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Perceptions of Acupuncture and Acupressure by Anesthesia Providers

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PERCEPTIONS OF ACUPUNCTURE AND ACUPRESSURE BY ANESTHESIA PROVIDERS

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

by

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Dedication

This dissertation is dedicated to my grandparents:

Dr. and Mrs. William R. Rice

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Quotes inspire me and I will conclude with the quote posted above my desk:

"*Accept the challenges so that you can feel the exhilaration of victory*."

~ General George S. Patton

These words could not ring more true as I close the door on this academic journey and look forward, with hope, to what is next ... ACF

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Abstract

PERCEPTIONS OF ACUPUNCTURE AND ACUPRESSURE BY ANESTHESIA PROVIDERS

By: Amanda Caroline Faircloth, PhD, DNAP

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

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BACKGROUND**:** Randomized controlled trials show acupuncture and acupressure support anesthesia management by decreasing anxiety, opioid requirements and treating post-operative nausea and vomiting. Acupuncture and acupressure have demonstrated clinical usefulness and received governmental support (NIH, PPACA, WHO, U.S. Military), but have not yet diffused into mainstream anesthesia practice. This study examined US anesthesia providers' perceptions of acupuncture and acupressure.

METHODS: Ninety-six anesthesiology departments stratified by geographic region (Northeast, South, West, and Midwest) and institution type (university medical centers, community hospitals, children's hospitals, and VA hospitals) were selected for participation in an anonymous, online survey. The target sample was 1,728 providers of which $N = 292$ (54% anesthesiologists, 44% CRNAs, 2% AAs) responded yielding an overall 17% response rate.

RESULTS: Spearman's correlation coefficient revealed a statistically significant correlation between acupuncture and geographic region, with the West having the highest predisposition toward acupuncture use (r_s = 0.159, p = 0.007). Females are more likely to use acupuncture than men (r_s = -.188, p = 0.002). Age yielded a moderate effect size with providers between the ages of 31-50 years old experiencing the best outcomes administering acupuncture (r_s = 0.65, 95% CI = 2.79, 3.06). A strong effect size exists between acupuncture and country of pre-anesthesia training (r_s = 1.00, 95% CI = 1.08, 1.16). Some providers have used acupuncture (27%) and acupressure (18%) with positive outcomes, however the majority of providers have not used these modalities, but would consider using them (54%, *SD* = 1.44 acupuncture; 60%, *SD* = 1.32 acupressure). Seventy-six percent of respondents would like acupuncture education and 74% would like acupressure education (*SD* = 0.43, *SD* = 0.44, respectively). *Lack of scientific evidence* (79%, *SD* = 0.73) and *unavailability of credentialed providers* (71%, *SD* = 0.92) were the primary barriers.

CONCLUSIONS: While most U.S. anesthesia providers have not used these modalities, they still report a favorable perception of acupuncture/acupressure's role as part of an anesthetic and the majority of providers express an interest in receiving education. This study adds to the body of acupuncture and acupressure research by providing insight into anesthesia providers' perceptions of these alternative medicine modalities.

Chapter One: The Problem

Introduction

"Now, let me tell you about my appendectomy in Peking." This seminal *New York Times* article, published by James Reston (1971, p. 1) first introduced the United States to the concept of acupuncture. In 1971, Mr. Reston, underwent an appendectomy in China while covering President Nixon's diplomatic visit. Acupuncture was used successfully to treat his postoperative pain. After the dissemination of his article, teams of U.S. physicians took tours of Chinese operating rooms to witness firsthand acupuncture's role in anesthesia (Diamond, 1971; White & Ernst, 2004).

Acupuncture-assisted anesthesia (AAA) involves inducing an anesthetic effect via needling to allow for a procedure or operation to be performed (Hu, Chang, Hung, & Shieh, 2009). AAA has been successfully used in China to serve as either the sole anesthetic or as an adjunct to a general anesthetic for pulmonary, neurosurgical, cardiac, gynecologic, general, and colorectal operations (Shen et al., 2007; Wu, Yan, & Feng, 2011; Xu & Qian, 2009; Yang, Ma, & Li, 2012; Zhou et al., 2011). While AAA is unique to China, acupuncture and acupressure have diffused into international anesthesia practice.

The World Health Organization (WHO) recognizes acupuncture as an effective treatment for nausea, vomiting, and postoperative pain management (WHO, 2003). Internationally, randomized controlled trials show acupuncture and acupressure support anesthesia management by decreasing anxiety and opioid requirements and treating

postoperative nausea and vomiting (PONV) (Fassoulaki, Paraskeva, Kostopanagioutou, Tsakalozou, & Markantonis, 2007; Fu, Zhang, Zhao, Chen, & Huang, 2012).

In the United States, acupuncture and acupressure are recognized as credible practices by the U.S. military, White House, and National Institutes of Health (NIH). The U.S. military currently uses acupuncture to provide pain relief to military personnel who may be excluded from opioid usage because of potential interference with alertness (Goertz et al., 2006). In 2002, the White House Commission on Complementary and Alternative Medicine drafted a policy to prioritize research and address issues related to the access and delivery of complementary and alternative medicine (CAM) (White House Commission, 2002)[1]. The NIH has completed 45 clinical trials examining the impact of acupuncture on various medical conditions. In spite of this government-supported research, there remains a void in the U.S. anesthesia literature regarding these Eastern medicine modalities (National Center for Complementary and Alternative Medicine [NCCAM], 2013).

The paucity of high quality research on this topic in U.S. anesthesia literature suggests that acupuncture and acupressure are not widely practiced in the United States, though major hospitals (Duke University Medical Center, University of Maryland Medical Center, University of North Carolina-Chapel Hill Hospital, and Massachusetts General Hospital) include acupuncture services as part of acute pain service management. Additionally, Stanford University School of Medicine has established a fellowship, Anesthesia Acupuncture. The 1-year fellowship is intended to provide medical acupuncture certification, initiate clinical research trials, and teach perioperative acupuncture for

[1] This policy has not been updated since 2002.
[2] Qi: natural energy, life force or energy flow

nausea/vomiting and oncology treatments, as well as acupuncture for opioid withdrawal (Stanford University School of Medicine, 2013).

Background of the Problem

Each year, increasing numbers of patients worldwide request CAM (El Deeb & Ahmady, 2011). Owen and Lewith (2004) propose that patients may benefit from the integration of CAM with conventional biomedicine. Likewise, trends suggest the inclusion of CAM, notably acupuncture and acupressure, in mainstream U.S. health-care provision in the near future (Wahner-Roedler et al., 2006).

Perceptions of CAM have been studied among health educators, physical therapy faculty, and pharmacy, medicine, and nursing students (Harris, Kingston, Rodriguez, & Choudary, 2006; Johnson, Priestley, & Johnson, 2008; Kreitzer, Mann, & Lumpkin, 2008; Liggett, 2009); however, a void exists in surveying the perceptions of anesthesia providers toward CAM. The limited exploration of these alternative medicine modalities in U.S. anesthesia literature prompts the question: Are these Eastern medicine practices being used by anesthesia providers in the United States?

This study focused on a subset of CAM—acupuncture and acupressure. These practices were chosen for their reference in the international literature as a complement to anesthesia practice. The remainder of this chapter will state the problem, detail the purpose of the study, provide research questions, and introduce the theoretical framework and methodology.

Statement of Problem

According to the Veterans Health Administration (2000), pain is the fifth vital sign. Good pain control after surgery is necessary to prevent negative clinical outcomes such as

tachycardia, decreased ventilation, and poor wound healing and conventional medical treatments may not be definitive (Han, 2011; Zhang, Lao, Ren, & Berman, 2014). Opioids are commonly used to mask pain, however, they have many adverse side effects including respiratory depression, pruritus, drowsiness, cognitive dysfunction, hallucinations, constipation, dependency issues, and an increased propensity toward nausea.

An estimated one-third of all patients will experience postoperative nausea and vomiting, which can prolong discharge from the recovery unit, lead to wound dehiscence, and diminish patient satisfaction (Kolodzie & Apfel, 2009; Rawlinson et al., 2012). Any medically important decrease in opioid usage will decrease the incidence of postoperative nausea and vomiting, provide cost savings, and improve patient outcomes.

International randomized control trials reveal that acupuncture and acupressure have been used to alleviate preoperative anxiety (Agarwal et al., 2005; Valiee, Bassampour, Nasrabadi, Pouresmaeil, & Mehran, 2012). Additionally, they have been shown to decrease opioid use in post-thoracotomy patients, anesthetic requirements in neurosurgical patients, and pain intensity in nulliparous women during the active phase of labor (Gheorghita et al., 2010; Hjelmstedt et al., 2010; Wong et al., 2006).

Despite a growing body of systematic studies, skepticism about acupuncture and acupressure remains high among medical professionals in the United States (Chernyak & Sessler, 2005). This study examined skepticism; knowledge deficits; and cultural, social or educational barriers by assessing the perceptions of U.S. anesthesia providers towards these alternative medicine modalities. Clarifying perceptions of these Eastern medicine modalities will provide an evidence-based, enlightened view of the current climate among U.S. anesthesia providers. Positive perceptions will allow the United States to progress into

conducting randomized controlled trials and examine the role that acupuncture and acupressure may fulfill as part of the perioperative experience.

Purpose of Study

The purpose of this study was to investigate U.S. anesthesia provider perceptions of acupuncture and acupressure. Perceptions were ascertained via an examination of anesthesia provider attitudes towards acupuncture and acupressure, current usage patterns, and identification of any barriers to clinical use. Specific aims are to (a) ascertain the usage patterns and attitudes among anesthesia providers, (b) identify any barriers to implementation, and (c) examine the relationship between geographic region and clinical use.

According to Fu et al. (2012), Western medical practitioners are beginning to incorporate acupuncture into mainstream medicine. CAM is an established component in the German, French, and Dutch medical curricula (Fisher & Ward, 1994). One-third of German medical doctors use acupuncture as part of their clinical practice to treat nonsurgical conditions such as chronic pain, migraines, and back pain (Frank & Stollberg, 2004). In Germany, surgical patients receiving preoperative acupuncture required 21% less fentanyl during the operation and had decreased postoperative pain requirements (Usichenko et al., 2006; Usichenko et al., 2007).

To gain an accurate depiction of the culture surrounding acupuncture and acupressure, researchers must first assess the perceptions of anesthesia providers towards these CAM practices in the United States. This research and the associated conclusions were accomplished by surveying U.S. anesthesia providers to ascertain their perceptions and current use of acupuncture and acupressure, to examine the impact of geographic location on

a provider's propensity to use these alternative medicine modalities, and to isolate the existence of any barriers to clinical use.

Introduction to the Theoretical Foundation

The theoretical framework of Everett Rodgers' (2003) diffusion of innovations theory provides the scientific underpinnings for this study. Rodgers' theory has been used in many clinical settings to describe the process of integrating a new innovation among members of a social system (Bowen Stanton, & Manno, 2012; Harting, Rutten, Rutten, & Kremers, 2009; Tian, 2011). Globally, acupuncture and acupressure are not new practices, as they have existed for over 3,000 years; however, it is unknown what role they play in current anesthesia practice. The relative shortage of U.S. anesthesia literature indicates that these alternative medicine modalities may not have diffused into daily clinical practice.

This study focuses on the first two stages of the theory—the knowledge stage and the persuasion stage. The knowledge stage examines exposure to and understanding of an innovation. This stage will reveal current usage patterns of U.S. anesthesia providers towards acupuncture and acupressure.

Persuasion is defined as attitude formation (Rodgers, 2003). The general perceptions of an innovation are developed during the persuasion stage. The constructs of *awareness-knowledge* (measuring the knowledge stage) and *attitude* (measuring the persuasion stage) will frame the research questions:

1. What proportion of anesthesia providers currently use acupuncture and acupressure in clinical practice? (measuring awareness-knowledge)
2. What barriers prevent acupuncture and acupressure use in anesthesia practice? (measuring attitude)

3. Is there a relationship between the use of acupuncture and acupressure in anesthesia practice based on geographic region? (measuring awareness-knowledge)
4. What are the general attitudes of anesthesia providers towards the use of acupuncture and acupressure? (measuring attitude)

Summary of Methods

This quantitative, nonexperimental, descriptive study used a cross-sectional research design to survey U.S. anesthesia providers. Anesthesia providers are defined as certified registered nurse anesthetists (CRNAs), physician anesthesiologists (anesthesiologists), and anesthesiologist assistants (AAs). Primary data were collected via a validated survey tool distributed over the Internet. The survey questions were aligned with the constructs of awareness-knowledge and attitude. The target population U.S. anesthesia providers.

Cluster sampling was employed to survey CRNAs, anesthesiologists, and AAs. Clusters were obtained from four geographic regions (West, Midwest, Northeast, South). Inclusion criteria involved adult, anesthesia providers, male or female, of any ethnicity or race, who currently practice anesthesia in the United States. The project team consisted of the primary researcher (a CRNA), a tenured professor in nurse anesthesia, the chairman of anesthesiology at a major university medical center, a methodologist, and the support of a faculty anesthesiologist who is certified in acupuncture.

With Institutional Review Board (IRB) approval, a sample of 1,728 anesthesia providers was surveyed. These providers were accessed from 96 anesthesia departments, equally distributed among the four specified geographic regions (West, Midwest, Northeast, South). Anesthesia is practiced in a variety of clinical settings including university medical

centers, community hospitals, children's hospitals, and U.S. Department of Veterans Affairs (VA) hospitals. The target sample in each region was comprised of anesthesiology departments from six university medical centers, six community hospitals, six children's hospitals, and six VA hospitals. This provided a total of 96 anesthesiology departments (estimate of ~18 providers/facility) to be surveyed. Descriptive statistics (specifically frequency, percentage, mean, and standard deviation), Spearman's correlation, and contingency tables will provide analysis as appropriate for the type of data under consideration.

Significance of the Study

The purpose of the study was to investigate U.S. anesthesia provider perceptions of acupuncture and acupressure. Anesthetics are expensive. Similarly, there are inherent logistical complexities such as medication shortages, and patient related intricacies such as adverse reactions and hemodynamic changes that exist with an anesthetic. It is reasoned that any decrease in anesthetic drug use, including opioids, may not only be attended by cost savings, but also will be associated with a reduction in side effects and adverse events.

Acupuncture and acupressure have been shown to decrease opioid requirements, assuage postoperative pain, and effectively treat PONV. These modalities, despite quantifiable success in international perioperative pain management, have yet to become part of mainstream anesthesia practice in the United States.

Current anesthesia practice in the United States is based on conventional western biomedicine, which represents the dominant health-care model in the United States (Milburn, 2004). Medical acupuncture works synergistically as a complement to western biomedicine or it may be used separately from biomedicine (Frank & Stollberg, 2004). This study

measured whether anesthesia providers who are familiar with acupuncture and acupressure currently use these practices as a complement to conventional, Western biomedicine. For anesthesia providers who do not use acupuncture or acupressure, this study revealed if there were any barriers that inhibit assimilation of these modalities into U.S. anesthesia practice. Finally, this study isolated the relationship between geographic region and acupuncture and acupressure use so that future researchers may have a better context for understanding the culture surrounding acupuncture use in the United States.

This study fills the gap between English-written U.S. and international literature. Long-term goals include establishing a framework for acupuncture and acupressure randomized controlled trials, identifying and estimating potential cost-saving benefits, and ultimately increasing U.S. anesthesia provider awareness and use of acupuncture and acupressure in anesthesia practice.

Definition of Terms

Complementary and alternative medicine (CAM): "A group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine" (NCCAM, 2011, p. 1).

Oriental medicine: Also referred to as Eastern or Asian medicine. Oriental medicine includes therapies such as acupuncture, acupressure, Chinese herbal medicine, moxibustion, Tui Na (Chinese medical massage), cupping glass therapy, Tai Qu and Qi Gong (meditative movement exercises), traditional Chinese medicine, Kampo (Japanese medicine), traditional Korean medicine, traditional Vietnamese medicine, and Ayurvedic medicine (Lee, Khang, Lee, & Kang, 2002; Omura 2003; Povolny, 2008).

Anesthesia practice: The clinical practice of anesthesia including, but not limited to, the perioperative environment, pain management clinics, and the acute pain service.

Certified registered nurse anesthetist (CRNA): An advanced practice nurse with specialized training in anesthesiology.

Anesthesiologist: A physician (MD or DO) with specialized training in anesthesiology.

Anesthesiologist assistant (AA): An anesthesia provider who functions under the direction of an anesthesiologist after receiving specialized training in anesthesiology and a master's degree in the field.

Acupuncture: The insertion of fine needles into specific points on the body to restore health. For the purposes of this study, acupuncture includes French energetic acupuncture, traditional Chinese medicine (TCM)-based acupuncture, Korean hand acupuncture, laser acupuncture, auricular acupuncture, myofascially-based acupuncture, electromagnetic acupuncture, and sonopuncture.

Acupressure: Acupressure is based on meridian theory; pressure is applied by finger, hand, elbow, foot, and or acupressure bands or implements to stimulate pathways and increase the flow of qi (Lee & Frazier, 2011).

Summary

The United States faces a period of cost-effectiveness analysis, comparing health-care outcomes relative to their respective costs (Weinstein & Skinner, 2010). Acupuncture and acupressure have been shown in some settings to provide cost savings and may be a viable complement to anesthesia practice.

This study provides a foundation for future researchers to understand the perceptions and usage of these CAM practices in the United States. Ideally, this study provides a descriptive framework from which randomized controlled trials may emerge that will better define the efficacy of acupuncture and acupressure in contemporary anesthesia practice.

Ensuing chapters will frame the study. Chapter 2 will examine the literature and describe the inclusion of acupuncture and acupressure in the international, academic, and U.S. literature. Additionally, this chapter will describe the theoretical framework for the study. Chapter 3 will detail the research design and methodology. Chapter 4 provides the statistical analysis and study results and Chapter 5 the summary findings, implications, recommendations for future research, and the study conclusions.

