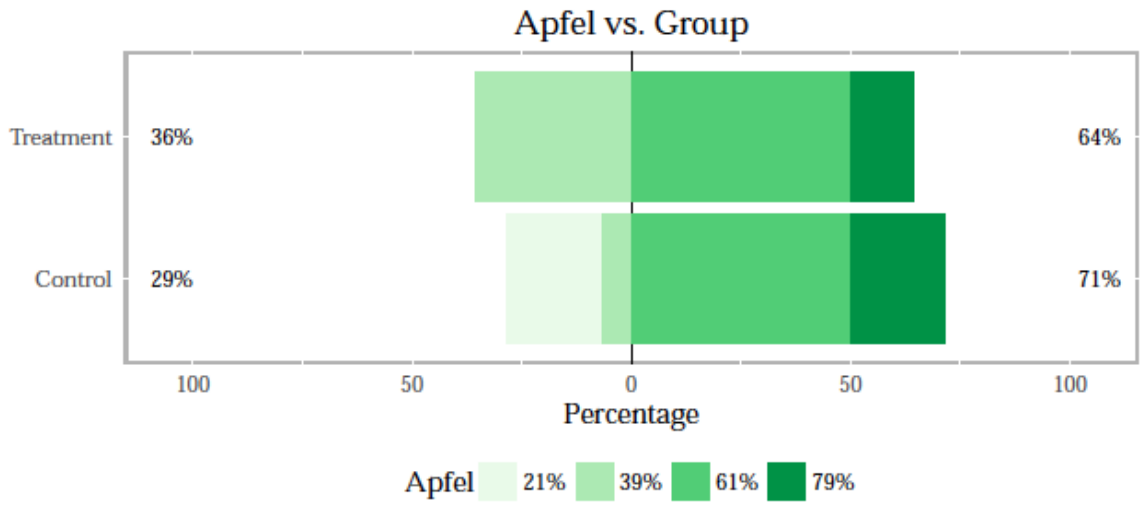


Figure 13. Distribution of Risk for PONV Between Treatment and Control Groups.

Statistics and Data Analysis

Scope of Inference. Because treatment was randomly assigned and tests on demographics showed no evidence of differences between the two groups, if significant differences between treatment and control groups appear, it is caused by the P6 acupressure treatment.

In patients undergoing abdominal surgery, does acupressure at P6, compared to routine care, decrease postoperative nausea and vomiting, antiemetic use, and the cost of care?

PONV Intensity Scale. The proportion of patients at pre-op with clinically significant PONV was fairly equal in the treatment and control groups. Four patients did

not have either a pre-op PONV, a PONV score at any time, or neither. These patients were excluded from the PONV analysis. Thirteen percent more patients in the treatment group did not experience clinically significant PONV at time points after surgery, compared to the control group (see Figure 14). However, based on a test statistic of 1.16 compared to a X_1^2 distribution, there is no evidence that the difference observed represents a true difference in the odds of clinically significant PONV between treatment and control groups (p-value = 0.281).

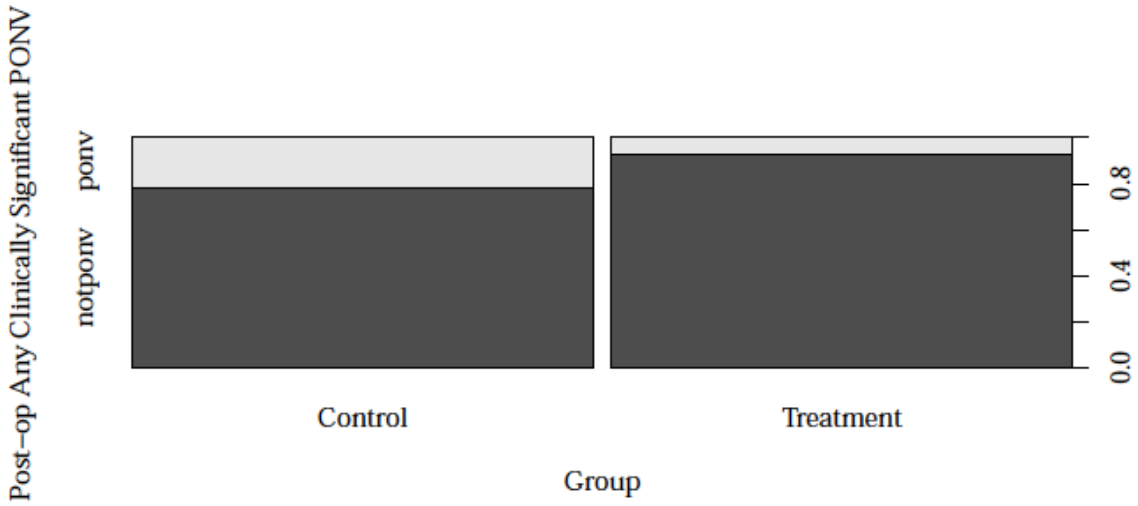


Figure 14. PONV Intensity Scores for the Treatment and Control Groups.

VRS Scores. Although VRS scores were recorded in PACU and at 0, 6, 18, and 24 hours on the surgical floor, statistical analysis was applied to values from PACU and at 6 and 24 hours on the surgical floor. Repeated measures ANOVA with unstructured covariance was done using REML. Based on an F statistic of 2.23 compared to a $F_{2,24}$ distribution, there was no evidence that at least one VRS measurement difference at different time points changed by group. Main effect for *Group:* $F_{1,24} = 0.61$; p-value =

0.444. Main effect for *Time:* $F_{2,24} = 1.47$; *p*-value = 0.25.

Antiemetic Use. In the control group, 36% of participants (n=5) required rescue antiemetic medications compared to 50% of those in the treatment group (n=7).

Cost. Participants in the control group required seven doses of rescue antiemetic medications costing $83, compared to nine doses in the treatment group, costing $93.

Does acupressure, compared to routine care, affect how patients undergoing abdominal surgery perceive holistic health and complementary and alternative therapies?

The HCAMQ was divided into the domains of Holistic Health (HH) and Complementary and Alternative Health (CAM) for analysis. Before analysis, the raw differences in CAM and HH scores between the pre-op visit and at discharge are represented in tables (see Figure 15).

The distribution of CAM changes was symmetrical in both the treatment and control groups. Pre-op CAM scores appeared higher in the treatment group than at discharge; opposite for the control group. Recall that smaller CAM scores mean more positive CAM attitudes. Welch's two-sample t-test on the differences, based on a $t_{16.26}$ statistic of -2.879, resulted in a *p*-value of 0.011, which provides very strong evidence that patients in the treatment group supported CAM more at discharge than at pre-op hen compared to the control group. The observed difference in average change in CAM (treatment-control) was 3.483 with an associated 95% confidence interval of a score of 0.93 to 6.04 higher.

Most participants in the treatment group did not have changes in holistic-health views between pre-op and discharge, with one person supporting holistic heath much more at discharge than at pre-op. The median holistic-health score was higher at pre-op than at discharge in the control group. The distribution of change scores is slightly skewed towards more supportive views on holistic health at discharge than at pre-op in the control group. Given the outlier in the treatment group and the small sample size, a Wilcoxson's Rank Sum Test for evidence in the sum of the ranks between the treatment and control groups resulted in a *p*-value of 0.174, which provides no evidence of a difference in changes in holistic-health views between the treatment and control groups.