Chapter Two: Review of Related Literature

The greatest mistake in the treatment of diseases is that there are physicians for the body and physicians for the soul, although the two cannot be separated." ~Plato

Overview

The purpose of this study is to examine anesthesia providers' perceptions of acupuncture and acupressure. This chapter defines complementary and alternative medicine (CAM), provides a historical context, reviews evidenced-based support for acupuncture and acupressure, reveals the perceptions of health-care providers toward CAM, discusses the economic implications of using alternative medicine, and details the theoretical foundation.

Many CAM studies are qualitative in nature and not subject to randomized-controlled trials. Anesthesia practice is built upon evidence-based, scientific research. This study seeks to elevate CAM research by examining evidence-based studies.

Complementary and Alternative Medicine

The influence of globalization paves a pathway whereby modalities discovered in the developing world may be adopted in the West (Debas, Laxminarayan, & Straus, 2006). CAM is described as "a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine" (NCCAM, 2011, p. 1).

CAM along with biomedicine is considered *complementary*, whereas CAM in lieu of biomedicine is considered *alternative* (Barrett et al., 2003). In the United States, 38% of adults and 12% of children have been treated with some form of CAM at an out-of-pocket

expense of $33.9 billion dollars (Barnes, Bloom, & Nahin, 2008). In 1998 the National Institutes of Health established the NCCAM to conduct clinical trials and explore the use of alternative modalities in the United States (NCCAM, 2013). The Third Strategic Plan 2011-2015: Exploring the Science of Complementary and Alternative Medicine identifies specific strategies for NIH/NCCAM funded research (acupuncture is designated as a mind and body intervention):

Strategic Objective 1: Advance research on mind and body interventions, practices, and disciplines (p. 17).

1.2 Support translational research to build a solid biological foundation for studies of efficacy or effectiveness of mind and body interventions or disciplines (p. 23).

1.3 Support clinical evaluation and intervention studies of mind and body interventions (p. 24).

The NCCAM (2011) strategic plan encourages practitioners to document interactions with patients to measure CAM patterns (p. 21). A final goal of the NCCAM strategic plan seeks to study nonspecific contextual factors that affect interactions between CAM professionals and patients (NCCAM, 2011).

The White House CAM Policy (2002) recommends how CAM should be categorized in the United States:

1. Alternative health care systems (ex., Ayurvedic medicine, traditional Chinese medicine).
2. Mind-body interventions (ex. meditation, prayer and mental healing).
3. Biologically based therapies (ex. herbal therapy).
4. Therapeutic massage, bodywork, and somatic movement therapies (ex. massage)

5. Energy therapies (ex. Reiki, therapeutic touch therapy).

6. Bioelectromagnetics (ex. magnet therapy). (pp. 9-10)

Acupuncture and acupressure are a component of alternative health-care systems, specifically the health-care system of Oriental medicine. This study sought to fill the gap in the literature by augmenting acupuncture-related translational research. Results from this study will provide researchers with a better understanding of the perceptions of anesthesia providers toward acupuncture and acupressure and also what role these Oriental medicine modalities currently serve in U.S. anesthesia practice.

Oriental Medicine

Oriental medicine is a CAM modality that has been an integral part of Eastern Asian culture for thousands of years. Acupuncturists are conventionally referred to as "practitioners of Oriental Medicine" (Utlett, Han, & Han, 1998, p. 1119). Oriental medicine, also referred to as Asian medicine, was founded on the traditions of Hindu (Ayurvedic), Arabic (Yunānī Tibbia), and Chinese medicine, which also has offshoots in Korea, Taiwan, Vietnam, and Japan. Traditional Chinese medicine, a well-known component of Oriental medicine, arose from classical Chinese medicine (Huang et al., 2011). TCM was developed in the People's Republic of China in the 1950s and 1960s and is currently being taught in many U.S. acupuncture schools.

Oriental medicine is based on harmony, creating a balance between humans and the surrounding natural world. The NCCAM acknowledges that ancient teachings based on meridian theory and the flow of qi[2] are difficult to reconcile with modern-day anatomy and

[2] Qi: natural energy, life force or energy flow

neurophysiology; however, the NIH also maintains that evidenced-based support for acupuncture exists (NCCAM, 2013).

History of Acupuncture

China. While the exact origin of acupuncture is unknown, it is believed the Zhou dynasty (first century BC) was the first civilization to use stone needles (Zhen Shi) to cure illnesses (De Morant, 1994). The *Yellow Emperor's Classic of Internal Medicine* (Huang Ti Nei Ching Su Wen (黃帝內經), the earliest medical textbook in the world, is considered the pre-eminent medical acupuncture book. The author is unknown; however, the book was discovered during the Han dynasty (100 to 121 AD), and it is accepted that the textbook was based on Chinese oral tradition preceding 1000 BC (Veith, 1972).

The *Yellow Emperor's Classic of Internal Medicine* (Veith, 1972) is written as a dialogue between Emperor Huang Ti and his minister Ch'I Po with the Emperor posing questions and the minister responding to the Emperor's questions. The Ling Shu (灵枢经) section details yin[3], yang[4] and the process of acupuncture and moxibustion[5] (Omura, 2003). A succeeding book, *The Great Compendium of Acupuncture and Moxibustion,* published during the Ming dynasty (1368-1644), offers the basis for modern acupuncture (White & Ernst, 2004).

Acupuncture is not unique to China. There is evidence of references to acupuncture practices with stone, bone, metal, or bamboo needles in Eastern cultures as far back as the sixth century BC (Omura, 2003). Beyond Asia, evidence of acupuncture-related therapies have been discovered amongst the Eskimos, tribes in Brazil, and the South African

[3] Yin: cold, passive elements.
[4] Yang: hot, active elements.
[5] A traditional Chinese medicine therapy using moxa from dried mugwort (a medicinal plant used in TCM, Japanese, and South Korean traditional medicine).

have been discovered amongst the Eskimos, tribes in Brazil, and the South African Bantus (Gori & Firenzuoli, 2007).

India. The ancient Indian text, the *Vedas*, composed 7,000 years ago in Vedic Sanskrit, mentions Ayurvedic medicine and needle therapy. Ayurvedic acupuncture (*Bhedankarma*) or "piercing through treatment" was originally practiced by Buddhist monks and the *Fourth Shastra*, written by the Buddha, states that Tibet adopted acupuncture from India (Ros, 1994, pp. 3-4). Many of the original Ayurvedic techniques are not globally known because the ancient texts are not available to Western scholars (Ros, 1994).

Japan. Japanese acupuncture is directly based on Chinese science (De Morant, 1994). Acupuncture first came to Japan via the Silk Roads from Chinese monks (Kobayashi, Uefuji, & Yasumo, 2010). In 443 AD, Japanese acupuncture flourished under Emperor Yinkyo. In the 17th century, Dutch living in Japan as part of the Dutch East India Company first learned of acupuncture and conveyed these techniques to the West via Holland. In 1680, Willem ten Rhijne, a Dutch physician for the East Indian Company, wrote the first Western medical description of acupuncture (White & Ernst, 2004).

France. The French are considered the first Western civilization to actively pursue acupuncture and apply its techniques to clinical practice. The word acupuncture is derived from translation by the Jesuits of the French Mission (De Morant, 1994); the English translation for Chen (acupuncture in Mandarin [針治療]) comes from the Greek *acus* (needle) and *puncture* (piercing) (Omura, 2003).

George Soulié De Morant (1878-1955), a French diplomat to China, is considered the pioneer of Western acupuncture. His book, *L'Acuponcture Chinoise* (Chinese Acupuncture) has been widely used by Western providers in both Europe and abroad.

Modern Acupuncture History

International history. While acupuncture surged in Europe during the 20th century, its use in China had been suppressed with the advent of Western medicine until the 1940 Communist revolution. During this period, Chairman Mao Tse-tung demanded a resurgence of TCM in the People's Republic of China in response to the lack of Western pharmaceuticals (Ros, 1994). This led to publication of *The Barefoot Doctor's Manual,* a resource for providing traditionally based medical care in rural areas (Veith, 1972).

Once Allied Forces conquered Japan in 1945, the General Headquarters demanded that the Japanese cease acupuncture use. Instead of terminating practices the Japanese physicians pleaded with the headquarters and eventually succeeded in keeping their practices. This led to the formation of a law in 1948 making acupuncture a permanent part of Japanese medical practices (Kobayashi et al., 2010).

Modern acupuncture research began in 1949 in the People's Republic of China. In the 1950s the Soviet Union began to explore acupuncture, though research from both geographic regions remained unknown to Western scientists and physicians (Cherynak & Sessler, 2005).

U. S. history. James Reston's article in the *New York Times* first introduced the United States to the concept of acupuncture. In 1972, the NIH awarded its first grant to study acupuncture and in 1996, the U.S. Food and Drug Administration Code of Federal Regulations, approved acupuncture needles as medical devices where they currently maintain a Class II (Special Controls) classification (U.S. Food and Drug Administration, 2013). Currently there are 18,000 licensed acupuncturists in the United States (Acufinder, 2014).

The National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM) is the U.S. governing body that certifies acupuncturists and practitioners of Oriental medicine. In February 2013, the NCCAOM submitted a petition to the Obama Administration to designate acupuncturists as a recognized health-care provider under the Social Securities Act. Some insurance companies and employers recognize the importance of including alternative medicine in their health-care packages (Ruggie, 2005); however to date, acupuncture is not covered under Medicare or Medicaid (Povolny, 2008).

Evidenced-Based Support in the Context of Anesthesia Practice

The following section provides a review of anesthesia-related acupuncture and/or acupressure articles, including perioperative anesthesia management, chronic pain management, and a review of the academic literature. Perioperative management is delineated by preoperative, intraoperative, and postoperative areas. Acupuncture has minimal to no side effects as the rate of adverse events with acupuncture is reported as 0.0001 (MacPherson, Thomas, Walters, & Fitter, 2001).

Preoperative management. When administered preoperatively, acupuncture and acupressure can exhibit anxiolytic properties and similarly may contribute toward an intraoperative decrease in bispectral index (BIS) values.[6]

International literature. There is a robust literature demonstrating the efficacy of acupuncture and acupressure on decreasing preoperative anxiety. Fassoulaki et al. (2003, 2007) conducted two studies in Greece to examine the effect of acupressure on the Extra 1 acupoint[7] and its impact on decreasing preoperative anxiety. Results demonstrated a 50% reduction in BIS values and preoperative anxiety when acupressure on the Extra 1 acupoint

[6] A BIS monitor is used to measure brain waves and determine the depth of a patient's anesthetic.
[7] Extra 1 acupoint is located midway between the medial ends of the two eyebrows.

was applied for 10 minutes (Fassoulaki et al., 2003, 2007). These results were replicated and confirmed in India by Agarwal et al. (2005). In Iran, Valiee et al. (2012) concluded that acupressure at true points (third eye and Shen men)[8] can decrease preoperative anxiety. True points refer to known acupoints versus sham treatment, in which patients receive treatment on nonacupoints.

U.S. literature. A CAM study by Yale New Haven Hospital revealed that, if available, 42% of patients would use acupuncture to decrease preoperative anxiety (Wang, Caldwell-Andrews, & Kain, 2003). Wang, Esclera, Lin, Maranets, and Kain (2008) discovered that acupressure in the Extra-1 (Yintang) point produced a statistically significant ($p = 0.012$) decrease in preprocedural anxiety.

Also, two U.S. studies revealed that acupuncture and acupressure may decrease a parent's anxiety prior to their child's surgery (Wang, Gaal, Maranets, Caldwell-Andrews, & Kain, 2005; Yip, Middleton, Cyna, & Carlyle, 2009). However, with both of these studies the acupuncture or acupressure was administered to the parents and not the patient (the child) receiving the anesthetic. Therefore, they reflect an ability to decrease parental anxiety yet they are not representative of acupuncture or acupressure's effect on an anesthetic. Table 1 depicts the international and domestic review of preoperative anxiety literature.

Intraoperative management.

International literature. In 2012, Yang, Ma, and Li conducted a controlled trial examining the impact of acupuncture on decreasing anesthesia requirements in the American Society of Anesthesiologists (ASA physical status classification system) I-II patients undergoing elective gynecologic laparoscopic cases. Ninety patients were enrolled in the

[8] Third eye is also referred to as Yintang or Extra 1 acupoint. In this study the sham point was the external corner of the left eyebrow.

Table 1

Review of Preoperative Anxiety Literature

Country	Author(s)	Year	AC/AP/B	Study design	Results
Turkey	Acar, Cuvas, Ceyhan, & Dikmen	2013	AC (Yintang)	RCT (n = 52)	AC decreased BIS values ($P < 0.0004$) and anxiety ($p = 0.018$).
Iran	Valiee et al.	2012	AP (3rd eye and shen men)	RCT (n = 70)	AP decreased preoperative anxiety ($p < 0.01$).
USA	Yip et al.	2009	AC	LR (n = 17 trials)	Children of parents receiving acupuncture were less anxious during induction (95% CI 3.49 to 30.51) and children were more cooperative (RR 0.63, CI 0.4 to 0.99).
USA	Wang et al.	2008	AP (Extra 1)	RCT (n = 52)	AP decreased anxiety in children undergoing endoscopic procedures ($p = 0.012$).
Greece	Fassoulaki et al.	2007	AP (Extra 1)	Pilot study (n = 12)	AP decreased BIS values ($p = 0.008$).
India	Agarwal et al.	2005	AP (Extra 1)	RCT (n = 76)	AP decreased preoperative anxiety and BIS values ($P < 0.001$).
USA	Wang et al.	2005	AP (Yintang)	RCT (n = 61)	AP decreased parental anxiety ($p = 0.03$) prior to their children having surgery.
Greece	Fassoulaki et al.	2003	AP (Extra 1)	RCT (n = 25)	AP decreased BIS values and stress ($p < 0.001$).

Note. AC = acupuncture, AP = acupressure, B = both, RCT = randomized controlled trial, LR = literature review.

in the study. When compared to the control group, the acupuncture group required 25% to 35% less sevoflurane ($p < 0.05$) leading to a faster emergence from anesthesia and decreased PONV.

A controlled, double-blinded Japanese study by Kotani et al. (2001) examined the impact of acupuncture in augmenting hemodynamics and its subsequent impact on postoperative analgesia. Postoperative morphine values were assessed and recorded for 107 patients after upper or lower abdominal surgery. Kotani et al. (2001) concluded that morphine requirements were cut in half ($p < 0.05$), postoperative nausea and vomiting was decreased 20% to 30% ($p < 0.01$), and plasma cortical and epinephrine concentrations were decreased 30% to 50%.

In China, Wu, Yuan, and Feng (2011) conducted a randomized control trial of 40 patients having a laproscopic choleycystectomy to examine acupuncture's impact on hemodynamics. Mean arterial pressure (MAP), heart rate (HR), and saturation of blood oxygenation (SpO2) were all measured. Hemodynamics were significantly more stable in the acupuncture group ($P < 0.05$). Also, in China, Xu and Fang (2010) conducted a controlled trial looking at *acupuncture anesthesia* and its use in conjunction with transrectal ultrasound-guided prostate biopsies via the perineum. Visual analogue scores were measured for 105 cases. Hemodynamics (MAP and HR) were more stable in the acupuncture group over the control group ($p < 0.05$).

U.S. literature. Currently, there are no U.S. studies examining the impact of acupuncture and acupressure on intraoperative anesthesia management. Table 2 provides an overview of international studies examining the effect of acupuncture on intraoperative anesthetic and opioid requirements.

Table 2

Review of Intraoperative Acupuncture Literature

Country	Author(s)	Year	AC/AP/B	Study design	Results
China	Yang et al.	2012	AC (Han's acupoint)	RCT (n = 90)	AC decreased sevoflurane requirements 25%-35% ($p < 0.05$).
China	Wu, Yuan, & Feng	2011	AC	RCT (n = 40)	AC provided more hemo-dynamic stability than the control group ($p < 0.05$).
Germany	Streitberger et al.	2010	AC	European witnessed AAA in Beijing, China	Bilateral turbinate outfracture and RFA operation with no local or anesthesia.
China	Xu & Fang	2010	AC (ST 36)	RCT (n = 105)	AC provided better pain scores and more stable hemodynamics ($p = 0.01$).
Romania	Gheorghita et al.	2010	AC (Electro)	RCT (n = 12)	AC decreased neurosurgical anesthesia requirements.
Japan	Kotani et al.	2001	AC (Intradermal)	RCT (n = 107)	AC improved post op pain relief ($p = 0.05$), decreased morphine consumption by 50%, decreased the incidence of PONV by 20%-30% ($p < 0.01$), and improved postoperative pain relief ($P < 0.05$).

Note. AC = acupuncture, AP = acupressure, B = both, RCT = randomized controlled trial, LR = literature review, AAA = acupuncture assisted anesthesia.

Postoperative management.

Postoperative nausea and vomiting. PONV occurs with an incidence of 30% after elective cases and up to 80% in high-risk patients (White et al., 2012). PONV prolongs hospital stay and may lead to dehydration and metabolic disturbances (Liodden et al., 2010).

Many pharmacologic treatments are expensive and only partially effective in preventing PONV, and may carry their own side effects such as sedation, a propensity towards headaches, and extra pyramidal symptoms (White et al., 2012).

International literature. Lee and Fan (2011), of the University of Hong Kong, conducted a meta-analysis of 40 clinical trials and 4,858 patients to examine the impact of acupuncture on reducing PONV. They concluded that in comparison to sham treatment, stimulation of the P6[9] acupoint significantly reduced nausea (RR 0.71, 96%, CI 0.61 to 0.83); vomiting (RR 0.70, 95%, CI 0.59 to 0.83); and the need for rescue antiemetics (RR 0.69, 95%, CI 0.57 to 0.83) (Lee & Fan, 2011).

The incidence of PONV varies depending on demographic and procedural factors; however, both acupuncture and acupressure can effectively decrease PONV by statistically significant levels (Holmér Pettersson & Wengström, 2012; Ming, Kuo, Lin, & Lin, 2002; Xu et al., 2012).

U.S. literature. In the United States, White et al. (2012) revealed that utilizing an acupressure band (P6 band) decreases the incidence of PONV from 30% to 12%. Additionally, Gan, Jiao, Zenn, and Georgiade (2004) found that in addition to providing PONV prophylaxis, simulating acupoint P6 provided has the added benefit of analgesia. Table 3 reviews PONV literature, both international and domestic.

Postoperative pain management. Postoperative anesthesia pain management is improved with acupuncture use.

International literature. Postoperative acupuncture leads to decreased opioid requirements and improved relaxation (Arai et al., 2013; Chang et al., 2012; Wong et al.,

[9] P6, also SP6 = Spleen 6, an acupoint located on the lower leg.

Table 3

Review of PONV Literature

Country	Authors(s)	Year	AC/AP/B	Study design	Results
Sweden	Holmer Pettersson & Wengstrom	2012	B	LR (n = 21)	AC prevents PONV with minimal side effects.
U.S.	White et al.	2012	AP (device)	RCT (n = 100)	AP decreased vomiting in the first 24h (p = 0.04); vomiting at hours 0-72 decreased from 30% to 12% (p = 0.03).
Iran	Noroozinia, Mahoori, Hasani, Gerami-Fahim, & Sepehrvand	2013	AP (Nei-Guan acupoint)	RCT (n = 152)	AP reduced incidence of nausea and vomiting in C-section patients from 35.5% to 13.2% (p < 0.001).
Hong Kong	Lee & Fan	2011	AC (P6)	LR (n = 40)	AC reduces nausea (RR 0,71, 95% CI 0.61-0.83); vomiting (RR 0.70, 95% CI 0.59-0.83); and the need for rescue emetics (RR 0.69, 95% CI 0.57-0.83).
Egypt	El-Deeb & Ahmady	2011	AC	RCT (n = 450)	AC decreased PONV (p = 0.001) in parturients during their C-section.
Norway	Liodden et al.	2011	B (preop AC & post-op AP band	RCT (n = 154)	Perioperative AC and post-operative AP led to ~20% less retching and vomiting (p = 0.015).
U.S.	Gan et al.	2004	AC (Electro)	RCT (n = 77)	AP as effective as ondan-setron for preventing PONV (p = 0.01).

Table 3 - continued

Country	Authors(s)	Year	AC/AP/B	Study design	Results
Taiwan	Ming et al.	2002	AP	RCT (n = 150)	AC decreased nausea from 73% to 40% ($P < 0.001$), and decreased vomiting from 90% to 42.9% ($P < 0.01$).
Austria	Boehler, Mitterschiffthaler, & Schlager	2002	AP (Korean hand)	RCT (n = 80)	AP decreased the incidence of nausea from 70% to 40%, and vomiting from 50% to 22.5%.

Note. AC = acupuncture, AP = acupressure, B = both, RCT = randomized controlled trial, LR = literature review.

2006). Sun, Gan, Dubose, and Habib (2008) found that opioid-sparing effects such as a decrease in postoperative nausea, dizziness, sedation, and urinary retention were clinically meaningful in acupuncture group study patients.

U.S. literature. Lin et al. (2009) reported that intraoperative acupuncture decreases postoperative agitation and pain requirements by up to 57% in children after bilateral myringotomy and tympanostomy tube insertion. A review of postoperative pain literature, both international and domestic can be found in Table 4.

Acute and chronic pain management.

International literature. Clinical trials from the World Health Organization (WHO) demonstrate that acupuncture is an effective treatment for pain management (WHO, 2003). In Israel, 7.1 million Israelis use CAM and all four of Israel's health maintenance organizations offer complementary and alternative treatments as part of their medical plans (Ben-Arye, Frenkel, Klein, & Scharf, 2008).

Table 4

Review of Postoperative Pain Literature

Country	Author(s)	Year	AC/AP/B	Study design	Results
Japan	Arai et al.	2013	AC (auricular); post hemi-colectomy patients	RCT (n = 26)	AC provided postoperative relaxation to patients.
Taiwan	Chang et al.	2012	AC (auricular); total knee replacements	RCT (n = 62)	AC led to decreased opiod use ($P < 0.05$) and an improvement in passive knee motion ($P = 0.05$).
U.S.	Lin et al.	2009	AC (LI-4 He Gu and HT 7 Shen Men)	RCT (n = 60)	AC decreased postoperative agitation and decreased pain requirements by 57% ($P < 0.001$) in children.
Germany	Sun et al.	2008	AC	LR (n = 15)	AC decreased pain intensity at 8 and 72 hours; decreased nausea (RR 0.67, 95% CI 0.53-0.81); dizziness (RR 0.65, 95% CI 0.52-0.81); sedation (RR 0.78, 95% CI 0.61-0.99); pruitis (RR 0.75, 95% CI 0.59-0.96); and urinary retention (RR 0.29, 95% CI 0.12-0.74). Morphine sparing effect of 21%.
China	Wong et al.	2006	AC (Electro)	Pilot study (n = 27)	AC decreased patient controlled analgesia morphine use ($p < 0.05$).

Note. AC = acupuncture, AP = acupressure, B = both, RCT = randomized controlled trial, LR = literature review.

With regard to international, nonsurgical pain management, the clinical effectiveness of acupuncture varies. In a British meta-analysis of 32 pain management cases, Ernst (2009) determined that 25 cases failed to demonstrate the effectiveness of acupuncture, only five cases had positive results, and two were inconclusive.

U.S. literature. The U.S. military has been the driving force of acupuncture utilization for acute and chronic pain management in the United States. In 2001, Dr.

Niemtzow, a military physician, developed a specific form of auriculotherapy using points on the ear that anatomically correspond to areas of the body. He coined the therapy battlefield acupuncture in hopes that this quick and simple form of acupuncture could be easily accessed and utilized on the military battlefield. Stateside, battlefield acupuncture is currently used by the U.S. military to treat conditions such as pain management, obesity, smoking, skin disorders, dystonia, and vertigo (Niemtzow, 2007).

Chen (2010) concludes that acupuncture provides a cost-effective and successful treatment for chronic back pain, neck/shoulder pain, lower back pain, and headaches. Table 5 provides a review of acupuncture-supported acute and chronic pain management literature.

Table 5

Review of Acute and Chronic Pain Literature

Country	Author(s)	Year	AC/AP/B	Study design	Results
Sweden	Hjelmstedt et al.	2010	AP	RCT (n = 71)	AP reduced labor pain ($p < 0.001$) during active phase of labor.
U.S.	Goertz et al.	2006	AC (auricular)	Pilot study (n = 87)	AC provided a 23% reduction in pain before leaving the ER ($p < 0.0005$).
Austria	Kober et al.	2002	AC	RCT (n = 60)	AC for victims with minor trauma provided less pain and anxiety, and led to hemo-dynamic stability and greater patient satisfaction ($p < 0.01$).

Note. AC = acupuncture, AP = acupressure, B = both, RCT = randomized controlled trial, LR = literature review.

Controversy. Not every published study supports the use of acupuncture or acupressure. In 2013, *Anesthesia and Analgesia* ran a pro/con editorial looking at the controversy surrounding acupuncture and acupressure in the context of anesthesia management. The con article reviews chronic pain management studies. This article states

that any positively perceived results in acupuncture are secondary to publication bias or placebo effect. The article recommends that researchers cease future acupuncture studies (Colquhoun & Novella, 2013).

The pro editorial focuses on a broader range of clinical areas: PONV, postoperative pain management, and chronic pain treatments. The authors cite clinical trials that support acupuncture use for PONV and postoperative pain, but acknowledge the need for more evidence to support chronic pain management as there are mixed results in this area of medicine (Wang, Harris, Lin, & Gan, 2013).

Placebo acupuncture. According to Wang, Kain, and White (2008), a sham-control or placebo design is necessary in acupuncture research to prevent bias. Acupuncture controlled trials are conducted via either sham or placebo needles. With sham treatment, needling is administered to nonacupuncture points or "spurious stimulation" is provided over established acupuncture points (Wang, Kain et al., 2008). Placebo acupuncture uses blunt-tip needles that touch, but do not penetrate the skin (Lundeberg, Lund, Sing, & Näslund, 2011).

In a sample of 49 subjects, Goddard, Shen, Steele, and Springer (2005) tested placebo acupuncture versus real acupuncture to see if placebo acupuncture provided a reasonable alternative for clinical acupuncture trials. Fisher exact test revealed an insignificant difference between real and placebo acupuncture ($p = .463$) indicating that placebo acupuncture is an appropriate control alternative for acupuncture naïve patients.

While acupuncture naïve patients can be blinded in acupuncture studies, difficulty exists in blinding the researcher as acupuncture is based on a subjective De Qi sensation experienced by the acupuncturists. Ultimately, more research is needed to find a sham

control that allows the researcher to be blinded not only to touch, but to sensation as well (Wang, Kain et al., 2008).

Acupuncture and acupressure in the academic literature. A comprehensive international literature search found only one dissertation that examined acupuncture and acupressure from an anesthetic perspective. In Sweden, Kvorning (2003) found a positive relationship between the use of acupuncture on parturients and decreasing levels of anesthesia. A ProQuest literature review revealed 10 health-related dissertations that have focused on acupuncture, yet no studies explored the relevance of acupuncture to anesthesia.

Acupressure yields a greater return within the academic literature, though no studies examined anesthesia practice. This study aims to be the first to examine U.S. anesthesia providers' perceptions of acupuncture and acupressure use in clinical practice.

International and Domestic CAM Use by Health-Care Providers

International. The International Society of Complementary Medical Research (ISCMR) is working to collaborate on interdisciplinary and international research efforts among members in Asia, Europe, and the United States (ISCMR, 2014). In the United Kingdom, 14 universities are focusing on CAM research and Canada supports university research with both government and privately funded grants (Lewith, Verhoef, Koithan, & Zick, 2006).

Acupuncture Ambassadors is a professional organization with a mission to integrate the medicine of acupuncture into a global health-care model. Specifically, they are studying the impact of acupuncture on treating post-traumatic stress disorder (PTSD) as worldwide, 25-69% of men, women, and children in refugee camps suffer from PTSD. Acupuncture is unique in that it can be tailored to treat specific symptoms. The Acupuncturist Ambassadors

use the Battlefield Acupuncture Protocol and the National Acupuncture Detoxification Association-Plus protocol to treat PTSD (Giovanniello, n.d.).

Veterinary medicine. The first mention of equine acupuncture was in Bai-Le's *Cannon of Veterinary Medicine* written in 650 BC (Schoen, 2000). Since then acupuncture has diffused into veterinary medicine and is used to supplement local anesthesia cases and to decrease anesthetic requirements for animals under general anesthesia (Chan, Chen, Liu, Nu, & Lin, 2001). International and U.S. veterinarians have used acupuncture to successfully treat bovine reproductive disorders, canine lameness or paralysis, and equine back pain, colic, and chronic diarrhea (Chan et al., 2001).

United States.

Government. In the United States, the NCCAM (2013) has completed 45 clinical trials examining the impact of acupuncture on conditions such as peripheral neuropathy in human immunodeficiency virus patients, chronic pain management, fibromyalgia, treatment for colon cancer, arthritis, post-traumatic stress disorder, and cardiovascular disease. Despite research, none of the studies focused on acupuncture and acupressure in the context of anesthesia practice.

Nursing. In 2012, Bertrand examined CAM use among Midwestern critical care nurses, revealing that acupressure is more commonly utilized than acupuncture (Bertrand, 2012). Avino (2011) surveyed 695 nursing faculty and students to ascertain their perceptions of CAM practices. Her study revealed that 81% of students and 92% of faculty agreed that CAM should diffuse into nursing curriculum. Additionally, 47% of the respondents recommended that acupuncture be incorporated into nursing academic instruction (Avino, 2011).

Voight (2012) studied the perception of Doctor of Nursing (DNP) program administrators regarding the integration of acupuncture and acupressure into DNP curricula. She surveyed 158 DNP programs and found that half of the respondents agreed education about acupuncture and acupressure should be included in DNP curricula (Voight, 2012).

Physician. In 2006, Wahner-Roedler et al. (2006) conducted a survey to ascertain the attitudes of medical staff internists in the Mayo Clinic Department of Medicine towards CAM practices. Eighty-two of the physicians surveyed agreed they should have knowledge about the most common CAM therapies (Wahner-Roedler et al., 2006).

Both nursing and medical faculty have expressed an interest in learning more about CAM; however, the perception of anesthesia providers towards these alternative medicine modalities remains unknown.

Economic Implications

The current and chronic U.S. drug shortage has created repercussions among all areas of health care including the specialty domain of anesthesiology. Limited alternative treatment options can significantly influence patient care and patient safety outcomes (Jensen & Rappaport, 2010). Elective cases may be cancelled or procedures performed with suboptimal alternatives, negatively affecting both patient care and hospital budget (DeOliveira, Gilfasio, Theilken, & McCarthy, 2011).

In 2010, there were 178 drug shortages, of which 132 were sterile injectables (Zhang, Lao, Chen, & Ceballos, 2012). Public health can be dramatically affected by drug shortages, while expert opinion notes that anesthetic drug-related shortages will continue and may worsen (DeOliveira et al., 2011).

Current and potential future drug shortages prompt examination of other alternatives to supplement perioperative care. The average cost for an anesthesiologist is $1.34/min, inhalational agents $189 (per 250mL bottle sevoflurane), IV injectable drugs $42, and cost per episode of PONV, $75 (Borendal Wodlin, Nilsson, Carlsson, & Kjolhede, 2011; Parra-Sanchez et al., 2011; Song, Greilich, White, Watcha, & Tongier, 2000). The cost of acupuncture needles is $1.52 per patient, proving an affordable and easily administered whole body treatment (Goertz et al., 2006).

Alternative medicine modalities may provide a cost-effective complement to drug shortages (El-Deeb & Ahmady, 2011) as out-of-pocket expenses for CAM are less than prescription drugs (Ho, Jones, & Gan, 2009). However, while acupuncture and acupressure may assist in assuaging preoperative anxiety, PONV, and postoperative pain management, more research, especially in the United States, is warranted.

Theoretical Framework

Diffusion of innovations. Everett Rodger's (2003) diffusion of innovations (DOI) theory provides structure to understand the diffusion of public health innovations. There is a gap between knowledge and practice in health and medicine (Oldenburg & Glanz, 2008). Anesthesia providers may not be familiar with acupuncture and acupressure or they may be reluctant to use these alternative medicine modalities because there is not enough evidenced-based support. The purpose of this study was to examine the perceptions (both favorable and unfavorable) and usage patterns of acupuncture and acupressure by U.S. anesthesia providers. The DOI theory provides structure to frame the study research questions.

Acupuncture and acupressure have been practiced abroad for thousands of years yet they are relatively new practices to the United States (Chernyak & Sessler, 2005).

Additionally, there are limited U.S. studies to support or refute the international literature. The fact that most of the international studies have not been replicated in the United States, leads one to question if this is due to a lack of knowledge about acupuncture and acupressure among U.S. anesthesia providers—or does the knowledge exist but providers are intentionally choosing to not incorporate these modalities into practice? This present study aimed to illuminate these areas and examine how acupuncture and acupressure are currently perceived (negatively or positively) in the domain of anesthesiology.

There are four main elements that comprise the DOI theory: innovation, communication, time, and social system. Rodgers defines diffusion as "the process by which (1) an *innovation* (2) is *communicated* through certain *channels* (3) *over time* (4) among the members of a *social system*" (p. 11). This study aimed to first, assess and analyze the perception of anesthesia providers towards acupuncture and acupressure (the innovation). These perceptions were then communicated via channels (publication), over time, to members of the social system (anesthesiology) (Figure 1).

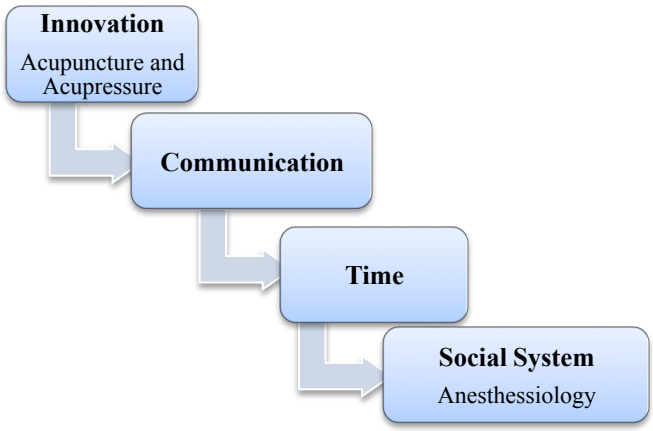

Figure 1. The four main elements of the DOI theory.

The innovation-decision process is a major component of the DOI theory. This process is used for information seeking and processing. Once information is processed, it may then diffuse into a social system. Innovations carry some degree of uncertainty for individuals, and social reinforcement from peers can help form or change attitudes and perceptions of an idea (Rodgers, 2003).

The innovation-decision process occurs in five sequential stages. Rodgers (2003) describes the innovation-decision process as the progression of an innovation passing from first *knowledge*, to the formation of an *attitude* about the innovation, to a *decision* to accept or reject the innovation, to *implementation* of the innovation, and finally *confirmation* of the decision (Figure 2).

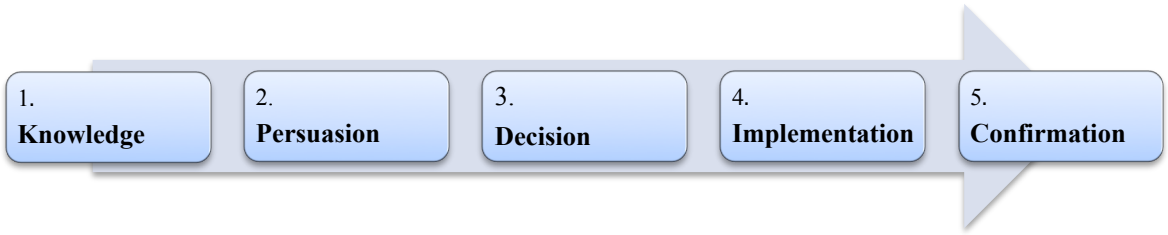

Figure 2. A 5-stage model of Rodgers (2003) innovation-decision process.