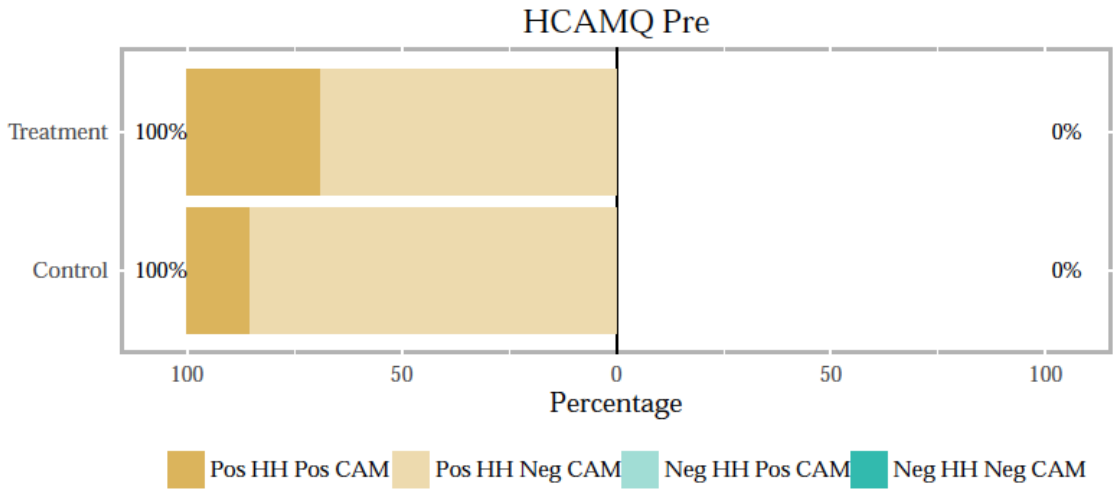


Figure 15. HCAMQ Scores Obtained at Prior to Surgery and at Discharge.

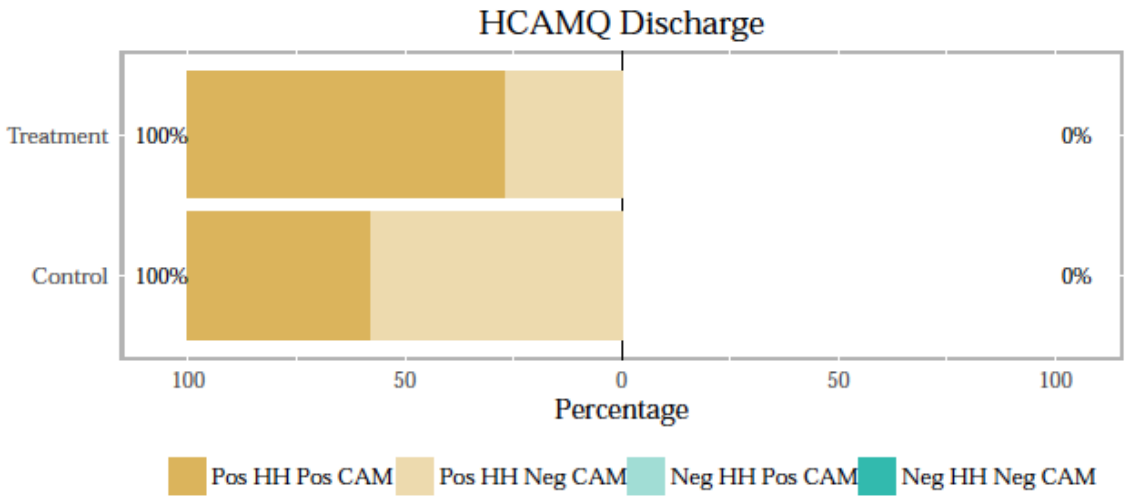


Figure 15. HCAMQ Scores Obtained at Prior to Surgery and at Discharge Continued.

Does acupressure, compared to routine care, affect how patients undergoing abdominal surgery perceive how they were cared for by nursing staff?

The observed mean CFS in the treatment group was 3.9924242 units lower than the controls group's mean CFS. Welch's two-sample t-test, based on a test statistic of 0.726 when compared to a t distribution with 17.712 degrees of freedom, resulted in a two-sided *p*-value of 0.477. There is no evidence of a difference in mean CFS between the treatment and control groups (see Figure 16).

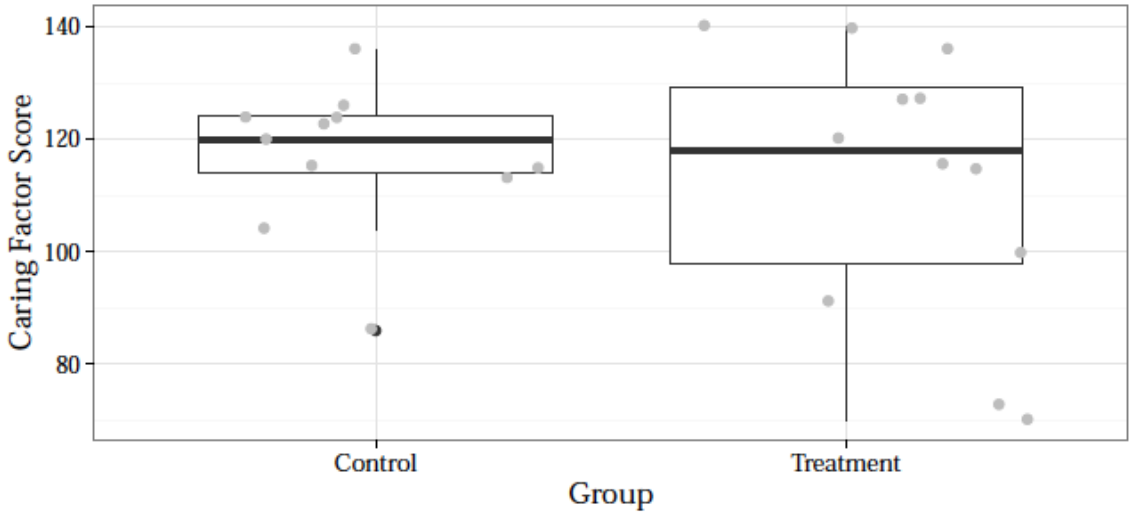


Figure 16. Caring Factor Scores at Discharge.

Adverse Events

One participant in the treatment group reported discomfort with the acupressure bands, but voluntarily continued to wear the bands per the protocol without adverse effects. No other events were reported.

DISCUSSION

Nursing Staff

The MNA education seminar was effective and increased knowledge of acupressure at P6 to prevent and treat PONV. Overall, most nurses were excited and interested in learning about acupressure and wanted to know if the graduate student could provide other education seminars highlighting additional CAM therapies they could implement at the bedside. One nurse responded, "Many patients are looking for alternatives to medications for every ailment that shows up." Although nurses were interested in learning about CAM therapies, one major theme surfaced about concerns related to their busy workday and the feasibility of adding another intervention. One nurse wrote, "I'm sorry, but I don't have enough time and energy resource to add anything to my workload, especially if it requires me to spend time doing it at the bedside." Additional perceived barriers expressed by nurses included: conflict with IV placement, patient beliefs, lack of patient willingness to try acupressure, patient mind frame related to western and eastern medicine practices, and lack of patient education on acupressure.

Almost all nurses were unsure of how integrative interventions fit into their practice. This is not surprising as the Montana State Board of Nursing does not have specific rules for implementing this at the bedside. As long as integrative therapies are performed and documented according to one of the standard nursing taxonomies (North American Nursing Diagnosis Association [NANDA] nursing diagnosis), this brings the

modality into the domain of nursing and provides the intervention as a way to address patients' needs (Frisch, 2001). Nursing perceptions of patient hesitancy to try acupressure and additional perceived barriers suggest a need for research and education for nurses about patient preferences for Integrative Healthcare practices. The education seminar provided an opportunity to discuss how this intervention fits into the nursing scope of practice. This discussion also provided new information about education needs and future education opportunities for nursing staff.

Pilot Project

Acupressure at P6 decreased PONV compared to routine care, although it was not statistically significant. The failure to demonstrate statistically significant reduction in PONV with acupressure at P6 has been reported in other studies as well. Thorn and colleagues (2016) created a study design similar to this pilot study in which Sea-band® application was used bilaterally with routine care, compared to only routine care in a non-blinded fashion, and found no significant difference in complete response, or need for rescue antiemetic. A similar study design with use of preventative antiemetic medication and acupressure at P6 did not show a significant reduction in PONV (White, et al., 2012). Klein and colleagues (2004) also failed to find a reduction in PONV with acupressure bands applied prior to anesthesia. In contrast, many studies comparing acupressure and routine care found that P6 stimulation is effective in reducing PONV (Agarwal, et al., 2002; Coloma, et al., 2002; Soltani, et al., 2011; Yang et al., 2015).

Lack of significant reduction in PONV may have been skewed by the different

pre-op antiemetic medications given between groups. Six patients in the control group received a scopolamine patch compared to two in the treatment group. Furthermore, two patients in the control group with clinically significant PONV received a scopolamine patch prior to anesthesia induction, where two in the treatment group who presented with clinically significant PONV did not receive a scopolamine patch. Taking this into account may have increased the effect of the P6 intervention.

Interestingly, although acupressure at P6 did not significantly decrease PONV or antiemetic use, treatment group attitudes toward CAM therapies significantly improved over time compared to the control group. This may suggest that, although patient PONV did not significantly decrease with the treatment, patients were pleased with the use of acupressure and had a positive attitude shift toward the idea of CAM therapies. One participant felt compelled to write a note that stated, "The Sea-band® [wristbands] were very effective with helping prevent nausea. Anytime I had nausea I pressed on them (plastic beads), and it stopped. I used no nausea meds all day yesterday. Thank you!" After looking at her data, the experience described by her note was not represented in the nurse charting. The failure to capture what this participant experienced suggests a design flaw and a more effective method would have been to give participants diaries to record nausea levels and use of the bands.

Patient satisfaction with nursing care was reported with the CFS and no difference between groups was detected. This suggests that patients did not perceive more of a caring relationship with their nurses related to the acupressure intervention. Even though there was no difference between groups, both groups reported high levels of caring from

the nursing staff. This tool was not specific to the acupressure intervention; instead focused on the caring relationship between the nurse and patient and, therefore, may explain why there was no change between groups.

Following data collection from the first two participants, there was a concern that the PONV intensity scale would not detect smaller changes in PONV over time; so the VRS score was added after approval from MSU IRB and the facility. This did provide more information, but analysis revealed no significant differences in the scores between the treatment and control groups. Moreover, the treatment group surprisingly required more rescue antiemetic medications, which resulted in marginally higher healthcare costs. Again, consideration for differences in clinical practice and type of medications used among anesthesiologists could contribute to the lack of significant reduction in PONV between groups.

Recruitment was difficult as only 13 patients were recruited in the first six months, and some months had no patient enrollment at all. Initially, the surgical clinic nurses were relied on for recruitment and enrollment due to their willingness and convenience. In order to increase enrollment, the graduate student became more present in the clinic, when available, to discuss the project with potential participants and decrease the work load of the nursing staff. It became apparent that nurses in the clinic were unsure of what type of surgeries were eligible to participate and, once this was clarified, enrollment increased. Schultz and colleagues (2003) suggest that, when a member of the research team is not present at enrollment, confidence in the research may be compromised and lead to decreased likelihood of participation. The small sample size

should be taken into consideration when looking at the results.

Pre-op nurses initially did not follow the protocol and gave the first two patients Sea-band® wristbands, even though they were in the control group. Nurses in PACU and on the surgical floor did not collect data for the first two patients. The study protocol was complicated with the use of five different tools, and nursing staff initially did not successfully follow the protocol although expressing their interest in the project. The graduate student became more present in the surgical-care areas to prevent lost data and take some of the work load off nursing staff. As the project progressed and more patients were enrolling, nursing staff collected data more reliably when they saw study patients consistently. Nursing staff expressed that acupressure could be realistically implemented into their practice resulting from their experience with this pilot study. In addition to proving this intervention was easily implemented, it was also found to be safe and well tolerated by patients, with no serious side effects.

The theory and model used for this project provided specific tenets that helped to guide nurse education and implementation of the intervention. Watson's human caring theory was especially helpful when educating the nursing staff, as the interpersonal relationship and the role of this intervention in promoting a connection between the nurse and patient were discussed. The Integrative Healthcare model complemented Watson's human caring theory and brought the medical and nursing model together, with a common set of goals. While the Integrative Healthcare model focuses on combining complementary and traditional approaches to patient care, the human caring theory focuses on the relationship developed between the nurse and patient and how this can

positively affect patient outcomes. It was important to include both to recognize the strides made by the medical community to emulate patient-centered care, one that nursing has upheld since its inception. Additionally, these two foundations have fostered the development of the DNP role by translation of evidence through implementation of this intervention and evaluating the data obtained for continual improvement of patient care.

This study had a few limitations. The participants and nurses were not blinded, so participants knew if they were in the treatment or control group, as did nurses, which could have caused bias in the assessment of nausea. It is evident that the sample size for this study was small and could therefore not likely demonstrate significant change due to the intervention. The pilot design did provide valuable information related to feasibility of this intervention.

Results will be disseminated to the facility as a presentation given by the graduate student. Recommendations for practice include implementing a PONV risk score for all surgical patients to assist the surgical team in addressing those at risk for PONV, as one is not currently being used at this facility. The pilot study did not provide statistically significant data in favor of acupressure, but the data was clinically significant and should be used as a basis to continue research in this field. Additionally, this study provided valuable data that this intervention is safe and easily implemented. Even though this pilot project did not have the intended results for PONV, previous evidence described earlier should encourage this practice for patients who are at risk for PONV and are willing to try acupressure as an adjunctive intervention.

Future research on this topic should include qualitative data from patients and

nurses to further understand their thoughts and feelings regarding acupressure and PONV. The use of diaries to obtain patient data regarding PONV outcomes and satisfaction is recommended to provide a better understanding of the patient's experience. Nurse's satisfaction and experience with implementing this intervention and their perspective on patient outcomes from acupressure at P6 is also important, therefore, obtaining a satisfaction survey from surgical nurses could be suitable. A simplified study protocol could benefit the nurses who implement this intervention for future research and promote protocol fidelity. The development of a quality team devoted to PONV that includes physicians, nurses, and management could also ensure fidelity and promote adoption of this new practice. Overall, to ensure that future research is completed with ease, strong champions are needed in the many care areas this project affects.

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APPENDICES

APPENDIX A

EVIDENCE TABLE FOR ACUPRESSURE AT P6

Authors, Title, Journal	Year Pub	Purpose	Comparison Groups	# of Subjects	Subject Characteristics	Sample Design	Source or Instrument	Type of Surgery	Comments
Agarwal, A., Pathak, A., & Gaur, A. Acupressure wristbands do not prevent postoperative nausea and vomiting after urological endoscopic surgery. ***Canadian Journal of Anesthesia*** **.**	2000	To evaluate the efficacy of acupressure wristbands in the prevention of postoperative nausea and vomiting (PONV).	Spherical beads of acupressure wristbands were placed at the P6 points Group 1 patients (acupressure group, n=100) whereas, in Group 2 (control group, n=100) they were placed inappropriately on the posterior surface. The acupressure wristbands were applied	200	Patients were comparable in both the groups as regards to age, sex, height and weight. ASA I - II patients.	randomized, prospective, double blind, placebo-controlled study.	nausea was classified as none, mild, moderate or severe. Vomiting and retching were not distinguished and their severity was classified by the number of episodes over 24 hr.: none, mild (0-2), moderate (3-5), or severe (5)	endoscopic urological procedures	The acupressure group had a slightly lower numerical incidence of nausea and vomiting compared with the control group but this difference was not statistically significant, (Figure 3), with a relative risk ratio of 0.86. Acupressure, when applied after induction of anesthesia, Was not effective. This

			30 min before induction of anesthesia. The acupressure wristband has an adjustable strap, . inch in width, with a spherical plastic bead attached to it and Velcro fastener to prevent the head from slipping from its position. No specific brand of band was identified.						emphasizes the importance of application of acupressure before induction of anesthesia. The important component of this treatment includes the timing of the stimulation and correct location.
Coloma, M., White, P. F., Ogunnaike, B. O., Markowitz, S. D., Brown, P. M., Lee, A.	2002	Evaluate transcutaneous electrical acupoint stimulation (acustimulation) using the	1)Ondansetron IV and a Sham band 2) ReliefBand® and IV injection of sterile saline 3) Ondansetron	90	Demographic characteristics for the three treatment groups were not significantly	randomized, double-blind, placebo- and sham-controlled study	verbal rating scale (VRS) for nausea (from 0 _ none to 10 _ worst imaginable)	22 patients underwent a gynecologic laparoscopy and 68 underwent a laparoscopic cholecystectomy.	The complete response rate was significantly higher with the combination therapy compared with