This study focused on the first two stages of the innovation-decision process: the knowledge and persuasion stage. The knowledge stage describes the process of obtaining knowledge or awareness-knowledge about an innovation of phenomenon of in interest. The stage is information seeking.

The persuasion stage immediately follows the knowledge stage and is where *attitudes* (both favorable and unfavorable) and perceptions are formed. This stage leads to information processing. This study was built upon the constructs of awareness-knowledge and attitude.

Samuel Bacharach (1989) presented a foundation for evaluating theoretical frameworks. Applying the DOI constructs of awareness-knowledge and attitude provides the following variables: clinical use (measured by usage patterns), barriers, geography (measured by geographical location), and perception (measured by positive or negative attitude formation) (Figure 3).

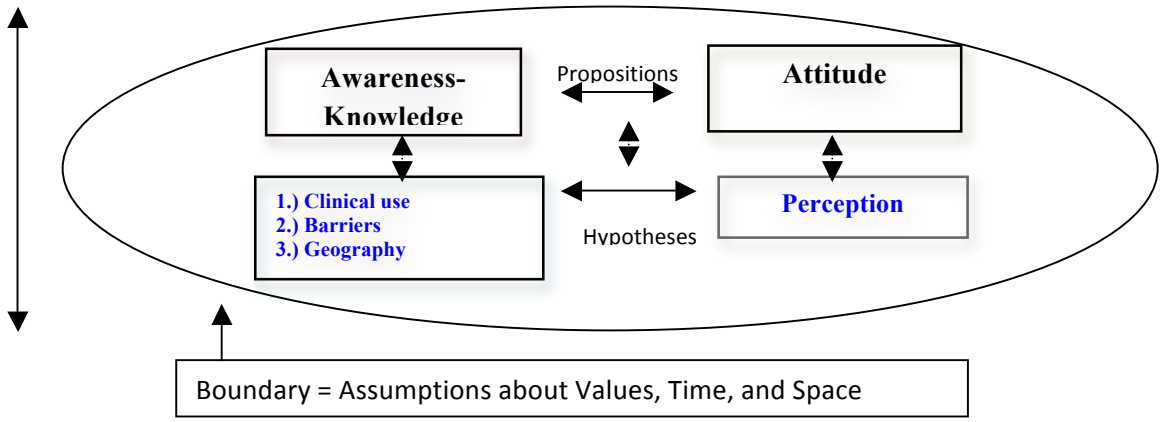

Figure 3. Application of DOI constructs to Bacharach theoretical framework.

Measuring clinical use (active or inactive), barriers (significant or absent), geography (consistent versus inconsistent usage patterns) and attitude (favorable versus unfavorable feelings) will provide an accurate depiction of how US anesthesia providers perceive acupuncture and acupressure.

The DOI constructs, awareness-knowledge (measuring the knowledge stage) and attitude (measuring the persuasion stage), along with their corresponding variables, frame the study research questions:

1. What proportion of anesthesia providers currently use acupuncture and acupressure in clinical practice? (awareness-knowledge)

2. What barriers prevent acupuncture and acupressure use in anesthesia practice? (attitude)
3. Is there a relationship between the use of acupuncture and acupressure in anesthesia practice based on geographic region? (awareness-knowledge)
4. What are the general attitudes of anesthesia providers towards the use of acupuncture and acupressure? (attitude)

The DOI theory has been used in many clinical settings to describe the process of integrating a new innovation among members of a social system. George, Hamilton, and Baker (2012) used the theory to describe the process of introducing telemedicine to low-income African-Americans and Latinos as a means of providing access to specialty medical care. Harting et al. (2009) applied the DOI theory to examine determinants of guideline adherence among physical therapists, and Bowen et al. (2012) used the theory to explain how critical care nurses process the knowledge stage with a new innovation.

Tian (2011) applied the DOI theory to examine the decision-making process of acute care hospitals towards adopting CAM. He successfully used the innovation-decision process and another component of the DOI theory, the attributes of an innovation, to describe the thought process of hospital administrators to either accept or reject the assimilation of CAM into their institution. The findings from Tian's (2011) study suggest that an innovation has a greater chance of being adopted when it is compatible with existing values and the needs of potential adopters. These findings are in alignment with the DOI theory.

The DOI model provides the theoretical framework for examining the perceptions of anesthesia providers towards acupuncture and acupressure. Results from this study will pave a pathway for future researchers to build upon the knowledge and persuasion stages, and

conduct clinical research on the remaining stages of decision, implementation, and confirmation.

Summary

Acupuncture and acupressure have demonstrated clinical usefulness and received governmental support, but have not yet transcended into mainstream U.S. anesthesia practice. This study examined the perceptions of anesthesia providers towards these Eastern medicine modalities. Applying the theoretical constructs of awareness-knowledge and attitude from the DOI theory provides the foundation for establishing a more comprehensive view of how acupuncture and acupressure are perceived, what barriers to practice exist, the influence of geography on impacting clinical use, and ultimately, anesthesia provider attitudes towards these alternative medicine modalities. Developing a better understanding of the perceptions surrounding acupuncture and acupressure will lead to conceptualizing what role they may serve in future U.S. anesthesia practice.

Chapter Three: Methodology

Overview

The previous chapter provided a historical review of acupuncture and acupressure practices, discussed the relevant literature, and detailed the theoretical framework for the study. This quantitative, nonexperimental, descriptive study utilized a cross-sectional survey design to assess anesthesia providers' perceptions of acupuncture and acupressure. Anesthesia providers in the United States were surveyed using a prevalidated instrument administered over the Internet. The survey covered the following research topics: clinical use, barriers, geography, and attitude, which directly align with the research questions. The survey was pretested and pilot tested prior to administration.

This study sought to examine anesthesia provider perceptions of acupuncture and acupressure. The following chapter describes the research design, target population, sample description and recruitment, survey design, procedure, data collection, ethical considerations, and data analysis.

Research Design

Quantitative descriptive studies have successfully examined health-care provider attitudes toward the use of complementary and alternative medicine (CAM) (Kreitzer, Mitten, Harris, & Shandeling, 2001), or acupuncture and acupressure (Liggett, 2009; Voight, 2012). This study employed a cross-section design to survey U.S. anesthesia providers. Descriptive studies are appropriate when not much is known about a phenomenon

(Sousa, Driessnack, & Mendes, 2007). To date, no studies have formally investigated the perceptions of U.S. anesthesia providers toward acupuncture and acupressure.

A cross-sectional design supports collecting data at a single point in time (Polit & Beck, 2012). Cross-sectional studies also allow researchers to identify associations that may be studied more rigorously at a future point (Mann, 2003).

The goal of this study was to identify current anesthesia provider perceptions of acupuncture and acupressure. This descriptive research will enable further studies to build upon demonstrated cultural perceptions, facilitating more research of acupuncture and acupressure for clinical, economic, educational, and culturally orientated applications here in the United States.

Variables. This study targeted U.S. anesthesia providers. Anesthesia providers were defined as certified registered nurse anesthetists (CRNAs), anesthesiologists, and anesthesiologist assistants (AAs). CRNAs are advanced practice nurses with graduate-level training in anesthesiology who work in a variety of settings, including independent practice or in collaboration with anesthesiologists as part of an anesthesia care team. AAs are master's prepared anesthesia providers who function under the direction of an anesthesiologist.

Rodger's (2003) diffusion of innovations (DOI) theory provides the theoretical framework for the study. Specifically, the constructs of awareness-knowledge and attitude frame the research and subsequent survey questions.

Demographic profiles encompassing age, gender, anesthesia provider type, institution, and country of educational training, and practice setting were obtained to see if these variables serve as covariates. Wahner-Roedler et al. (2006) reveal that younger

physicians and females are more likely to recommend CAM to their patients than their older counterparts. Country of educational training was included as a covariate because practitioners who received medical training in countries inspired by Eastern influences may have differing familiarity and favorability toward acupuncture and acupressure versus providers who studied solely conventional biomedicine. Similarly, the practice settings of university medical centers, community hospitals, children's hospitals, and U.S. Department of Veterans Affairs (VA) hospitals were examined. Treating the aforementioned variables as covariates described the amount of influence they have over study results. The study's variables are operationally defined in Table 6.

Table 6

Variables and Their Operational Definitions

	Variables	Operational definition
IV	U.S. anesthesia providers Geographic region	Occupation: CRNA, anesthesiologist, AA West, Midwest, Northeast, and South
DV	Acupuncture and acupressure use, measured by DOI constructs: a. awareness-knowledge, and b. attitude	(a) When an individual is exposed to an innovation's existence and begins to understand its functionality, and (b) an individual's beliefs, which, in turn, directs their actions.
Covariates	(a) age, (b) gender, (c) anesthesia provider type, (d) institution, and (e) country of pre-anesthesia training.	(d) Where the providers received their medical or nursing training. (e) University medical center, community hospital, children's hospital, or VA hospital.

Note. DOI = diffusion of innovations theory, IV = independent variable, DV = dependent variable.

Population and Sample Description

Data sources. Anesthesiology is practiced in every state in a variety of clinical settings including, but not limited to, university medical centers, community hospitals,

children's hospitals, and U.S. Department of Veterans Affairs (VA) hospitals. According to the American Hospital Association (AHA) there are currently 5,723 registered hospitals in the United States (excluding college infirmaries and prison hospitals). The federal government supports 211 hospitals, the state houses 1,037 hospitals, and there are 2,894 not-for-profit community hospitals in the United States (AHA, 2014, p. 1). University medical centers include any hospitals supported by a university health-care system. Community hospitals are defined as nonfederal, short-term general or specialty hospitals (AHA, 2013). For the purposes of this study, children's hospitals were studied separately from community hospitals.

The U.S. Census Bureau breaks the United States down into four regions (West, Midwest, Northeast, and South). Using a geographic cluster sampling technique, this study equally accessed anesthesiology departments from four clinical settings (university medical centers, community hospitals, children's hospitals, and VA hospitals) in each geographic domain (Northeast, South, Midwest, and West).

Target population. The target population was all anesthesia providers (CRNAs, anesthesiologists, and AAs). There are approximately 80,000 providers currently practicing anesthesia in the United States (Daugherty, Fonseca, Kumar, and Michaud, 2010). A geographic cluster sampling design was used to represent the target population of 80,000 U.S. anesthesia providers. The goal of this sampling design was to procure an adequate sample that is heterogeneous and representative of the target population, U.S. anesthesia providers.

Cluster sampling allows for broad groups (or clusters) to be studied; additionally, the clusters may be subject to stratification (Polit & Beck, 2012). An advantage of this sampling

design is that it is cost-effective for studying large groups, especially for a widely dispersed population (Hulley, Cummings, Browner, Grady, & Newman, 2007).

A disadvantage to this sampling design is that groups selected may be homogeneous (Hulley et al., 2007). This study accounted for any risk of homogeneity by ensuring that geographically diverse groups, representative of all four regions in the United States, were purposively selected.

Ninety-six anesthesiology departments were randomly selected from four geographic regions (West, Midwest, Northeast, and South) and stratified by institution type (university medical centers, community hospitals, children's hospital, and VA hospitals). Six university medical centers, six community hospitals, six children's hospitals, and six VA hospitals were chosen for each geographic region (four regions), compiling a total sample of 96 anesthesiology departments (Figure 4).

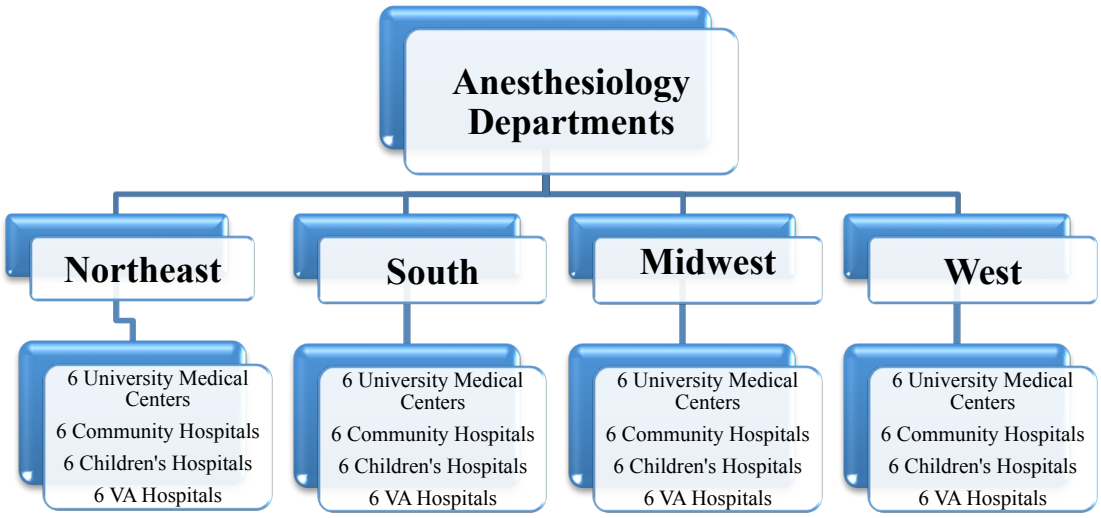

Figure 4. Anesthesiology department sample—stratified by geographic region and institution type.

Sample.

Inclusion criteria. Inclusion criteria were adult male and females, over the age of 21, of any ethnicity and race, who currently live and practice anesthesia either full or part time in the United States.

Exclusion criteria. Providers in training (student registered nurse anesthetists and anesthesiology residents) were excluded from the study. A provider functioning in a learning capacity is practicing under the license and direction of their superior, thus their anesthetic plan is the reflection of a CRNA or anesthesiologist.

Sample size. Cochrane's formula for categorical data is used in survey research to approximate sample sizes (Bartlett, Kotrlik, & Higgins, 2001). Cochrane's (1977) formula is as follows: $n = [(t)^2 * (p)(q)]/ (d)^2$. When alpha is set a priori at $\alpha = 0.05$ (indicated level of risk) then, $t = 1.96$, $p = 0.5$ (proportional variable), $q = 0.5$ (acceptable error), and $d = 0.06$ (the acceptable margin of error). For a population of 80,000, with a 95% confidence interval, the required minimum sample size is $n = 267$.

This descriptive study utilized survey research. Previous survey, descriptive studies examining CAM use among health-care providers yielded response rates of 41% (Liggett, 2009) and 34% (Voight, 2012). Both of the aforementioned studies accessed smaller populations.

The logistical impossibility of surveying all anesthesia providers ($n = >80,000$) precipitated the selection of a smaller sample of 96 anesthesiology departments. This study estimated 18 providers/anesthesiology department. A selection of 96 anesthesiology departments provided an accessible sample of 1,728 anesthesia providers, which was the target for solicitation to reach an appropriate sample size.

Sample recruitment. The sample was accessed from 96 anesthesiology departments evenly distributed among the four U.S. geographic regions. In each region, departments from six university medical centers, six community hospitals, six children's hospitals, and six VA hospitals were randomly selected for participation.

Anesthesiology departments were selected due to recruitment feasibility. Each department employed anesthesiologists, CRNAs, and/or AAs. University medical centers, community hospitals, and children's hospitals were purposively selected from a comprehensive Internet search of institutions that fit the aforementioned institutional criteria.

The U.S. Department of VA Health Administrator's website geographically lists all VA hospitals. VA anesthesiology departments selected for participation in this study were accessed from the VA list (U.S. Department of VA, 2014). The U.S. Armed Forces comprises the remaining large proportion of anesthesia providers in the United States; however, this group of anesthesia providers is not accessible to the civilian public.

A challenge of this study was to achieve an acceptable (> 50%) response rate. Surveying the two national anesthesia associations, the American Society of Anesthesiologists (ASA) and the American Association of Nurse Anesthetists (AANA) was considered to create a more representative sample; however, previous studies reported poor response rates from surveying larger databases. Ford (2010) yielded a 14% response rate from the AANA, and Trentman, Mueller, Ruskin, Noble, and Doyle (2011) a 12.3% response rate from the ASA. Access occurred through contacting the chair of anesthesiology at each institution via both a personal, written letter and e-mail.

Another potential challenge concerned garnering the research support of anesthesiologists in a CRNA-driven study. To combat this issue, the researcher engaged the

support of the chairman of anesthesiology at a major university medical center along with the participation of a board certified anesthesiologist and licensed acupuncturist, whose names and signatures each accompanied the written letter and e-mail.

Survey

Development. The University of Minnesota Center for Spirituality and Healing, led by Mary Jo Kreitzer, created an original survey to study medical, nursing, and pharmacy faculty and student perceptions of CAM (Kreitzer et al., 2001). Funding for this study was provided by a National Institutes of Health (NIH) R-25 grant. The CAM survey of 627 initially contacted faculty and students provided a 50% response rate.

In 2008, Avino used Kreitzer's survey to assess CAM perceptions among nursing students and faculty at the University of Delaware, yielding a 92.3% (n = 48) response rate among faculty and a 48.6% (n = 324) response rate among students. In 2012, Voight modified the web-based survey specifically to study acupuncture and acupressure. Voight's study, with a 34% response rate, examined the perception of Doctor of Nursing (DNP) program administrators regarding the integration of acupuncture and acupressure into DNP curricula.

This study used a cross-sectional survey design based on Voight's instrument. Survey questions focused on the following research topics: clinical use, barriers, geography, and attitude. Slight modifications tailored the questions appropriately to anesthesia providers (see Appendix A). Specifically, the words health professional were changed to anesthesia provider. Likert scales were arranged with negative responses on the left and positive responses on the right due to the researcher's preferences and to provide scale consistency. Additionally, the title barriers (found in the original survey) was left out of the heading for

questions 16-21 so as to remove any leading or negative connotations associated with the question wording. The Virginia Commonwealth University (VCU) Survey and Evaluation Research Lab (SERL) approved these modifications. Written permission was received from Kreitzer, Avino, and Voight to modify and include the survey in this study (see Appendix B).

Administration. Survey questions were uploaded into Qualtrics® 2014, a web-based survey platform, and administered via the Internet. Qualtrics is a private research software firm founded in 2002 in Provo, UT. Qualtrics is a Forbes Top 25 ranked company that serves more than 50% of Fortune 100 companies and 1,300 colleges and universities worldwide (Qualtrics, 2014a). This study used software from the Qualtrics Research Suite (Qualtrics, 2014b).

Internet surveys are time efficient, provide access to distance locations, and have the convenience of automated data collection (Wright, 2005). Qualtrics provides anonymity of subjects, a requirement for the VCU Institutional Review Board (IRB). Additionally, Qualtrics®, differently than other web-based surveys, allows for customizability of the design including format, fonts, and graphics. A sans serif, 10-12 point, font was used to optimize web readability (Dillman, Smyth, & Christian, 2009). Also, the colors red and green were avoided to ensure all study participants, including individuals who may be color-blind, were able to read the survey.

Professional surveys, including physician surveys, are characterized by low response rates (VanGeest, Johnson, & Welch, 2007). Visually enhancing the design of questionnaires, along with a consistent page layout, can increase study response rates (Dillman et al. 2009). This study was intended to make the survey easily accessible to providers and user-friendly

through strategically selected font and format settings in order to garner sample participation and yield higher response rates.

Survey Design

Pretesting. Dillman et al. (2009) recommends pretesting web-based surveys prior to pilot testing and final administrations. Pretesting involves questionnaire evaluation by individuals who are either experts on the topic or members of the survey population (Dillman et al., 2009). This survey was pretested by a board-certified anesthesiologist, who is also a licensed acupuncturist, to represent providers with a favorable attitude toward acupuncture and acupressure. A Ph.D. educated CRNA, with no personal experience with acupuncture and acupressure also pretested the survey to represent a nonpredisposed provider perspective.

Reliability. The survey was pilot tested by a panel of anesthesia experts. A pilot test is a "mini study" used to test the questions and analysis prior to final administration of the survey (Dillman et al., 2009). The VCU SERL center recommended pilot testing 16 anesthesia experts. Experts were defined as anesthesia providers with greater than 10 years of clinical experience. These providers were purposively selected to represent geographic diversity and also to reflect providers who have used acupuncture and acupressure versus providers with no exposure to these alternative medicine modalities.

After receiving VCU IRB approval, the researcher personally e-mailed 16 anesthesia acquaintances to request their permission to participate in the pilot test. The survey was then administered via Qualtrics® over the Internet and results uploaded into IBM SPSS Statistics (SPSS).

On average, the survey took participants 7 minutes to complete. Internal consistency was measured in SPSS via the test reliability technique, Cronbach's α. Cronbach's α is a

single-administration test that provides a unique estimate of the reliability of a given test (Gliem & Gliem, 2003). Internal consistency of scale items is greater when the alpha coefficient is closer to 1 (Gliem & Gliem, 2003). For established questionnaires, Cronbach's α should achieve or exceed 0.80 (Rattray & Jones, 2007).

For each summated scale or subscale Cronbach's α coefficient of internal consistency was measured along with the alpha of item deleted. Survey questionnaire items without discriminating power were removed to avoid reliability issues. The initial data analysis provided a reliability coefficient of $\alpha = 0.618$. Using alpha of item deleted, three questions were evaluated and removed. These three questions (17, 19, and 23) were under the same heading—reasons why acupuncture and acupressure may not work in Western medical settings. Removing these questions raised the reliability coefficient to $\alpha = 0.812$.

Question 39 was a demographic question asking about the provider's level of education. Based on the pilot test, MMSc was added as a response to this question to reflect the most common degree obtained by AAs.

The researcher also met with a focus group of four anesthesia providers to ascertain their thoughts regarding the survey layout and format. Based on their feedback, Question 24 asking about acupuncture/acupressure clinical use was moved to Question 22 (preceding the acupuncture/acupressure education questions) to improve readability and create more consistency in the survey flow.

Measurement validity.

Face validity. Face validity occurs when the test administered is not only valid, but also *appears* to be valid (Nevo, 1985). The original developers of the survey instrument

(Kreitzer et al., 2001) established face validity. Additionally, face validity is established by pretesting and pilot testing the survey with anesthesia experts.

Content validity. Content validity is achieved through ensuring that the instrument has an adequate number of questions to provide meaningful information about the construct domain (Polit & Beck, 2012). Content validity was satisfied by pretesting the survey with a board-certified anesthesiologist and acupuncturist and aligning the survey and research questions.

Construct validity. Construct validity requires that the instrument accurately measures what it proposes to measure (the DOI theoretical constructs of awareness-knowledge and attitude). Both content and construct validity were measured by ensuring that the survey questions correlated with the study research questions (Table 7).

Table 7

Content and Construct Validity: Aligning the Survey Questions (Q) With the Research Questions (RQ)

	Q1	Q2	Q3	Q4	Q5	Q6-15	Q16-21	Q-22 24	Q-25 33	Q34	Q35	Q36-43
Construct: Awareness-Knowledge				X	X		X	X	X			
Construct: Attitude	X	X	X			X				X		
Demographics												X
RQ1 Clinical Use				X	X			X	X			
RQ2 Barriers							X					
RQ3 Geography				X							X	
RQ4 Attitude	X	X	X			X				X		

Survey scoring. This survey utilized 43 questions that are Likert scale, Likert-type, or partially closed format. Partially closed questions include a set of response categories along with an "Other" response, allowing for participants to provide free text (Dillman et al., 2009). Likert scales of measurement are frequently used when measuring survey respondents' attitudes (Jamieson, 2004). Likert-type questions provide discrete approximation of the continuous variable (Clason & Dormody, 1994).

For questions with a Likert scale, measurement quality was achieved by assigning a number to each response. Responses worded with a positive or favorable attitude towards acupuncture and acupressure were awarded a higher score versus negative responses. Assigning numeric values allows for score summation, which assists with analysis (Polit & Beck, 2012).

Data Collection

Mixed-mode. Using mixed-modes of paper and electronic options increases survey response rates based on past research and performance (Millar & Dillman, 2011). This study employed mixed-modes by first mailing a letter to the chair of anesthesiology at each selected institution and then following up with that individual electronically via e-mail. In many organizations, e-mail has become the standard method for communication (Dillman et al., 2009). The profession of anesthesiology, as an organization, is likely to parallel this standard of using e-mail as the preferred mode of communication.

Observational, nonexperimental designs are subject to nonresponse. Professionals may refuse to participate in survey designs because of lack of time, perceived salience of the study, or concerns about confidentiality (VanGeest et al., 2007). Conveying the usefulness of a study has been deemed the most important factor in influencing a respondent's decision

to participate (Barriball & White, 1999). The chair of anesthesiology at each institution selected was contacted personally with an introductory letter that detailed the importance of this study as the first to assess anesthesia providers' perceptions of acupuncture and acupressure. The introductory letter is included in Appendix C and Appendix D lists all institutions considered for this study.

Social exchange principles. The tailored design method (Dillman et al. 2009), specifically the social exchange principles, provided the methodological structure for this study. The purpose of engaging in social exchange is to motivate survey respondents. The social exchange principles include:

- Providing information about the survey.
- Asking for help (appeal to an individual's desire to help others).
- Saying "thank you."
- Providing tangible rewards.
- Providing social validation.

These principles were integrated into the study by first sharing the study's purpose and then asking the chair to assist with doctoral research. All correspondence (letters, e-mails, and the survey) reiterated a thank you. A tangible incentive encouraged study participation. Lastly, Dillman et al. (2009) acknowledge that people may be influenced by peer pressure, especially knowing that others have participated in a study. The chairs and study participants were notified of nationwide peer participation.

Procedure. The chair at each institution was contacted personally via a mailed introductory letter, on VCU letterhead, sent via FedEx. The letters were mailed on Friday for an estimated Monday arrival. A total of 96 letters were mailed. The letter included an

introduction to the research study, an explanation of the study purpose, confirmation that the study was voluntary, and an assurance that confidentiality would be maintained. The letter also explained that study results would be made available to those interested.

The introductory letter was signed by the researcher, who is a CRNA. Additional signers were John Butterworth, IV, M.D., Professor and Chairman of the Department of Anesthesiology at VCU Medical Center, a nationally recognized scholar and clinician in the field of anesthesiology; and Arkadiy Dubovoy, M.D., Assistant Professor of Anesthesiology at VCU Medical Center, and licensed acupuncturist.

One week after the letter was mailed, an e-mail was sent to each chair including a portable document format of the introductory letter, an explanation of the study, request for departmental involvement, and the hyperlink to the Qualtrics survey (see Appendix E).

The e-mail was sent from the researcher's university e-mail account before 7:00 a.m. on Monday as Dillman et al. (2009) state that early, Monday morning e-mails generate a greater response than e-mails sent later in the day or week. Utilizing a university e-mail account would ensure successful delivery and avoid any routing or spam mail issues.

If the chair agreed to participate then he/she was asked to: (a) forward the hyperlink to his or staff (CRNAs, anesthesiologists, and AAs), and (b) to respond to the e-mail stating if they would like to receive results at the end of the study.

One week after the initial e-mail, a follow-up, reminder e-mail was sent to chairs who had not responded to encourage survey participation and address any nonresponse issues. The study had a completion timetable of one month. Figure 5 depicts the procedure process.

Incentive. Creating incentives can increase survey response rates by 64% (Ulrich et al., 2005). An incentive was provided in this study to encourage participation and higher

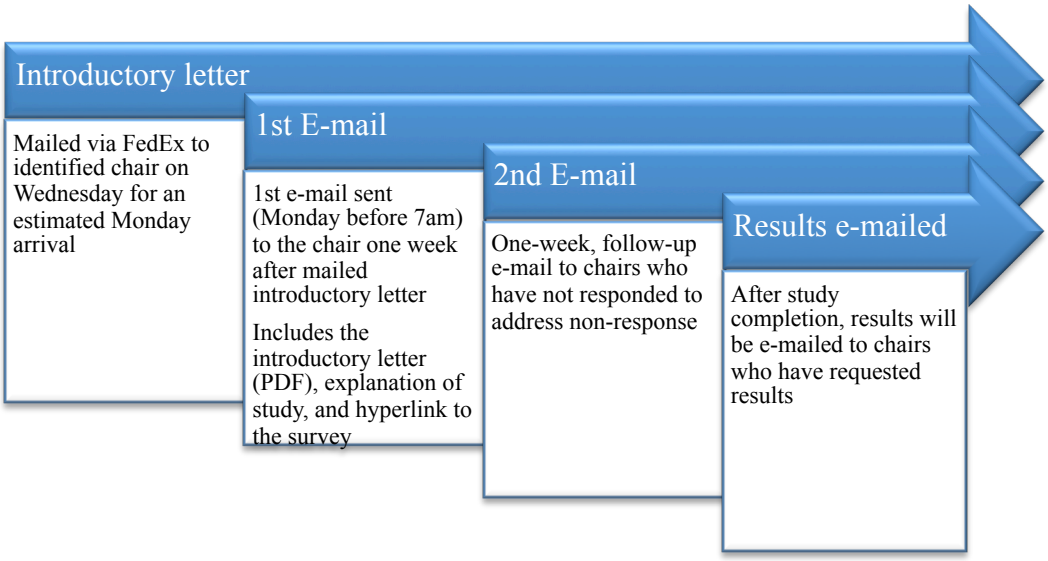

Figure 5. Study procedure.

response rates. Achieving a > 50% response rate would increase external validity and minimize potential biases and extreme outliers. This study offered an award of 12 Apple TVs® via a raffle.

After the survey questionnaire ended, a new screen opened providing each participant the option to enter an e-mail address for inclusion in the raffle. Upon study completion, 12 individuals were selected randomly to win a new Apple TV®**.** Winners were notified via e-mail, and then asked to provide a physical mailing address for delivery. The Apple TVs® were mailed directly from Apple®.

Ethical considerations. Institutional Review Board approval was obtained from the VCU IRB. This study was classified as exempt under 5 CFR 46.101(b)(2) which states that a survey design may receive IRB exempt status if it contains no identifying information, does not involve children, and that the subjects are not at risk. This study satisfied the aforementioned conditions.

Dillman et al. (2009) cite that establishing trust improves survey response rates. Trust is gained by assuring participants that confidentiality will be maintained. VCU IRB approval was enunciated in the introductory letter sent to the department chairs. The first screen of the survey was a welcome message that included the study title, survey description, instructions, documentation of IRB approval, an assurance of response anonymity, and mention of the incentive: a raffle to win an Apple TV®.

Data Analysis

Coding and storing. Electronic results were uploaded from Qualtrics into IBM SPSS (SPSS) for statistical analysis. Missing data were handled on a case-by-case basis. Data cleaning was conducted to observe and to remove any outliers. All data were stored on the researcher's hard drive. Stored data contained no identifying information.

Statistical analysis. Descriptive statistics are used to address descriptive research questions (Polit & Beck, 2012). Descriptive statistics were run for each survey question as well as demographic information (age, gender, anesthesia provider type, institution, and country of pre-anesthesia training) to determine if these areas could serve as covariates. Previous studies examining acupuncture and acupressure practices among health-care providers used descriptive statistics for analysis (Liggett, 2009; Voight, 2012). This study intended to improve upon those studies by adding the statistical dimension of observing relationships. Results are presented numerically and visually with graphs and tables. Research questions (RQ) and their corresponding statistical analyses were as follows:

RQ1: What proportion of anesthesia providers currently use acupuncture and acupressure in clinical practice?

This research question examined the proportion of anesthesia providers who currently use acupuncture and acupressure as part of their clinical practice. It was answered with descriptive statistics, specifically frequencies, percentages, means, and standard deviations. Additionally, Spearman's correlation and effect size were measured and reported for the covariates.

RQ2: What barriers prevent acupuncture and acupressure use in anesthesia practice?

The literature reports that lack of training and unfamiliarity are the two most common barriers to using acupuncture and acupressure (Voight, 2012; Zhang et al., 2012). This research question identified any barriers that prevented anesthesia providers from using acupuncture and acupressure. Additionally, descriptive statistics (frequencies, percentages, means, and standard deviations) were used to investigate this question.

RQ3: Is there a relationship between the use of acupuncture and acupressure in anesthesia practice based on geographic region?

This study examined if there is a relationship between acupuncture and acupressure use in anesthesia practice based on U.S. geographic region. Zhang et al. (2012) reported that in a sample of U.S. adults (n = 23,393), individuals in the West and South were more likely to use acupuncture over individuals who live in the Northeast and Midwest.

Research Question 3 was assessed with descriptive statistics (frequencies, percentages, means, and standard deviations) and a contingency table expressing the frequency distribution of the four geographic variables. Spearman's correlation coefficient was used to examine the correlation between acupuncture and acupressure use and U.S. geographical region.

RQ4: What are the general attitudes of anesthesia providers towards the use of acupuncture and acupressure?

The remaining research question sought insight into the attitudes and beliefs of anesthesia providers toward acupuncture and acupressure. This question was examined with descriptive statistics, specifically frequencies, percentages, means, and standard deviations. Table 8 summarizes the relationship between research questions, constructs, survey questions, and statistical measurements.

Table 8

Relationship Between Research Questions (RQ), Constructs, Survey Questions, and Statistical Measurements

	Construct	Survey question(s)	Statistical measurement
RQ1 Current use	Awareness-knowledge	4, 5, 26-36	Descriptive statistics (frequencies, percentages, means, standard deviations). Spearman's correlation, effect size.
RQ2 Barriers	Attitude	16-24	Descriptive statistics (frequencies, percentages, means, and standard deviations).
RQ2 Geographic region	Awareness-knowledge	4, 38	Descriptive statistics, contingency table, Spearman's correlation.
RQ4 Attitudes	Attitude	1, 2-3, 6-15, 37	Descriptive statistics (frequencies, percentages, means, and standard deviations).

Summary

This quantitative, nonexperimental, descriptive study uses the research topics of clinical use, barriers, geography, and attitude to provide a cultural understanding of

anesthesia providers' perceptions of acupuncture and acupressure. A sample of 96 anesthesiology departments, from four U.S. geographic regions, were accessed for participation. Results provide future researchers with an awareness of current U.S. usage patterns and attitudes that may support or refute acupuncture and acupressure practices as adjuncts to anesthesia care plans.

Chapter Four: Results

"There never were in the world two opinions alike, no more than two hairs or two grains; the most universal quality is diversity."

~Montaigne

The purpose of this study was to examine anesthesia providers' perceptions of acupuncture and acupressure. Chapters 1-3 presented an overview of the study, a review of the literature, and methodology. This chapter reveals the study results.

Data Collection Review

Data were collected via a validated, pretested, and pilot-tested survey administered over the Internet by the survey software company Qualtrics® 2014. The study population included the three licensed anesthesia groups in the United States: anesthesiologists, CRNAs, and AAs. A sample of 96 anesthesiology departments, stratified by U.S. geographical region (West, Midwest, Northeast, and South) and institution type (university medical centers, community hospitals, children's hospitals, and VA hospitals) was selected for study participation.

Methodology Review

An introductory letter was sent via FedEx to the chairman of anesthesiology at each department for an estimated Monday delivery. An e-mail sent 7 days later, containing study instructions and the survey link, yielded a 28% response rate among the chairmen. To address any nonresponse, a second reminder e-mail was sent another 7 days later, with increased response rates among the chairmen from 28% to 40%.

Originally, the study design allowed 1 month for data collection; to accommodate the responses of three chairmen who returned out-of-town messages, the study was extended by 3 weeks. Out of the 96 anesthesiology chairmen contacted, 40% responded to the study. Thirty-seven chairmen granted departmental participation and two chairmen declined participation.

Data preparation and cleaning. Data were imported from Qualtrics® into IBM SPSS Statistics, Version 22.0 (SPSS) where it was cleaned to remove any missing responses and outliers. The target sample was 1,728 anesthesia providers of which $n = 338$ individuals attempted the survey (20% response rate). Of this group, 28 individuals did not complete the survey (3 refused the consent to participate and 25 only partially completed the survey). Excluding their responses left a sample of $N = 292$ respondents, providing an overall 17% study response rate.