Q., ... & Jones, D. B. Comparison of acustimulation and ondansetron for the treatment of established postoperative nausea and vomiting. ***Anesthesiology***		ReliefBand® compared with ondansetron for the treatment of established postoperative nausea and vomiting (PONV).	IV and ReliefBand®. Treatments applied in PACU.		different.				the Relief-Band® alone (73% vs. 40%), suggesting that ondansetron enhanced the efficacy of acustimulation in the treatment of PONV.
Alkaissi, A., Evertsson, K., Johnsson, V. A., Ofenbartl, L., & Kalman, S. P6 acupressure may relieve	2002	To investigate the effect of sensory stimulation of the P6 point on postoperative nausea and vomiting (PONV) after	One group was given bilateral P6 acupressure (n = 135), a second group similar pressure on bilateral non-acupressure points (n = 139), and a third group (n	410	Female patients, age data was not included.	Prospective, randomized, placebo-controlled, double-blind clinical trial with a reference group	Nausea (scale 0–6), vomiting, pain, and satisfaction with the treatment were recorded.	Abortion, dilatation and curettage or laparoscopic surgery	Our results would suggest a relative decrease in PONV of 28% compared to no PONV prophylaxis at all. A significant decrease occurs following

nausea and vomiting after gynecological surgery: an effectiveness study in 410 women. ***Canadian Journal of Anesthesia*** **.**		gynecological surgery in the everyday clinical setting (effectiveness study).	= 136) served as reference group. The patients were asked to wear the Sea-band® wristbands continuously for 24 hr. If the band caused discomfort, they could be removed for 30 min every two hours.						vaginal surgery (44%) but not after laparoscopic surgery (7%). 61 adverse events were reported. The bands felt uncomfortable, produced a red indentation or caused itching, (n = 15), headache and dizziness (n = 1), or the wrists hurt and the tightness of the band caused swelling or deep marks or blistering at the site of the button (n = 45).

Agarwal, A., Bose, N., Gaur, A., Singh, U., Gupta, M. K., & Singh, D. Acupressure and ondansetron for postoperative nausea and vomiting after laparoscopic cholecystectomy. ***Canadian Journal of Anesthesia*** **.**	2002	To compare the efficacy of acupressure wrist bands and ondansetron for the prevention of postoperative nausea and vomiting (PONV).	Group I (n=50) was the control; Group II (n=50) received ondansetron 4 mg iv just prior to induction of anesthesia; in Group III (n=50) acupressure wristbands were applied at the P6 points. Acupressure wrist bands were placed inappropriately in Groups I and II. The acupressure wrist bands were applied 30 min prior to induction of	150	Patients were comparable in all three groups with regard to age, sex, height, weight and duration of surgery.	Randomized, prospective, double-blind and placebo-controlled study.	Nausea was graded by visual analogue scale from 1–10 (1 = none, 2–5 = mild, 6–7 = moderate and 8–10 = severe). Vomiting and retching were not distinguished and their severity was classified using the number of episodes over 24 hrs.	Elective laparoscopic cholecystectomy	The acupressure and ondansetron groups had a significant decrease in the incidence of PONV during the same period. A significant decrease in the requirement for rescue medication in groups II and III was observed in the first six hours following surgery. No side effects from acupressure bands were reported.

			anesthesia and removed six hours following surgery. Groups I and III patients received normal saline 1 mL iv just before induction of anesthesia to maintain blinding. No antiemetic medication was given before or during the operation.						
Schultz, A. A., Andrews, A. L., Goran, S. F., Mathew, T., & Sturdevant, N.	2003	The purpose of this study was to evaluate the effectiveness of acupressure bands,	randomized to one of four groups: droperidol and acupressure bands, droperidol and placebo bands,	143	There was no statistically significant difference in age between groups.	Double-blind experimental design.	Nausea was measured by self-report on a four-point scale, from 0 for no nausea to 3 for severe nausea.	Forty-two women had abdominal surgeries, 73 had vaginal surgeries, 25 had laparoscopic procedures,	There was no statistically significant difference in the experience of nausea or vomiting among the

Comparison of acupressure bands and droperidol for reducing post-operative nausea and vomiting in gynecologic surgery patients. *Applied Nursing Research*.		droperidol, and the combined modalities, administered preoperatively, in reducing PONV in inpatient gynecologic patients.	placebo drug and acupressure bands, or placebo drug and placebo bands. Sea-band® wristbands were used and droperidol 1.25 mg IV.				Vomiting was defined as actual vomiting or retching without emesis. It was measured by the number of episodes, separated by a 5-minute time interval between episodes. Subjects were also asked to keep a home diary of episodes of nausea and vomiting and pain experiences for up to 7 days post-surgery.	and 3 were in the " other" category.	women in the four groups. It was noted that all women who were randomized to receive actual acupressure bands had higher rates of nausea preoperatively. More women in the droperidol/acupressure bands group had abdominal surgery and required more opioid medications for pain.

Apfel, C., Kranke, P., & Eberhart, L. Comparison of surgical site and patient's history with a simplified risk score for the prediction of postoperative nausea and vomiting. *Anaesthesia*	2004	Compared surgical site and patient history against a simplified four-factor risk score.	Surgical site, modified risk score, and history of PONV	1566	44% were female, 70% non-smokers, 36% history of PONV, 69% use of post-op opioids.	Comparison Study	The incidence of PONV, relative risk, odds ratio and predictive characteristics of surgical site, history of PONV and the simplified risk score	Opthal, ENT, abdominal, chole, GYN, and orthopedic. Highest levels of PONV were in abdominal, chole, and GYN	Researchers found that the site of surgery and the patient's history of PONV were not good predictors of PONV. The simplified risk score had a better predictive value, but even it was only modestly successful.
Klein, A. A., Djaiani, G., Karski, J., Carroll, J., Karkouti, K.,	2004	To determine whether the application of acupressure	Randomized to have Sea-band® wristbands on both wrists at P6 (n=75) or control bands with the	152	There were no differences between the 2 groups with regard to demographic	Prospective, randomized, double-blind clinical trial.	Nausea was assessed by rating it as mild, moderate, or severe. Retching and	Patients undergoing primary coronary artery bypass graft or valvular	There were no differences with respect to the incidence of nausea or vomiting and antiemetic

McCluskey, S., ... & Cheng, D. Acupressure wristbands for the prevention of postoperative nausea and vomiting in adults undergoing cardiac surgery. ***Journal of cardiothoracic and vascular anesthesia*****.**		bands would lead to a reduction in postoperative nausea and vomiting after cardiac surgery.	plastic bead removed (n=77). Applied prior to anesthesia induction		data and surgical characteristics except for gender; the placebo group had significantly more women than the study group.		vomiting were considered as equals and were recorded over a 24-hour period post extubation.	surgery.	requirements between the 2 groups. Because the 2 groups were not equally distributed with respect to sex, the Subset analysis by sex showed that female patients in the acupressure group required less antiemetic treatment than female patients in the placebo group. There was also a reduction in the incidence of vomiting.

Turgut, S., Ozalp, G., Dikmen, S., Savli, S., Tuncel, G., & Kadiogullari, N. Acupressure for postoperative nausea and vomiting in gynaecological patients receiving patient-controlled analgesia. ***European journal of anaesthesiology*****.**	2007	To evaluate the effectiveness of acupressure in preventing nausea and vomiting in patients undergoing gynaecological operations and receiving a patient-controlled analgesia device.	Acupressure (n _ 50) and control (n _ 50) The acupressure bands were applied 30 min before induction of anaesthesia in both groups. Sea-band® wristbands were placed on both wrists with the plastic bead positioned at the P6 point in the acupressure group, and In controls, bands were placed with the beads at a non-acupoint site on the dorsal surface of the	100	Patients of both groups were comparable with regard to age, weight, height, ASA physical status and duration of surgery.	Double-blind RCT	Total abdominal hysterectomy and bilateral salpingo-oophorectomy.	Postoperative nausea was classified as none, mild, moderate or severe. The degree of vomiting was recorded as none, mild (1–2 number of episodes), moderate (3–5) and severe (>5).	The cumulative incidence of nausea, vomiting and antiemetic use was significantly lower with acupressure. Acupressure at the P6 meridian point is efficacious in preventing nausea and vomiting in patients receiving morphine–PCA after gynecological surgery.