Respondent Demographic Profile

Twelve individuals from the sample did not complete all of the demographic questions; however, their responses were included in the analysis since they answered survey questions directly associated with research questions. The respondent demographic profiles are presented in this section.

One hundred fifty-three (54%) anesthesiologists participated in the study, followed by 126 (44%) CRNAs, and 6 (2%) AAs ($M = 1.48$, $SD = 0.54$). Figure 6 displays a table of anesthesia provider respondent types. Responses were evenly split between 142 (51%) males and 138 (49%) females ($M = 1.51$, $SD = 0.50$). The age of study participants ranged from 20-30 years old to over 70 years old, with the plurality (35%) of study participants between the ages of 31-40 years old ($M = 2.93$, $SD = 1.12$) (Table 9).

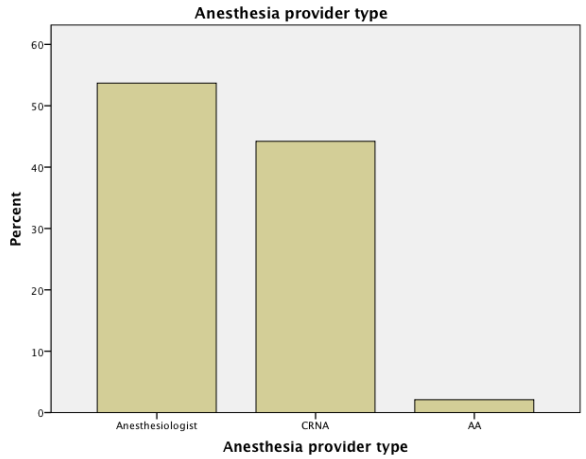

Figure 6. Anesthesia provider type.

Table 9

Age of Anesthesia Providers

		Frequency	%
Valid	20-30 years	20	7
	31-40 years	98	35
	41-50 years	73	26
	51-60 years	65	23
	61-70 years	23	8
	Over 70 years	2	<1
	Total	281	100.0
Missing	System	11	
Total		292	

Education. The majority (57%) of anesthesia providers reported a doctoral degree as their highest level of education. A doctoral degree was defined as MD, DO, PhD, DNAP, DNP, and/or EdD. The frequency and percentage of the respondent educational profiles are included in Table 10 ($M = 3$, $SD = 3.41$).

Anesthesia provider responses in the "Other" category were reported as 1 (<1%) BA degree, 1 (<1%) BS degree, 1 (<1%) AA, 2 (<1%) CRNA, 1 (<1%) in DNAP program, 2 (<1%) MA degrees, 1 (<1%) MAE degree, 1 (<1%) MSNA degree, 1 (<1%) Masters degree,

Table 10

Educational Profile of Anesthesia Providers

		Frequency	%
Valid	MD	137	48
	DO	4	1
	PhD	3	1
	DNAP	6	2
	DNP	2	<1
	MSN	92	33
	BSN	4	1
	Other	22	8
	MMSc	5	2
	MD & PhD	7	3
	MMSc & MEd	1	<1
	Total	283	100.0
Missing	System	9	
Total		292	

2 (<1%) MHA degrees, 1 (1<%) MBA degree, 1 (<1%) MEd degree, 1 (<1%) MHSc degree, and 6 (2%) MS degrees.

Years of practice. A plurality of providers had a professional anesthesia practice of either fewer than 5 years (27%) or more than 20 years (25%) (M = 3, SD = 1.55). Table 11 illustrates years of practice across respondent population.

Table 11

Years of Practice

		Frequency	%
Valid	Less than 5 years	76	27
	5-10 years	58	21
	11-15 years	38	14
	16-20 years	36	38
	Over 20 years	69	25
	Total	277	100.0
Missing	System	15	
Total		292	

Institution. The majority (69%) of anesthesia providers practiced in a university medical center followed by children's hospitals and community hospitals. Table 12 displays the frequency and percentages of the respondent demographic profiles stratified by place of employment ($M = 1.59$, $SD = 1.04$). Two individuals selected "Other," but did not specify a response. Figure 7 displays a histogram of institution types.

Table 12

Institution Type

		Frequency	%
Valid	University or academic medical center	199	69
	Children's hospital	43	15
	Community or regional hospital	32	11
	Department of Veterans' Affairs (VA) Hospital	11	4
	Other (please specify)	2	<1
	Total	287	100.0
Missing	System	5	
Total		292	

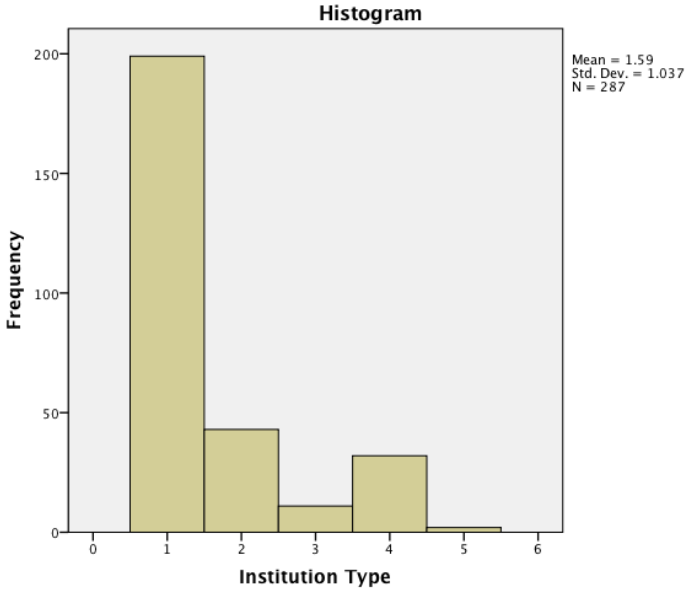

Figure 7. Histogram of institution type.

Patient population focus. Study participants reported that they most commonly provided anesthesia for patients undergoing general surgery, orthopedic, or ambulatory procedures. Table 13 illustrates frequency and percent of patient population focus.

Table 13

Patient Population Focus

	Frequency	%
General surgery	158	54
Orthopedics	138	47
Ambulatory	125	43
Pediatrics	120	41
Otolaryngology	117	40
Plastic surgery	116	40
Neurosurgery	114	39
OMFS	103	35
Gynecology	100	34
Oncology	89	31
Obstetrics	48	16
ICU	45	15
Cardiac	45	15
All of the above	43	15
Other	26	9

Note. OMFS = Oral and Maxillofacial surgery; ICU = Intensive Care Unit.

Table 14 presents the "Other" primary areas where anesthesia providers practice. Twelve individuals stated pain management as their primary area of service.

Country of pre-anesthesia training. The purpose of this demographic survey question (No. 41) was to ascertain if the country of educational training influenced predisposition to using acupuncture or acupressure. Pre-anesthesia training was defined as medical, nursing, or undergraduate education prior to anesthesia training. A sample of n = 284 respondents answered this question; 250 (88%) of anesthesia providers were trained

Table 14

"Other" Anesthesia Practice Areas

	Frequency	%
Abdominal transplantation	1	<1
All aspects of pediatric anesthesia and post operative care	1	<1
Chronic pain	3	1
Hepatobiliary	1	<1
Liver transplant	1	<1
No kids, no OB, everything else	1	<1
Pain management	5	1
Pediatric cardiac	1	<1
Pediatric pain clinic	1	<1
Radiology	1	<1
Regional	3	1
Transplant	1	<1
Trauma	1	<1
Urology	2	<1
Vascular, Thoracic, GI	1	<1

Note. n=2 responses were left out of table because they were blank.

solely in the United States; 34 (12%) received their pre-anesthesia (medical, nursing, or undergraduate) training in a foreign country (M = 1.12, SD = 0.33).

Respondents could enter as free text the non-U.S. countries of pre-anesthesia training: 1 (<1%) Belgium, 3 (1%), Canada, 1 (<1%) Columbia, 1 (<1%) Czech Republic, 1 (<1%), Dominican Republic, 1 (<1%) Egypt, 7 (2%) United Kingdom, 1 (<1%) Germany, 8 (3%) India, 1 (<1%) Italy, 1 (<1%) Japan, 1 (<1%) Nigeria, 1 (<1%) Romania, 1 (<1%) South Africa, 2 (1%) Sweden, 2 (1%) Taiwan, and one individual stated training “on both coasts” (<1%).

Descriptive Statistics Related to the Research Questions

Research questions focused on the following study topics: clinical use, barriers,

geography, and attitude. The theoretical constructs and survey questions were aligned with the study research questions (Chapter 3, Table 7).

Research question 1. What proportion of anesthesia providers currently use acupuncture and acupressure in clinical practice?

This research question was assessed by survey questions 4, 5, and 22-33 encompassing the areas of (a) personal use, (b) worldview, (c) acupuncture and acupressure approaches in clinical practice, (d) acupuncture and acupressure education, and (e) evidence for use.

Personal use. Survey questions (4 and 5) examined anesthesia providers' personal use of acupuncture and acupressure. These questions were measured on a 5-point Likert scale with options ranging from *no, and would not consider using it* to *yes, and have used it with positive outcomes.*

Acupuncture. Table 15 presents the descriptive statistics of anesthesia provider responses about personal acupuncture and acupressure use. Eighty (27%) anesthesia

Table 15

Personal Use

	Mean/SD	No, and would not consider using it	No, but would consider using it	Yes, and have used it with negative outcomes	Yes, and have used it with neutral outcomes	Yes, and have used it with positive outcomes
Acupuncture	*M* = 2.93 *SD* = 1.44	25 (9%)	157 (54%)	3 (1%)	27 (9%)	80 (27%)
Acupressure	*M* = 2.62 *SD* = 132	34 (12%)	175 (60%)	2 (<1%)	29 (10%)	52 (18%)

providers report using acupuncture with positive outcomes, and 157 (54%) stated they do not currently use acupuncture, but would consider using it ($M = 2.93$, $SD = 1.44$).

Acupressure. Acupressure had a similar positive response among anesthesia providers. Currently, 52 (18%) anesthesia providers in the study use acupressure with positive outcomes and 175 (60%) providers would consider using acupressure ($M = 2.62$, $SD = 1.32$).

A total of five anesthesia providers reported having a negative experience with acupuncture (1%) or acupressure (<1%). However, the majority of providers are either currently using or open to using these alternative medicine modalities. Figures 8 and 9 display histograms of respective acupuncture and acupressure use.

Significance testing. Likert-scale or Likert-type questions are considered ordinal data (Norman, 2010). Spearman's correlation coefficient is a nonparametric correlational test used to measure variables on an ordinal scale, specifically measuring the relationship or correlation between variables (Gravetter & Wallnau, 2008, p. 440).

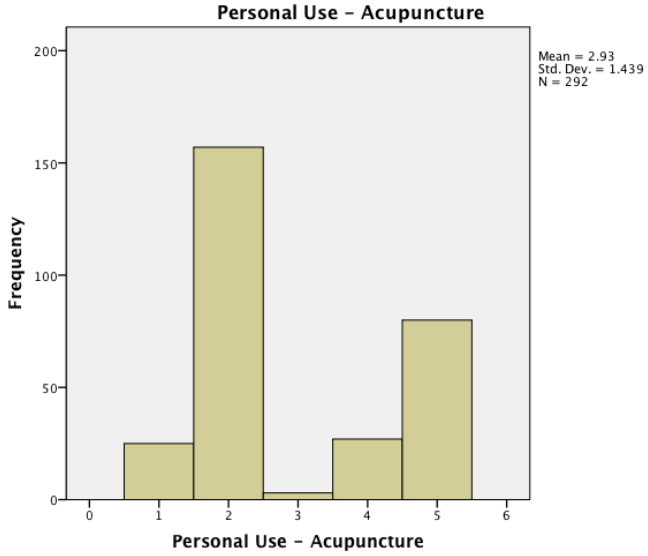

Figure 8. Histogram of personal acupuncture use.

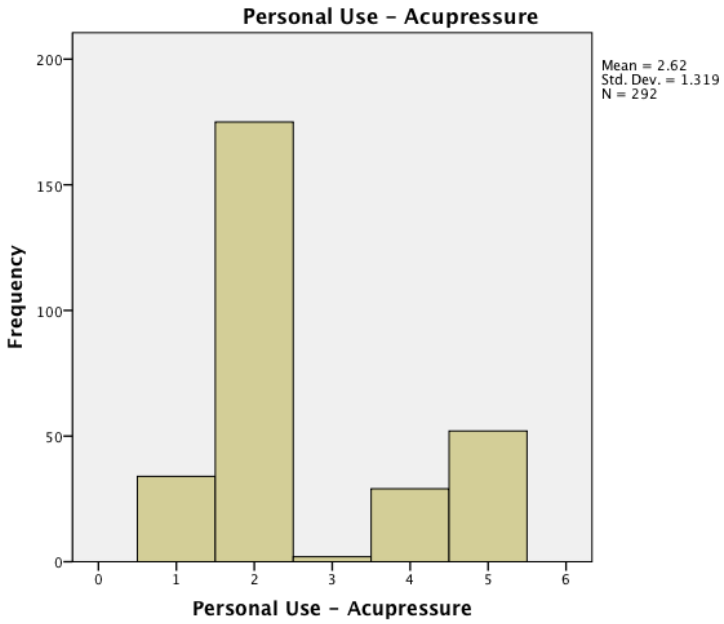

Figure 9. Histogram of personal acupressure use.

Effect size metrics assess the magnitude of association among the research variables and are resistant to sample size influence (Polit & Beck, 2012). When measuring effect size, Spearman's correlational coefficient is considered superior to Cohen's *d* for ordinal, continuous or categorical data (Ferguson, 2009). Ferguson (2009) reports the following effect sizes when using Spearman's correlation coefficient as the strength of association index for social science data: small effect = .2, moderate effect = .5, and strong effect = .8. Effect sizes that are small, moderate, or strong were reported. An alpha level of 0.05 was used for all statistical tests.

A Kolmogorov-Smirnov (K-S) test was run to ensure the data were in fact, nonparametric, indicating that Spearman's correlation coefficient was the appropriate statistical test. Spearman's correlation coefficient was computed to assess the relationship between the following variables and their potential influence on anesthesia providers' use of acupuncture and/or acupressure: *age*, *gender*, *anesthesia provider type*, *institution*, and

country of pre-anesthesia training. Additionally, a subgroup analysis was conducted on the 12 individuals who reported pain management as their clinical specialty.

Age. There was a nonsignificant correlation between age and acupuncture use ($r_s = 0.65$, $n = 281$, $p = 0.27$), however, there was a moderate effect size [95% CI = 2.79, 3.06]. A contingency table shows that providers between the ages of 31-50 have experienced the best outcomes with acupuncture (Table 16). There was no statistically significant relationship between age and acupressure use ($r_s = .094$, $n = 281$, $p = .116$).

Gender. Spearman's correlation coefficient revealed that gender and acupuncture use were correlated ($r_s = -.188$, $N = 292$, $p = .002$). A contingency table shows that women (61%) have experienced more positive outcomes using acupuncture than men (39%) (Table 17). Regarding acupressure, our data were inconclusive regarding gender and acupressure use ($r_s = -.105$, $n = 280$, $p = .08$).

Anesthesia provider type. Spearman's correlation coefficient was computed to calculate if a relationship between acupuncture/acupressure use and anesthesia provider type existed. There were nonsignificant correlations between anesthesia provider type (MD, CRNA, AA) and the use of acupuncture ($r_s = .012$, $n = 285$, $p = .84$) or acupressure ($r_s = .017$, $n = 285$, $p = .77$). Our data excluded the likelihood of important differences among providers in their likelihood to use acupuncture or acupressure.

Institution. Similar to both age and provider type, Spearman's correlation coefficient virtually excluded an association between institution type and the use of acupressure ($r_s = .001$, $n = 287$, $p = .98$) and showed no statistically significant association between institution type and the use of acupuncture ($r_s = -.094$, $n = 287$, $p = .11$). Place of

Table 16

Acupuncture Cross-Tabulation: Age (Personal Use)

			Age 20-30 years	Age 31-40 years	Age 41-50 years	Age 51-60 years	Age 61-70 years	Age Over 70 years
Personal use acupuncture	No, and would not consider using it.	Count	5	8	5	3	3	0
		% within personal use acupuncture	20.8	33.3	20.8	12.5	12.5	0.0
	No, but would consider using it.	Count	13	52	33	38	13	2
		% within personal use acupuncture	8.6	34.4	21.9	25.2	8.6	1.3
	Yes, and have used it with negative outcomes.	Count	0	0	1	2	0	0
		% within personal use acupuncture	0.0	0.0	33.3	66.7	0.0	0.0
	Yes, and have used it with neutral outcomes.	Count	1	9	10	4	0	0
		% within personal use acupuncture	4.2	37.5	41.7	16.7	0.0	0.0
	Yes, and have used it with positive outcomes.	Count	1	29	24	18	7	0
		% within personal use acupuncture	1.3	36.7	30.4	22.8	8.9	0.0
Total		Count	20	98	73	65	23	2
		% within personal use acupuncture	7.1	34.9	26.0	23.1	8.2	0.7

Table 17

Acupuncture Cross-Tabulation: Gender (Personal Use)

			Gender	
			Female	Male
Personal use-acupuncture	No, and would not consider using it.	Count	5	18
		% within personal use acupuncture	22	78
	No, but would consider using it.	Count	71	80
		% within personal use acupuncture	47	53
	Yes, and have used it with negative outcomes.	Count	0	3
		% within personal use acupuncture	0	100
	Yes, and have used it with neutral outcomes.	Count	14	10
		% within personal use acupuncture	52	42
	Yes, and have used it with positive outcomes.	Count	48	31
		% within personal use acupuncture	61	39
Total		Count	138	142
		% within personal use acupuncture	49	51

employment appears to have no influence over an anesthesia provider's decision to use acupuncture or acupressure personally.

Pre-anesthesia training. Finally, pre-anesthesia training was correlated against personal use to see if country of educational training served as a covariate, influencing a provider's decision to use acupuncture or acupressure.

Spearman's correlation coefficient could not exclude a relationship between pre-anesthesia training and acupuncture use ($r_s = 1.00$, $n = 284$, $p = .09$). Moreover, there was a strong effect size [95% CI = 1.08, 1.16]. A contingency table reveals that 67 (85%) of US trained anesthesia providers have used acupuncture with positive outcomes and 137 (90%) of U.S. trained providers have no experience, but would consider acupuncture use (Table 18).

Table 18

Acupuncture Cross-Tabulation: Pre-anesthesia Training (Personal Use)

			Pre-anesthesia training	
			U.S.	Other
Personal use-acupuncture	No, and would not consider using it.	Count % within personal use acupuncture.	22 96	1 4
	No, but would consider using it.	Count % within personal use acupuncture.	137 90	16 12
	Yes, and have used it with negative outcomes.	Count % within personal use acupuncture.	1 33	2 67
	Yes, and have used it with neutral outcomes.	Count % within personal use acupuncture.	22 85	4 15
	Yes, and have used it with positive outcomes.	Count % within personal use acupuncture.	67 85	12 15
Total		Count % within personal use acupuncture.	249 87	35 12

Similar to acupuncture, Spearman's correlation coefficient showed an insignificant correlation between pre-anesthesia training and acupressure use (r_s = .091, n = 284, p = .13).

Isolating anesthesia providers who specialize in regional anesthesia or pain management (n = 12) revealed that all of these specialists have either used acupuncture/acupressure with good results, or are receptive towards using these modalities. The majority of pain management providers (67%) have used acupuncture with positive outcomes. Acupressure was less frequently used; however, pain specialists still showed an interest in considering its use (42%). Results are presented in Table 19.

Table 19

Personal Use by Pain Management Specialists

	Mean/SD	No, and would not consider using it	No, but would consider using it	Yes, and have used it with negative outcomes	Yes, and have used it with neutral outcomes	Yes, and have used it with positive outcomes
Acupuncture	M = 416 SD = 134	0	3 (25%)	0	1 (8%)	8 (67%)
Acupressure	M = 3.5 SD = 1.38	0	5 (42%)	0	3 (25%)	4 (33%)

Worldview. Survey question 5 examined anesthesia providers' prevailing view of medicine. A total of 206 (71%) respondents follow Western biomedicine and 84 (29%) respondents believe in a combination of traditional Chinese medicine (TCM) and Western biomedicine (M = 1.58, n = 290, SD = 0.9). Two individuals did not answer the survey question and no respondent selected the option of only following TCM.

Acupuncture and acupressure approaches in clinical practice. Survey question 22 asked how anesthesia providers use acupuncture and acupressure in their anesthesia

practice. This question was measured via a 4-point Likert scale. The largest response group of anesthesia providers does not practice acupuncture (47%), but would refer patients to a complementary and alternative medicine (CAM) provider (39%). Results for acupressure clinical use were similar: 51% of anesthesia providers do not practice acupressure, but 37% would be willing to refer patients to a CAM provider. Table 20 presents the data.

Table 20

Acupuncture and Acupressure Approaches to Clinical Practice

	Mean/SD	Do not practice	Would not recommend	Would refer to a CAM* provider	Personally provide
Acupuncture	*M* = 2.11 *SD* = 1.10	137 (47%)	14 (5%)	114 (39%)	27 (9%)
Acupressure	*M* = 1.99 *SD* = 1.06	148 (51%)	18 (6%)	107 (37%)	19 (7%)

Note. CAM = Complementary and Alternative Medicine.

Education. Survey questions, 23 and 24, evaluated exposure to alternative medicine education. These questions addressed the level of acupuncture/acupressure education attained and how much education the anesthesia providers desired, respectively. Table 21 details acupuncture and acupressure education attained. The majority of providers have not received any acupuncture or acupressure education (44% and 53%, respectively).

Acupuncture education desired. A total of 218 (76%) respondents asserted with a "yes" response that they would like to receive education about acupuncture (*M* = 1.24, *SD* = 0.43). Figure 10 shows a histogram depicting anesthesia provider responses regarding acupuncture education.

Table 21

Acupuncture and Acupressure Education Received

	Mean/SD	None	Some, but not sufficient to advise patients about use	Sufficient to advise patients about use	Sufficient to personally provide
Acupuncture Education received	*M* = 1.85 *SD* = 0.92	127 (44%)	103 (35%)	39 (13%)	22 (8%)
Acupressure Education received	*M* = 1.67 *SD* = 0.86	155 (53%)	94 (32%)	26 (9%)	16 (6%)

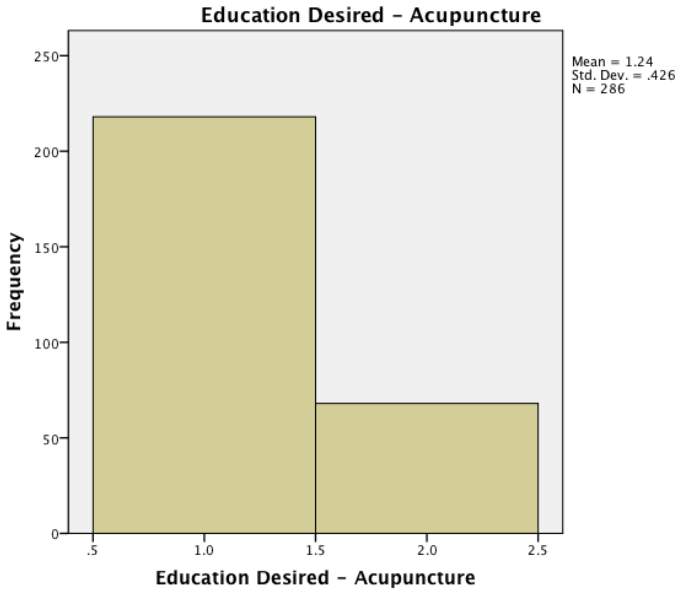

Figure 10. Acupuncture education desired.

Acupressure education desired. Likewise, a strong majority of respondents (212, 74%) would like acupressure education (*M* = 1.26, *SD* = 0.44). This is reflected in Figure 11.

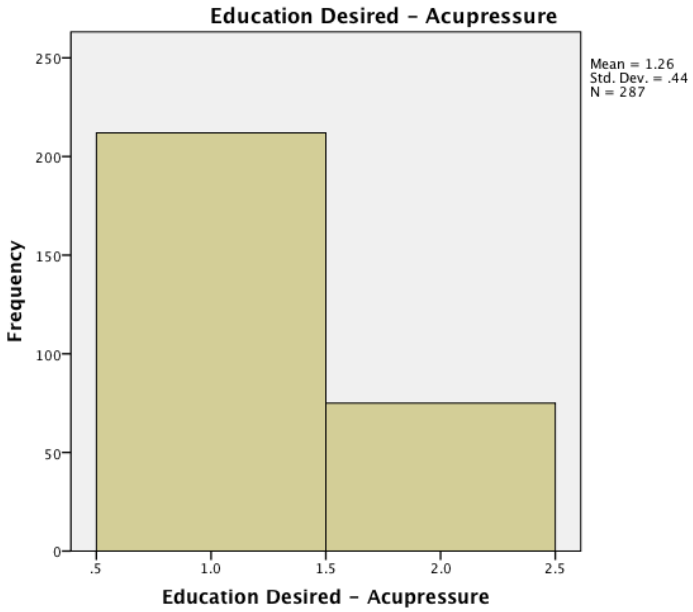

Figure 11. *Acupressure education desired.*

Evidence for use. Survey questions 25-33 asked anesthesia providers to acknowledge how important each type of evidence was to them when deciding whether to recommend acupuncture or acupressure. Table 22 shows the frequency and percent of responses toward evidence for use.

The responses indicate that randomized controlled trials (RCT) with humans were considered the only *essential* evidence; RCT with animals was considered *unimportant*. Proven mechanism, proposed mechanism of action, and colleague recommendations were deemed "somewhat important." "Somewhat essential" evidence included epidemiological studies, published case studies, successful use in practice, and personal experience.

Research question 2. What barriers prevent acupuncture and acupressure use in anesthesia practice?

Survey questions 16-21 addressed this research question by asking for the reasons why acupuncture and acupressure may not work in Western medical settings. A 5-point

Table 22

Evidence for Use

	Mean/SD	Unimportant	Somewhat important	Somewhat essential	Essential
Proven mechanism R	*M* = 2.62 *SD* = 0.96	36 (12%)	102 (35%)	89 (31%)	63 (22%)
Proposed MOA*	*M* = 2.71 *SD* = 0.92	24 (8%)	104 (36%)	92 (32%)	69 (24%)
RCT* with animals	*M* = 2.10 *SD* = 1.01	104 (36%)	83 (29%)	73 (25%)	30 (10%)
RCT with humans	*M* = 3.07 *SD* = 0.90	15 (5%)	64 (22%)	99 (34%)	113 (39%)
Epidemiological studies	*M* = 2.59 *SD* = 0.91	11 (4%)	69 (24%)	100 (35%)	86 (30%)
Published case studies	*M* = 2.62 *SD* = 0.91	33 (11%)	98 (34%)	105 (36%)	53 (18%)
Successful use in practice	*M* = 2.83 *SD* = 0.94	29 (10%)	69 (24%)	113 (39%)	77 (27%)
Colleague recommendations	*M* = 2.44 *SD* = 0.84	38 (13%)	113 (39%)	111 (38%)	28 (10%)
Personal experience	*M* = 2.64 *SD* = 0.97	38 (13%)	84 (29%)	104 (36%)	60 (21%)

MOA = mechanism of action; RCT = randomized controlled trial.

Likert scale was used with options ranging from *strongly disagree* to *strongly agree*. The word barrier was left out of the survey question to minimize any leading or negative connotations through the question wording. Table 23 presents the data.

Table 23

Reasons Why Acupuncture and Acupressure May Not Work in Western Medical Settings

	Mean/SD	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Lack of scientific evidence	*M* = 3.88 *SD* = 0.73	0	18 (6%)	42 (14%)	187 (64%)	43 (15%)
Unavailability of credentialed providers	*M* = 3.72 *SD* = 0.92	6 (2%)	30 (10%)	50 (17%)	159 (55%)	46 (16%)
Lack of reimbursement	*M* = 3.77 *SD* = 0.87	5 (2%)	15 (5%)	77 (27%)	139 (48%)	54 (19%)
Lack of available equipment	*M* = 3.33 *SD* = 0.97	9 (3%)	52 (18%)	86 (30%)	119 (41%)	24 (8%)
Too time consuming to perform	*M* = 3.14 *SD* = 0.99	11 (4%)	69 (24%)	100 (35%)	86 (30%)	23 (8%)
Other	*M* = 3.25 *SD* = 0.67	1 (<1%)	2 (<1%)	85 (77%)	14 (12%)	9 (8%)

The majority of anesthesia providers agree that lack of scientific evidence, unavailability of credentialed providers, and lack of reimbursement are the primary reasons why acupuncture and acupressure are not used in U.S. anesthesia practice. Respondents also had the option to free-text their responses to "Other" barriers to acupuncture and acupressure (Table 24).

Research question 3. Is there a relationship between the use of acupuncture and acupressure in anesthesia practice based on geographic region?

Survey questions 4 (personal use) and 35 (geographic region where employed) addressed Research Question 3. All four U.S. geographic regions were represented in the study. Responses were divided as follows: West (29%), Midwest (17%), Northeast (20%),

Table 24

"Other" Reasons Why Acupuncture and Acupressure May Not Work in Western Medical Settings

	Frequency	Percent
Valid	244	84
Actual lack of well-controlled studies showing scientific evidence for acupuncture and acupressure.	1	0.3
Acupuncture/pressure is easily accepted in Asia because of centuries of use.	1	0.3
Because we should not promote placebo "therapy."	1	0.3
Broad familiarity.	1	0.3
Cultural attitudes.	1	0.3
Fear.	1	0.3
I have been on a trip to China where I saw both modern and traditional Chinese medical techniques applied to anesthesia and postoperative pain management. I had a more positive view of acupuncture before the trip than I did after seeing it in a somewhat controlled manner.	1	0.3
Ignorance of the procedures by the public.	1	0.3
It does work, but Western thought does not totally accept it. Personal experience would change that.	1	0.3
It is a useless technique.	1	0.3
Knowledge deficit.	1	0.3
Lack of patient/family interest.	1	0.3
Lack of acceptance.	1	0.3
Lack of cooperation among providers.	1	0.3

Table 24 - continued

	Frequency	Percent
Lack of exposure to these modalities in medical school makes it hard for physicians to recommend these treatments.	1	.3
Lack of familiarity leads to skepticism. I think that eventually, these modalities will be adopted into standard practice.	1	.3
Lack of knowledge.	1	.3
Lack of knowledge by health-care providers.	1	.3
Lack of scientifically rigorous studies evaluating use compared with other modalities.	1	.3
Misunderstanding	1	.3
Most people are still skeptics.	1	.3
N/A	2	.7
No education for anesthesia providers.	1	.3
No proprietary devices, drugs, or other for industry to support/promote.	1	.3
None	3	1.0
Not enough knowledge among doctors and health-care professionals.	1	.3
Opposition from patients.	1	.3
Overall bias and lack of understanding.	1	3
Patient buy-in.	1	.3
Patient perception.	1	.3
Patient reluctance.	1	.3

Table 24 - continued

	Frequency	Percent
Patients do not know enough of acupressure/acupuncture	1	.3
Persistent negative rhetoric from opposing health-care groups not versed in integrative therapies.	1	.3
Provider biases.	2	.7
Public knowledge.	1	.3
Sham.	1	.3
Surgeon patience and acceptance of puncture/pressure.	1	.3
The provider is uncomfortable about using it.	1	.3
There is a general lack of knowledge among providers as to what acupuncture can treat.	1	.3
When could an anesthesia provider have time to perform or teach these modalities?	1	.3
Widely accepted knowledge.	1	.3
Total	292	100.0

South (34%) with the majority of anesthesia providers employed in the West and South (M = 2.59, SD = 1.23). Figure 12 presents the percentage of survey participation across U.S. regions.

Acupuncture. A contingency table was computed to assess trends between acupuncture use and geographic region. Table 25 displays results. Overall, 27% of providers in the United States have used acupuncture with positive outcomes. The majority (54%) of providers have not used acupuncture, but are open to using this modality.

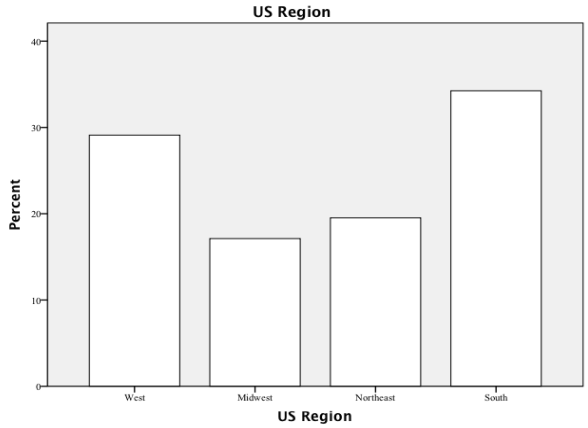

Figure 12. U.S. geographic regions represented by study participants.

Table 25

Acupuncture Cross-Tabulation: U.S. Region (Personal Use)

				Personal use - Acupuncture		
U.S. region		No, and would not consider using it	No, but would consider using it	Yes, and have used it with negative outcomes	Yes, and have used it with neutral outcomes	Yes, and have used it with positive outcomes
West	Count	4	37	2	10	32
	% within U.S. region	5	44	2	12	38
Midwest	Count	11	24	1	2	12
	% within U.S. region	22	48	2	4	24
Northeast	Count	4	32	0	4	17
	% within U.S. region	7	56	0	7	30
South	Count	6	64	0	11	19
	% within U.S. region	6	64	0	11	19
Total	Count	25	157	3	27	80
	% within U.S. region	8.6	54	1	9	27

Stratifying the data by specific regions reveals that the West has the highest percentage of providers who have used acupuncture with positive outcomes (38%). The Midwest had the largest opposition to acupuncture with 22% of providers stating they have not used acupuncture and would not consider using this modality. This was the only region to have a > 7% opposition to acupuncture.

Spearman correlation coefficient was computed and revealed a statistically significant correlation (r_s = -.135, N = 292, p = .02) between acupuncture use and U.S. geographic region. The data were then stratified to see which specific regions had a statistically significant correlation.

Table 26 presents the Spearman's correlation between acupuncture use and U.S. region. The West was the only region to have a statistically significant result (r_s = .159, n = 291, p = .007) revealing that there is a positive relationship between West Coast anesthesia providers and their choice to use acupuncture.

Table 26

Spearman's Correlation - Acupuncture (U.S. Region)

				Personal use-Acupuncture			
				West	Midwest	Northeast	South
Spearman's rho	Personal use-Acupuncture	Correlation Coefficient	1.000	.159	-.086	.032	-.077
		Sig. (2-tailed)		.007	.141	.587	.191
		N	292	291	292	292	292

Acupressure. Table 27 represents a contingency table of U.S. regions and personal use of acupressure. Again the majority (60%) of anesthesia providers has not used acupressure, but are open to the modality. Interestingly, with regards to acupressure, the

Table 27

Acupressure Cross-Tabulation - U.S. Region (Personal Use)

		Personal use - Acupuncture				
U.S. region		No, and would not consider using it	No, but would consider using it	Yes, and have used it with negative outcomes	Yes, and have used it with neutral outcomes	Yes, and have used it with positive outcomes
West	Count	7	55	1	7	15
	% within U.S. region	8	65	1	8	18
Midwest	Count	9	26	1	4	10
	% within U.S. region	18	52	2	8	20
Northeast	Count	4	38	0	6	9
	% within U.S. region	7	67	0	11	16
South	Count	14	56	0	12	18
	% within U.S. region	14	56	0	12	18
Total	Count	34	175	2	29	52
	% within U.S. region	12	60	1	10	18

Midwest was the region with the highest use (20%) compared to the West (18%), Northeast (16%), and South (18%). However, the Midwest was also the region with the most anesthesia providers who reported they would not consider using acupressure (18%), which was a similar result to Midwestern providers' opposition to acupuncture.