			forearm. In both groups, bands were covered by loose gauze. All patients received Morphine by PCA pump for 24 hours postop.						
Kim, Y. H., Kim, K. S., Lee, H. J., Shim, J. C., & Yoon, S. W. The efficacy of several neuromuscular monitoring modes at the p6 acupuncture point in preventing postoperat	2011	identify which neuromuscular monitoring modes (ST, TOF, DBS, or tetanus) at the P6 acupoint can prevent PONV after laparoscopic hysterectomy	Control, 1-Hz single twitch (ST) (n=54, control), ST txt (n=52) double-burst stimulation (DBS) (n=53), tetanus stimulating P6 (n=52), and train-of-four (TOF)(n=53).	264	Female. Baseline characteristics of study participants were similar, as were intraoperative variables. No side effects were reported from the electrical stimulation.	prospective, randomized, double-blind, placebo-controlled study	PONV was assessed on a 3-point scale: 0 = no symptoms, 1 = only nausea, 2 = vomiting. Pain and satisfaction were evaluated with a visual analog scale.	Laparoscopic hysterectomy	This study found that tetanic stimulation applied to the P6 acupoint significantly reduced PONV, requests for PCA, and total PCA dose during the first 6 hours after laparoscopic hysterectomy, while it increased patient

ive nausea and vomiting. ***Anesthesia & Analgesia***									satisfaction.
Soltani, A. R. E., Mohammadinasab, H., Goudarzi, M., Arbabi, S., Mohammadinasab, A., Mohammadinasab, F., & Samimi, M. Comparing the efficacy of prophylactic p6 acupressure,	2011	To compare the efficacy of acupressure wrist bands, ondansetron, metoclopramide and placebo in the prevention of vomiting and nausea after strabismus surgery.	Group I was the Control, group II received metoclopramide 0.2 mg/kg, group III received ondansetron 0.15 mg/kg iv just before induction, in Group IV acupressure wristbands were applied at the P6 points. Acupressure wrist bands were placed	200	Patients were comparable in all groups with regard to age, sex, weight and duration of surgery.	Randomized, prospective, double-blind and placebo-controlled study.	Patients were followed up at the recovery (0-2 hr.) and in the ward (2-24 hr.) during first 24 hours and were assessed for PONV. Postoperatively retching, nausea and vomiting were recorded by nursing staff. No specific tool	Strabismus surgery	There was a statistically significant decrease in PONV in the acupressure group compared to placebo and metoclopramide and an equal efficacy with ondansetron.

ondansetron, metoclopramide and placebo in the prevention of vomiting and nausea after strabismus surgery. ***Acta Medica Iranica*****.**			inappropriately in Groups I, II and III. The acupressure wrist bands were applied 30 min prior to the induction of anesthesia and removed six hours after surgery. Each group had n=50 patients.				was identified in this study, or how the data was collected.		
Holmér Pettersson, P., & Wengström, Y. Acupuncture prior to surgery to minimize postoperative nausea and	2012	assess the outcome of acupuncture treatment prior to surgery in order to avoid or minimize postoperative nausea and	acupressure by transcutaneous electric stimulation, TENS, acupressure via a non-invasive stimulation by wristband, and	8 articles	3 RCTs, 3 Meta-analyses, 2 Cochrane Reviews, and one overview.	Systematic Literature Review	Electronic data base search	Review of multiple studies of differing surgical procedures.	The overall results of this review conclude that all kinds of AP stimulation, both non-invasive and invasive, seem to prevent PONV with

vomiting: a systematic review. ***Journal Of Clinical Nursing***		vomiting.	acupuncture						minimal side effects. Two studies showed no difference between txt and placebo, 6 showed significant decrease in N/V with AS txt.
White, P. F., Zhao, M., Tang, J., Wender, R. H., Yumul, R., Sloninsky, A. V., & Cunneen, S. Use of a disposable acupressure device as part of a multimodal antiemetic	2012	assess the efficacy of a disposable acupressure device (Pressure Right®) on the incidence of emetic episodes and quality of recovery when used in combination with	"sham" acustimulation device or a disposable Pressure Right device placed bilaterally at the P6 point 30 to 60 minutes before induction of anesthesia	100	Demographic characteristics, including age, body weight, smoking status, and histories of PONV or motion sickness were not significantly different in the 2 antiemetic study	randomized, sham-controlled, and double-blind study	modified Aldrete criteria, 3-point verbal rating scale (1 = dissatisfied, 2 = satisfied, and 3 = highly satisfied), and quality of recovery (QoR) score was assessed using a standardized 9-item	Major laparoscopic procedure; 45 cholecystectomies, and 55 gastric banding.	Use of the Pressure Right acupressure device in combination with antiemetic drugs provided a significant reduction in the incidence of vomiting from 0 to 72 hours after surgery with an associated improvement

strategy for reducing postoperative nausea and vomiting. ***Anesthesia & Analgesia***		ondansetron and dexamethasone for antiemetic prophylaxis.			groups.		questionnaire, incidence of nausea, vomiting, and retching were recorded as present or absent.		in patient satisfaction with their PONV management.
Hofmann, D., Murray, C., & Beck, J. Acupressure in Management of Postoperative Nausea & Vomiting (PONV) in High Risk Ambulatory Surgical Patients. ***Journal of PeriAnesthesia***	2013	Investigate the efficacy of preoperative placement of acupressure at P6 on PONV incidence in ambulatory surgical patients identified as high risk.	Acupressure at P6 (n=57) and sham acupressure (n=53), both along with routine care. Applied unilaterally prior to anesthesia (30-60 min).	110	This was not reported in the study.	Double blind Randomized Sham Controlled Study	VAS during recovery Phase I and II	Ambulatory surgery, not specified.	The use of a wrist band or band of beads for stimulation of acupoint P6 30-60 minutes prior to anesthesia induction significantly reduced PONV in all 3 postoperative phases.

Nursing									
Cheong, K. B., Zhang, J., Huang, Y., & Zhang, Z. The Effectiveness of Acupuncture in Prevention and Treatment of Postoperative Nausea and Vomiting - A Systematic Review and Meta-Analysis. ***Plos ONE***	2013	This paper included a systematic review and meta-analysis on the effect of different type of acupuncture and acupoint selection in PONV prevention and treatment.	P6 acupuncture vs. no acupuncture; P6 acupressure vs. sham; P6 electroacupoint stimulation vs. sham. PC6 acupressure was maintained for at least 24h. PC6 acupressure intervened prior to induction of anaesthesia.	30	RCTs	Qualitative synthesis and Meta-Analysis	Electronic database search	N/A	4 high quality studies, 9 moderate quality studies and 3 showed low quality in the P6 stimulation group. PC6 acupuncture significantly reduced the number of cases of nausea and vomiting. PC6 acupressure significantly reduced the number of cases of postoperative nausea and vomiting compared to sham group. PC6 electro-

									acupoint stimulation significantly reduced the number of cases of postoperative nausea and vomiting compared to sham group.
Cooke, M., Rapchuk, I., Doi, S. A., Spooner, A., Wendt, T., Best, J., & ... Rickard, C. Wrist acupressure for post-operative nausea and vomiting (WrAP): A pilot study. ***Compleme***	2015	Provide preliminary evidence for the efficacy of PC 6 acupoint stimulation vs. placebo for reducing post-operative nausea and vomiting in cardiac surgery patients.	Sea-band® with the bead for the intervention (n=38) and Sea-band® with the bead removed for the control (n=42). Applied in the ICU post-operatively.	80	Demographic and clinical characteristics were not different across randomized groups.	Blinded Pilot RCT	10-point nausea scale, rescue anti-emetics, and Quality of Recovery (QoR-15) scale	Cardiac surgery	Non-significant 2.3% decrease in any PONV in the beaded group. Clinically significant 16.5% decrease in vomiting overall in the beaded compared to the non-beaded group. a larger trial of *N* = 526 would be adequate to

ntary Therapies In Medicine									detect statistically significant differences
Lee A, Chan SKC, Fan LTY. Stimulation of the wrist acupuncture point PC6 for preventing postoperative nausea and vomiting. Cochrane Database of	2015	determine the effectiveness and safety of PC6 acupoint stimulation with or without antiemetic drug versus sham or antiemetic drug for the prevention of PONV	7667 participants; acupuncture, electro-acupuncture, transcutaneous electrical acupoint stimulation, transcutaneous nerve stimulation, laser stimulation, capsicum plaster, and acustimulation device,	59	RCTs	Cochrane Review	Electronic data base search	Review of all recent data, many different surgical populations.	To prevent PONV, the effect of PC6 acupoint stimulation is comparable to anti-emetics.

Systematic Reviews		in people undergoing surgery	compared to sham and anti-emetics						
Carr, K. L., Johnson, F. E., Kenaan, C. A., & Welton, J. M. Effects of P6 stimulation on postoperative nausea and vomiting in laparoscopic cholecystectomy patients. ***Journal of PeriAnesthesia Nursing***	2015	Investigate the effects of P6 electrical acustimulation on PONV and PDNV prophylaxis in females after laparoscopic cholecystectomy.	The control group did not receive P6 stimulation. In the treatment group, the intensity of the stimulation was arbitrarily set at 5 on a scale of 5 to 9. Immediately after induction of general anesthesia P6 stimulation was started with a nerve stimulator, one stimulation every 8 seconds.	56	Female. There were no significant differences in age, ASA class or history of nausea, vomiting, or motion sickness between treatment and control groups. Length of surgery was 50.8 (±15.2) minutes in the treatment group and 60.0 (±13.0) minutes in the control group ($P < .05$)	double-blinded randomized controlled clinical trial	Likert Nausea Scale Score developed by the hospital.	Laparoscopic cholecystectomy	The results of the study demonstrate that the use of P6 stimulation in the perioperative arena is clinically meaningful; however, more research is needed with a larger sample size.

Ertas, G., Sener, E. B., Kaya, C., Ozkan, F., Ustun, Y. B., & Koksal, E. Effects of P6 Acustimulation with the ReliefBand on Postoperative Nausea and Vomiting in Patients Undergoing Gynecological Laparoscopy. ***Holistic nursing practice***	2015	investigated the effects of a ReliefBand—a electrostimulation device on the incidence of PONV, rescue antiemetic use, consumption of painkillers, adverse effects, and hemodynamic responses.	ReliefBand group (n=31)and a sham ReliefBand group (n=31). Activated prior to anesthesia induction.	62	Female. The patients' demographic characteristics were not statistically significantly different between the groups.	double-blind, randomized, sham-controlled study	nausea verbal rating scale (VRS), in which 0 = the absence of nausea and 10 = the most severe nausea, and the visual analogue scale (VAS), in which 0 = no pain and 10 = the most severe pain, Apfel risk score. And satisfaction with postop nausea.	gynecological laparoscopy	P6 ReliefBand acustimulation in patients undergoing gynecological laparoscopy decreased the severity of nausea, PONV scores, and the use of rescue anti-emetics. Nausea scores were statistically significantly higher in the sham group than the acustimulation group.

Gilbert, R. T., Bergland, E., Davis, S., Farish, N., Hance, J., Kaplan, C., ... & McGrath, T. Short-Term Acupressure Does Not Prevent Long-Term Post-Operative Nausea and Vomiting. ***Journal of PeriAnesthesia Nursing***	2015	PACU staff hypothesized that manual acupressure to one wrist during the immediate post-operative period would decrease overall PONV.	The experimental group (N=134) wore an acupressure wristband which placed pressure at the P6 pressure point on one wrist. The control group (N=136) wore a wristband without the application of acupressure at P6. The bands were wrapped with gauze to blind the nurses from placement. The band was removed after being worn for 2 hours.	270	This data was not included in the study, they used convenience sampling of PACU patients, device applied in PACU, post-surgery.	double blind, randomized study	Data on the incidences of nausea, vomiting and 24-hour post-op antiemetic use was obtained, there was not specifics of what tools, if any were used.	The study didn't report different types of surgical patients or demographic data.	short-term use of acupressure was not associated with a difference in overall episodes of nausea, vomiting, or antiemetic use

APPENDIX B

INSTRUMENTS

1. Acupressure to prevent and treat postoperative nausea and vomiting

Pre/posttest Learner Evaluation

(Please circle the best answer)

1. What is acupressure?

    a. An invasive intervention using needles to stimulate acupuncture points.

    b. Acupressure is related to acupuncture but it is non-invasive and involves applying pressure using hands, elbows, or other devices at a specific acupressure point.

    c. Use of electrical stimulation with acupuncture needles at specific points.

2. Where is an acupressure point that addresses nausea and vomiting?

    a. The inner forearm 2 inches proximal to the wrist crease, between the flexor tendons.

    b. The upper auricle of the ear.

    c. The forehead between the eyebrows.

3. How much pressure should be used when administering acupressure?

    a. You should squeeze the patients arm as hard as you can.

    b. Use only the sensation of touch, no pressure is necessary.

    c. Pressure should be applied with 1cm of depth to the skin.

4. How long should an acupressure treatment take?

    a. Ten minutes.

    b. 30 minutes.

    c. Three minutes.

5. How often can acupressure be administered with the Sea-band®?

    a. The wrist bands can be worn continuously and additional pressure applied to the plastic stud if needed. These bands can be removed for 30 minutes every 2 hours if needed.

    b. No more than every hour.

    c. No more than every two hours.

6. What are the contraindications to administering acupressure?

    a. Impaired skin integrity at the application site.

    b. History of lymphedema in the upper extremities.

    c. All of the above.

7. How do you measure outcomes for this intervention?

    a. The Nausea VRS.

    b. The PONV intensity scale.

    c. The BARF scale.

    d. A & B.

8. Are there any side effects of acupressure with the Sea-band®?

    a. No side effects have ever been reported.

    b. Side effects are mild and include irritation at the stimulation point, pain at the stimulation point, and short term numbness and tingling in the hands.

    c. This is a high risk intervention that should be used cautiously.

9. What is a reliable, evidenced-based resource for providers and patients related to acupressure and other CAM therapies?

a. sciencebasedmedicine.org.

b. acupressure.com.

c. National Center for Complementary and Integrative Health, nccih.nih.gov.

10. Who can administer acupressure?

a. Nurses.

b. Only medical doctors.

c. Only certified acupuncturists.

d. Anyone who is educated on their use, with proper application and contraindications.

e. A&B only.

2. HCAMQ

Holistic Complementary and Alternative Health Questionnaire

Listed below are a number of statements concerning your health and complementary medicine. Please decide to what extent you agree or disagree with each statement. For each statement you should circle the number that corresponds most closely to your own view. There are no right or wrong answers. **Please do not leave out any statements**.

	Strongly Agree	*Agree*	*Mildly agree*	*Mildly disagree*	*Disagree*	*Strongly disagree*
1 Positive thinking can help you fight off a minor illness	1	2	3	4	5	6
2 Complementary medicine should be subject to more scientific testing before it can be accepted by conventional doctors	1	2	3	4	5	6
3 When people are stressed it is important that they are careful about other aspects of their lifestyle (e.g. healthy eating) as their body already has enough to cope with	1	2	3	4	5	6
4 Complementary medicine can be dangerous in that it may prevent people getting proper treatment	1	2	3	4	5	6
5 The symptoms of an illness can be made worse by depression	1	2	3	4	5	6
6 Complementary medicine should only be used as a last resort when conventional medicine has nothing to offer	1	2	3	4	5	6
7 If a person experiences a series of stressful life events they are likely to become ill	1	2	3	4	5	6
8 It is worthwhile trying complementary medicine before going to the doctor	1	2	3	4	5	6
9 Complementary medicine should only be used for minor ailments and not for the treatment of more serious illness	1	2	3	4	5	6
10 It is important to find a balance between work and relaxation in order to stay healthy	1	2	3	4	5	6
11 Complementary medicine builds up the body's own defences, so leading to a permanent cure	1	2	3	4	5	6

Scoring of the Holistic Complementary and Alternative Health Questionnaire (HCAMQ)

The total score is obtained by adding up over all 11 questions the numbers shown in the following table. The CAM subscale is obtained by adding up over the six CAM items (labelled in the table) and the HH subscale by adding up over the five HH items (labelled in the table. A lower score indicates a more positive attitude towards CAM and HH.

Item number 4 type	*Strongly agree*	*Agree*	*Mildly agree*	*Mildly disagree*	*Disagree*	*Strongly disagree*
1 HH	1	2	3	4	5	6
2 CAM	6	5	4	3	2	1
3 HH	1	2	3	4	5	6
4 CAM	6	5	4	3	2	1
5 HH	1	2	3	4	5	6
6 CAM	6	5	4	3	2	1
7 HH	1	2	3	4	5	6
8 CAM	1	2	3	4	5	6
9 CAM	6	5	4	3	2	1
10 HH	1	2	3	4	5	6
11 CAM	1	2	3	4	5	6

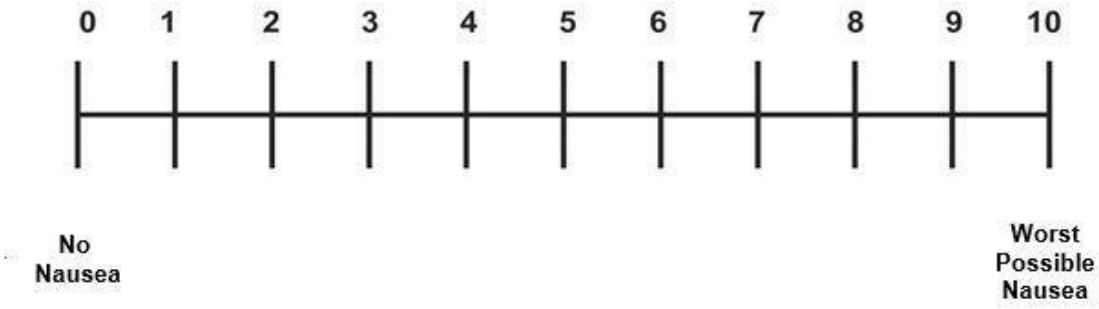
3. Apfel Risk Score

Table 1
PONV Risk Assessment Tool

Preoperative PONV risk assessment tool Based on Apfel's Simplified Risk Score	
Predictors	**Presence of Predictor(s)**
Female gender	
History of motion sickness or PONV	
Nonsmoking	
Postoperative opioids	
Number of Predictors Presented	**Predictive PONV Risk (%)**
Score and Correlated PONV Risk: 0 = 10%, 1 = 21%, 2 = 39%, 3 = 61%, 4 = 79%	
Clinical Implication: Patients with 0 to 1 risk score (21% predictive risk) are considered at low risk; preoperative prophylaxis with antiemetic is not indicated unless known medical sequel presents. Patients with a risk score of 2 (39% predictive risk) are considered at moderate risk; one antiemetic may be used for prophylaxis. Patients with risk scores of 3 or 4 (predictive risk 61% or higher) are considered at high-risk for PONV and should have combination antiemetics for preoperative prophylaxis.	

Adapted from: Apfel CC, Laara E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting: conclusions from cross-validations between two centers. *Anesthesiology*. 1999; 91, 693-700.

4. VRS for nausea



No Nausea

Worst Possible Nausea

5. PONV Intensity Score

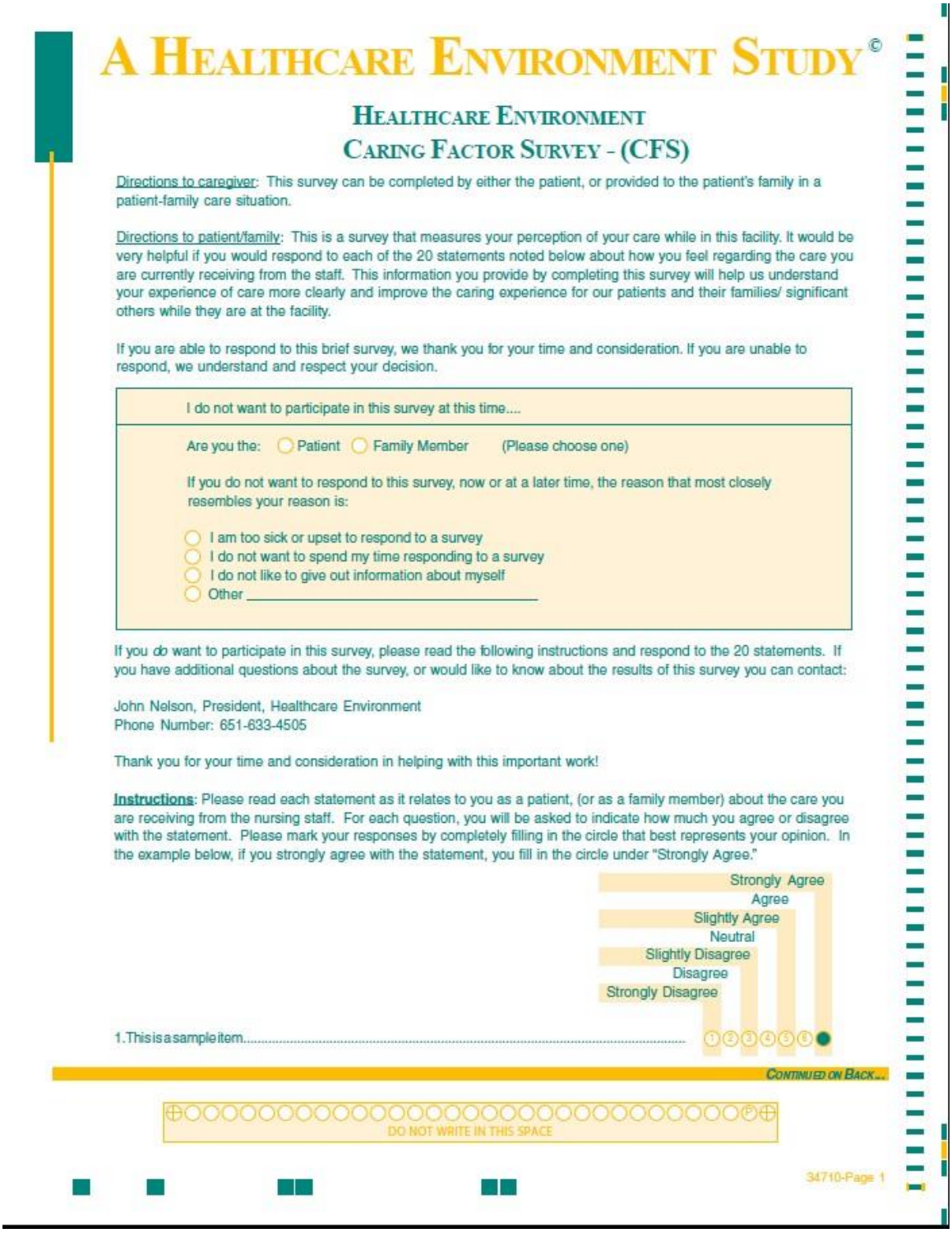
Assessment	Score
A. At 6 hours after surgery (or time of discharge if after ambulatory surgery)	
Q1 Have you vomited or had dry-retching*?	
a) No	0
b) Once or twice	2
c) Three or more times	50
Q2 Have you experienced a feeling of nausea (“*an unsettled feeling in the stomach and slight urge to vomit”)?* If yes, has your feeling of nausea interfered with activities of daily living, such as being able to get out of bed, being able to move about freely in bed, being able to walk normally or eating and drinking?	
a) No	0
b) Sometimes	1
c) Often or most of the time	2
d) All of the time	25
Q3 Has your nausea been mostly:	
a) varying (“*comes and goes*”)?	1
b) constant (“*is nearly or almost always present*”)?	2
Q4 What was the duration of your feeling of nausea (in hours [whole or fraction])?	___ ·___ h
For Part A, if answer to Q1 = c), score A = 50; otherwise, select the highest score of Q1 or Q2, then multiply x Q3 x Q4	PONV intensity score (0-6 h) **A =**

**Count distinct episodes: several vomits or retching events occurring over a short time frame, say 5 min, should be counted as one vomiting/dry-retching episode; multiple episodes require distinct time periods without vomiting/dry-retching*

Scoring for Clinical Importance of PONV

Total Score	Score
Clinically important PONV is defined as a total score ≥50 at any time throughout the study period. Scores at 6 and 24 (and, if considered important in the clinical context, 72) hours can be added for quantification of the entire period, or sub-scales used for each period.	Final PONV intensity score (0-72 h)
A + B + C =	

6. Caring Factor Survey



A Healthcare Environment Study©

Healthcare Environment
Caring Factor Survey - (CFS)

Directions to caregiver: This survey can be completed by either the patient, or provided to the patient's family in a patient-family care situation.

Directions to patient/family: This is a survey that measures your perception of your care while in this facility. It would be very helpful if you would respond to each of the 20 statements noted below about how you feel regarding the care you are currently receiving from the staff. This information you provide by completing this survey will help us understand your experience of care more clearly and improve the caring experience for our patients and their families/ significant others while they are at the facility.

If you are able to respond to this brief survey, we thank you for your time and consideration. If you are unable to respond, we understand and respect your decision.

I do not want to participate in this survey at this time....

Are you the: ○ Patient ○ Family Member (Please choose one)

If you do not want to respond to this survey, now or at a later time, the reason that most closely resembles your reason is:

- ○ I am too sick or upset to respond to a survey
- ○ I do not want to spend my time responding to a survey
- ○ I do not like to give out information about myself
- ○ Other _____

If you *do* want to participate in this survey, please read the following instructions and respond to the 20 statements. If you have additional questions about the survey, or would like to know about the results of this survey you can contact:

John Nelson, President, Healthcare Environment
Phone Number: 651-633-4505

Thank you for your time and consideration in helping with this important work!

Instructions: Please read each statement as it relates to you as a patient, (or as a family member) about the care you are receiving from the nursing staff. For each question, you will be asked to indicate how much you agree or disagree with the statement. Please mark your responses by completely filling in the circle that best represents your opinion. In the example below, if you strongly agree with the statement, you fill in the circle under "Strongly Agree."

	Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree
1. This is a sample item.....	①	②	③	④	⑤	⑥	●

CONTINUED ON BACK...

DO NOT WRITE IN THIS SPACE

Demographic Information

Facility: _____

Unit/Dept Type: ○ Medical ○ Surgical ○ Critical Care ○ Cardiac ○ Pediatrics ○ Women's Services ○ Psych ○ Other_____

Are you the: ○ Patient ○ Family Member (Please choose one)

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. Overall, the care I have received from the staff at this facility has been provided with loving kindness.	1	2	3	4	5	6	7
2. I believe the healthcare team that I am currently working with solves unexpected problems really well.	1	2	3	4	5	6	7
3. Every day I am here, I see that the care is provided with loving kindness.	1	2	3	4	5	6	7
4. As a team, my caregivers are good at creative problem solving to meet my individual needs and requests.	1	2	3	4	5	6	7
5. The care providers honored my own faith, helped instill hope, and respected my belief system as part of my care.	1	2	3	4	5	6	7
6. When my caregivers teach me something new, they teach me in a way that I can understand.	1	2	3	4	5	6	7
7. While in this facility, my caregivers helped support my hope and faith during their care for me.	1	2	3	4	5	6	7
8. My caregivers are responsive to how I learn and whether I am ready to learn when teaching me something new.	1	2	3	4	5	6	7
9. My caregivers were very respectful of my individual spiritual beliefs and practices.	1	2	3	4	5	6	7
10. This facility and its care provider have created an environment which helps me to heal physically and spiritually.	1	2	3	4	5	6	7
11. My caregivers encouraged me to practice my own individual spiritual beliefs as part of my self-caring and healing.	1	2	3	4	5	6	7
12. My healthcare team has created a healing environment that recognizes the connection between my body, mind, and spirit.	1	2	3	4	5	6	7
13. My caregivers have established a helping-trusting relationship with me during my time here	1	2	3	4	5	6	7
14. I know my healthcare team will help to meet my physical needs, as well as my emotional or spiritual needs.	1	2	3	4	5	6	7
15. Everybody on my healthcare team values relationships that are helpful and trusting.	1	2	3	4	5	6	7
16. My caregivers have responded to me as a whole person, helping to take care of all my needs and concerns.	1	2	3	4	5	6	7
17. My care providers encourage me to speak honestly about my feelings, no matter what my feelings are.	1	2	3	4	5	6	7
18. I feel like if I told my care providers I believe in miracles, they would support me in my belief.	1	2	3	4	5	6	7
19. I feel like I can talk openly and honestly about what I'm thinking, because those who are caring for me embrace my feelings, no matter what my feelings are.	1	2	3	4	5	6	7
20. My caregivers are accepting and supportive of my beliefs regarding a higher power, which allows for the possibility of me and my family to heal.	1	2	3	4	5	6	7

7. Surgical Nursing Staff Survey

(Please answer yes or no to each question)

1. Do you know what acupressure is?
2. Have you ever personally received an acupressure or acupuncture treatment?
3. Do you know anyone who has?
4. Are you interested in learning about acupressure treatments to incorporate into your practice?
5. Have you asked your patients about their use of complementary and alternative therapies (CAM)?
6. Do you think incorporating CAM therapies into your practice would be beneficial to your patients?
7. Do you think incorporating CAM therapies would benefit your nursing practice?
8. Are you interested in learning about other CAM therapies?
9. Do you know what CAM therapies are approved nursing interventions by Montana State Board of Nursing?
10. Do you think this facility would benefit from a CAM department?

Comments:

APPENDIX C

ELECTRONIC MEDICAL RECORD CHARTING FOR NURSES

Nausea and Vomiting Risk Score	
Has Patient Vomitted or Had Dry-Retching	◯ No ◯ Once or Twice ◯ Three or More Times
Has Patient Experienced a Feeling of Nausea	◯ No ◯ Sometimes ◯ Often or Most of the Time ◯ All of the Time If yes, has your feeling of nausea interfered with activities of daily living, such as being able to get out of bed, being able to move about freely in bed, being able to walk normally or eating and drinking?
What is the Patients Current Nausea Level	☐ Descriptors of nausea level may be correlated to the numerical nausea scale as follows: Mild Nausea is a score of 1-3 Moderate Nausea is a score of 4-7 Severe Nausea is a score of 8-10
Has Patients Nausea Been Mostly	◯ Varying ◯ Constant
What Was the Duration of Patients Feeling of Nausea	☐ (hr)
Pre-Op Checklist	
Skin is Intact Without Redness or Open Sores	◯ Yes ◯ No
P6 Acupressure Point Marked on Both Forearms	◯ Yes ◯ No
Patient is Wearing the Seabands on Both Forearms at P6	◯ Yes ◯ No
Pulse Oximetry in Both Upper Extremities is >90%	◯ Yes ◯ No
Patient Received 3 Minutes of Pressure to P6	◯ Yes ◯ No
Pre-Op Checklist Comment	☐

Nausea and Vomiting Risk Score	
Has Patient Vomitted or Had Dry-Retching	◯ No ◯ Once or Twice ◯ Three or More Times
Has Patient Experienced a Feeling of Nausea	◯ No ◯ Sometimes ◯ Often or Most of the Time ◯ All of the Time If yes, has your feeling of nausea interfered with activities of daily living, such as being able to get out of bed, being able to move about freely in bed, being able to walk normally or eating and drinking?
What is the Patients Current Nausea Level	☐ Descriptors of nausea level may be correlated to the numerical nausea scale as follows: Mild Nausea is a score of 1-3 Moderate Nausea is a score of 4-7 Severe Nausea is a score of 8-10
Has Patients Nausea Been Mostly	◯ Varying ◯ Constant
What Was the Duration of Patients Feeling of Nausea	☐ (hr)
Post-Op Checklist	
Discomfort at Seaband Application Site	◯ Yes ◯ No
Numbness and Tingling in the Hands or One Hand	◯ Yes ◯ No
Seabands Removed	◯ Yes ◯ No
Seabands Reapplied After 30 Minutes	◯ Yes ◯ No
Redness at the Application Site of Seaband	◯ Yes ◯ No
Patient Denies Discomfort (Skin is Warm, Dry and Intact)	◯ Yes ◯ No