Spearman's correlation coefficient was also computed for acupressure use. There was a non-statistically significant correlation between acupressure use and U.S. geographic region (r_s = -.008, N = 292, p = .892).

Research question 4. What are the general attitudes of anesthesia providers towards the use of acupuncture and acupressure?

The attitudes of anesthesia providers towards acupuncture and acupressure were assessed by survey questions 1-3, 6-15, and 34, which covered the following areas: (a) alternative vs. mainstream practices, (b) the effects of acupuncture and acupressure, (c) general attitudes, and (d) spirituality.

Alternative vs. mainstream practices. Questions 1-3 asked providers to state whether acupuncture and or acupressure were viewed as alternative or mainstream practices in light of the U.S. health-care system. These questions were measured with a 4-point Likert scale with options ranging from *clearly mainstream* to *no opinion*. The majority of anesthesia providers view both acupuncture (46%) and acupressure (55%) as clearly alternative practices. Table 28 presents the results.

Table 28

Alternative vs. Mainstream Practices

	Mean/SD	Clearly mainstream	Neither clearly mainstream nor alternative	Clearly alternative	No opinion
Acupuncture	$M = 2.33$ $SD = 0.73$	43 (15%)	112 (39%)	132 (46%)	3 (1%)
Acupressure	$M = 2.53$ $SD = 0.68$	21 (7%)	101 (35%)	157 (55%)	9 (3%)

Effects of acupuncture and acupressure. Survey questions 2 and 3 asked anesthesia providers if acupuncture (question 2) or acupressure (question 3) had a beneficial effect on

decreasing anxiety, postoperative nausea and vomiting (PONV), acute postoperative pain, and chronic pain. Chronic pain was defined as depression, migraines, cancer pain, etc.

The majority of anesthesia providers report that acupuncture had a beneficial effect on decreasing anxiety (75%), PONV (73%), acute postoperative pain (58%), and chronic pain (85%). The frequency and percentages are presented in Table 29.

Table 29

Acupuncture's Effects on Decreasing

	Mean/SD	Yes	No
Anxiety	*M* = 1.25 *SD* = 0.43	212 (75%)	71 (25%)
PONV	*M* = 1.27 *SD* = 0.45	209 (73%)	78 (27%)
Acute postoperative pain	*M* = 1.42 *SD* = 0.50	165 (58%)	120 (42%)
Chronic pain	*M* = 1.15 *SD* = 0.35	245 (85%)	42 (15%)

Anesthesia providers responded that acupressure too has a positive effect on decreasing anxiety (65%), PONV (63%), and chronic pain (61%). However, 165 (60%) of anesthesia providers reported that acupressure was not effective at decreasing acute postoperative pain. Descriptive statistics with frequency and percentages are included in Table 30.

General attitudes. Questions 6-15 examined the general attitudes of anesthesia providers towards acupuncture and acupressure. Respondents were asked to indicate how closely each statement represented their feeling about acupuncture and acupressure.

Table 30

Acupressure's Effects on Decreasing

	Mean/SD	Yes	No
Anxiety	*M* = 1.35 *SD* = 0.45	178 (65%)	96 (35%)
PONV	*M* = 1.37 *SD* = 0.48	175 (63%)	102 (37%)
Acute postoperative pain	*M* = 1.60 *SD* = 0.49	111 (40%)	165 (60%)
Chronic pain	*M* = 1.39 *SD* = 0.49	169 (61%)	108 (39%)

Responses were measured on a 5-point Likert scale. Negative responses *strongly disagree* or *disagree* to options acupuncture and acupressure (A/A) results are due to placebo effect, A/A not tested in a scientific manner should be discouraged, A/A has no impact on treating symptoms, conditions, and/or diseases, and A/A are a threat to public health indicate a positive attitude towards acupuncture and acupressure. Anesthesia providers showed a favorable attitude towards acupuncture and acupressure on all questions.

Table 31 presents the data.

Spirituality. The final survey question (#34) asked if spiritual or religious beliefs influenced one's attitude towards acupuncture or acupressure. It was measured with a 5-point Likert scale. Responses were as follows: 16 (6%) providers reported *yes, very much*, 48 (17%) reported *yes, somewhat*, 219 (75%) reported *no*, and 8 (3%) reported *no opinion* (*M* = 2.75, *SD* = 0.59). Overall, 75% of anesthesia providers agree that spiritual or religious beliefs have no influence over their attitude towards acupuncture and acupressure.

Table 31

General Attitudes

	Mean/SD	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Clinical care should integrate the best of conventional and A/A practices.	*M* = 3.79 *SD* = 0.95	10 (3%)	11 (4%)	74 (25%)	131 (45%)	66 (23%)
A/A include ideas and methods from which conventional medicine could benefit.	*M* = 3.92 *SD* = 0.83	5 (2%)	11 (4%)	49 (17%)	163 (56%)	63 (22%)
While we need to be cautious in our claims, A/A hold promise for treatment of symptoms, conditions, and/or diseases.	*M* = 3.87 *SD* = 0.84	6 (2%)	14 (5%)	47 (16%)	171 (57%)	54 (19%)
The results of A/A are in most cases due to placebo effect.	*M* = 2.69 *SD* = 0.92	16 (6%)	120 (41%)	111 (38%)	29 (10%)	16 (6%)
A/A therapies not tested in scientific manner should be discouraged.	*M* = 3.06 *SD* = 1.0	13 (5%)	89 (31%)	89 (31%)	70 (24%)	31 (11%)
While a few A/A approaches may have limited benefits, they have no true impact on treatment of symptoms, conditions, and/or diseases.	*M* = 2.49 *SD* = 0.89	19 (7%)	164 (56%)	65 (22%)	36 (12%)	8 (3%)
A/A are a threat to public health.	*M* = 1.60 *SD* = 0.72	149 (51%)	119 (41%)	17 (6%)	6 (2%)	1 (< 1%)

Table 31 - continued

	Mean/SD	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I hope to have A/A available to patients in my practice or referral network.	*M* = 3.53 *SD* = 0.94	9 (3%)	26 (9%)	97 (33%)	122 (42%)	38 (13%)
Anesthesia providers should be able to advise their patients about A/A.	*M* = 3.59 *SD* = 0.89	8 (3%)	21 (7%)	90 (31%)	138 (47%)	35 (12%)
Knowledge about A/A is important to me as an anesthesia provider.	*M* = 3.48 *SD* = 1.0	13 (5%)	34 (12%)	83 (28%)	124 (43%)	38 (13%)

*A/A = acupuncture and acupressure.

Figure 13 displays a histogram of responses to spirituality's influence over attitude towards acupuncture and acupressure.

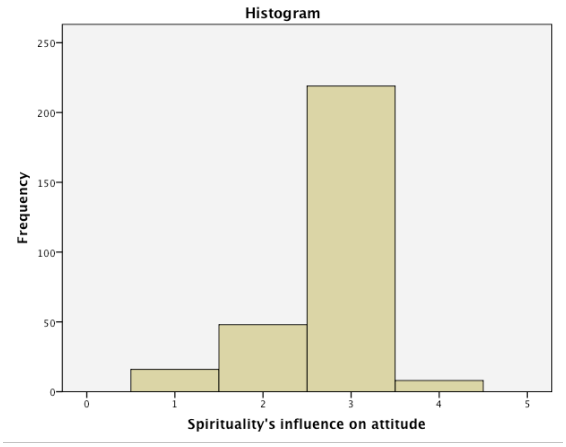

Figure 13. Spirituality's influence over attitude toward acupuncture and acupressure.

Chapter Five: Discussion

Purpose of the Study

This study examined U.S. anesthesia providers' perceptions of acupuncture and acupressure. Specific aims were directed toward (a) identifying the attitudes and current usage patterns of acupuncture/acupressure among anesthesia providers, (b) investigating if geographical differences contributed to personal use differences among providers, and (c) examining any barriers to practice.

This quantitative, nonexperimental, descriptive study utilized a cross-sectional survey design to study U.S. anesthesia providers. The ensuing chapter provides the demographic profile, summary findings for the research questions, limitations, application to theory, application to the literature, implications, recommendations for future research, and the study conclusion. To date, this is the only study to assess anesthesia providers' views of these alternative medicine modalities.

Respondent Demographic Profile

A sample of $N = 292$ anesthesia providers participated in the study. Demographic profiles revealed that responses were fairly evenly split between males (51%) and females (49%), and anesthesiologists (54%) and CRNAs (44%). AAs made up the remaining 2% of the respondents. The majority received their pre-anesthesia training in the United States, had doctoral degrees, and practiced in a university medical center working with general surgery, orthopedic, or ambulatory patients.

Summary Findings of Research Questions

Research question 1. What proportion of anesthesia providers currently use acupuncture and acupressure in clinical practice?

Personal use. The majority of anesthesia providers indicated that while they have not used acupuncture or acupressure they would consider using the modalities. Also, all of the respondents in the subspecialty of pain management have either experienced good results with acupuncture/acupressure or expressed a desire to want to use these alternative medicine modalities.

Stratifying the data by covariates revealed that gender has a significant impact on acupuncture use. Specifically, females are more likely to favor acupuncture use than men. This result is similar to the findings reported by Wahner-Roedler et al. (2006) that female physicians were 2.4 times more likely than men to refer patients for complementary and alternative medicine (CAM). Three other studies looking at CAM use also revealed that females have a greater personal use of CAM over men (Kronenberg, 2006; Raferty, McGee, Miller, & Reyes, 2002; Zhang, Lao, Chen, & Ceballos, 2012).

Age yielded a moderate effect size, indicating that there is a moderate correlation between age and acupuncture use. Specifically, providers between the ages of 31-50 years experienced the best outcomes with acupuncture. This result is similar to the report by Zhang et al. (2012) that middle-aged individuals have a higher acupuncture use than other age groups.

Country of pre-anesthesia training had a large effect size, revealing that—while not statistically significant—a strong correlation does exist between country of pre-anesthesia training and acupuncture use. Providers trained solely in the United States had the best

experiences with acupuncture use compared to providers who received their pre-anesthesia training in foreign countries. The variables of anesthesia provider type and institution did not significantly influence anesthesia providers' personal use of acupuncture or acupressure.

Worldview. The survey question enquiring about respondent worldviews yielded a noteworthy result. Two-thirds of anesthesia providers prescribe to Western biomedicine; however, one-third of providers believe in a combination of Western biomedicine and TCM. In both Voight's and Avino's studies, results were almost evenly split between respondents who prescribed to only Western biomedicine versus a combination of Western biomedicine and TCM (Avino, 2011; Voight, 2012). It is notable though, that both of these aforementioned studies examined nurses, and nursing encompasses many areas of practice. Nursing curriculum encourages an holistic approach to patient care and also provides students with an appreciation of alternative medicine (Helms, 2006; Henderson, 2002). Contemporary anesthesia practice is strongly grounded in traditional, Western biomedical patterns of thinking so it was interesting to see that a third of anesthesia providers report an acceptance of alternative medicine.

Acupuncture and acupressure approaches in clinical practice. With regards to clinical practice, 47% of respondents do not practice acupuncture and 51% do not practice acupressure; however, both of these groups are open to referring their patients to a CAM practitioner (39% would refer for acupuncture and 37% would refer for acupressure). These results were further confirmed when investigating anesthesia provider exposure to acupuncture/acupressure education.

Education. Overall, the majority of anesthesia providers have had little to no acupuncture or acupressure training and yet they are receptive to education in these areas. A

total of 218 (76%) of respondents desire acupuncture education and 212 (74%) desire acupressure education. These percentages show a receptiveness toward acupuncture/acupressure education and present a strong argument in favor of potential incorporation of acupuncture/acupressure education into anesthesia curriculum.

Evidence for use. Anesthesia providers were asked to specify what type of evidence would be most important to them in deciding whether or not to recommend acupuncture or acupressure. The only *essential* evidence reported was randomized controlled trials (RCT) with humans. The *somewhat essential* evidence included: epidemiological studies, published case studies, successful use in practice, and personal experience. The RCT with humans, epidemiological studies, and published case studies present in the international literature, apparently have not gained traction with U.S. anesthesia providers. The proven efficacy of acupuncture should diminish doubt about the modality (Hao & Mittelman, 2014). The evidence for successful use in practice and personal experience can only come through provider education and then subsequent clinical use.

Overall, this research question revealed that while the majority of anesthesia providers have not used acupuncture/acupressure, there is a majority open to receiving education, learning how to personally provide, or learning what to refer to CAM practitioners. Women are more likely than their male counterparts to personally provide acupuncture or refer patients for acupuncture/acupressure. That a significant one-third of anesthesia providers believe in a combination of Western biomedicine and TCM reveals an openness toward both Eastern and Western medical practices.

Research question 2. What barriers prevent acupuncture and acupressure use in anesthesia practice?

Anesthesia providers reported lack of scientific evidence, and unavailability of credentialed providers as the primary reasons why acupuncture and acupressure may not be used in U.S. anesthesia practice. This result is similar to Avino's (2011) study, which reported lack of evidence and lack of staff training as the perceived barriers to CAM integration among nursing faculty and students. In Singapore, Wong, Toh, and Kong (2010) found the same result citing personal lack of knowledge and unavailability of CAM practitioners as the two primary barriers to CAM use among health-care providers. Hard science in support of acupuncture does exist (Hao & Mittelman, 2014, p. 4), and the primary way to remedy the barrier of unavailability of credentialed providers is to provide acupuncture and acupressure education to anesthesia providers.

While the majority of providers selected the aforementioned areas as barriers to practice, important insights appeared also in the free-text, "Other" responses. The overarching theme in the "Other" responses was *lack of*. This included lack of well-controlled, scientific studies, lack of patient/family interest, lack of acceptance (including provider skepticism), lack of cooperation among providers, lack of exposure in medical school, lack of education, lack of familiarity, and lack of understanding.

Seven individuals reported lack of knowledge or knowledge deficits among anesthesia providers, the public, and patients as major reasons why acupuncture/acupressure may not work in Western medical settings. These results are similar to the study by Zhang et al. (2012), which cited unfamiliarity and unawareness as the primary reasons that health-care providers chose not to use acupuncture.

Some anesthesia providers reported positive experiences with acupuncture and/or acupressure and agreed that it does work, but Western thought does not totally accept it.

Personal experience will change that. Another respondent cited "persistent negative rhetoric from opposing health-care groups not versed in integrative therapies" as a "potential barrier."

Other themes included patient reluctance, patient buy-in, patient perception, misunderstanding, and surgeon acceptance. There were three negative comments: "We should not promote placebo 'therapy'," "It is a useless technique," and "Sham."

One respondent commented that there are "no proprietary devices, drugs, or other for industry to support/promote." Individuals also cited cultural attitudes and provider biases as reasons why acupuncture and acupressure have not diffused into U.S. anesthesia practice. Lack of industry incentives and cultural biases illuminate two complex, multifaceted barriers. One area questions whether profit incentives drive practice, while the other hints at inherent cultural prejudices.

Health-care choices may be industry driven (by government, insurance company, institutional culture, etc.) and currently there are no quantifiable or immediate incentives for industries to provide acupuncture or acupressure. Consistent use in the perioperative setting has the potential to decrease hospital and anesthetic-related costs, but the metrics will be accessible only in anesthesia departments where acupuncture and/or acupressure are deliberately studied.

The most effective way to combat cultural bias or prejudice is with education, recalling that the primary barrier to acupuncture/acupressure use in the United States is lack of scientific evidence. In reality, the evidence exists—published in peer-reviewed journals (Chapter 2, Tables 1-5)—but most of this information has not disseminated into practice. Whether this perceived lack of scientific evidence—which is really a lack of knowledge—

stems from ignorance (of the literature), or omission (from a preconceived bias) is undetermined.

A final consideration of cultural biases concerns the fact that most of the clinical studies examining acupuncture and/or acupressure use in anesthesia are international. They are not necessarily readily available in U.S. journals or, these articles may be ignored by practitioners who have an inherent cultural bias against non-U.S. research. Additionally, some of the articles are not in English. The best way to remedy skepticism and cultural biases is with evidence-based clinical research, published in English, in reputable journals.

Research question 3. Is there a relationship between the use of acupuncture and acupressure in anesthesia practice based on geographic region?

There is a statistically significant correlation between acupuncture use and geographic region, with the West having the highest predisposition toward acupuncture use. Zhang et al. (2012) also found that the West, followed by the South, were the dominant regions where health-care providers had a greater predisposition towards using acupuncture. Though entirely speculating, the West Coast's propensity toward acupuncture use may be related to its proximity to Asia or an openness toward Asian influences. This relationship may also be explained by patient desires, as patients on the West coast may be more likely to request acupuncture and acupressure over patients in other regions of the country.

Geographic region has no influence over acupressure use by anesthesia providers. While acupressure use was not correlated to area of the country, the data still offer some interesting information. The Midwest had the greatest use of acupressure, but this was also the region that had the greatest opposition toward using both acupuncture and acupressure.

There are not other studies to qualify these results, therefore the data warrant further investigation to determine why this discrepancy in the Midwest exists.

Research question 4. What are the general attitudes of anesthesia providers towards the use of acupuncture and acupressure?

Alternative vs. mainstream. The majority of anesthesia providers reported acupuncture and acupressure as being clearly alternative practices. These results differ from Voight (2012), who presented the same survey question to DNP administrators. In Voight's study the administrators reported that both practices were neither alternative nor mainstream (Voight, 2012). The divergent results may be explained by the difference between anesthesia and nursing backgrounds. As Wahner-Roedler et al. (2006) reports, attitudes and knowledge about CAM can differ significantly among physicians and across departments (p. 500). Whereas anesthesia is rooted in Western biomedicine where a clear distinction between conventional and nonconventional medicine exists, traditional nursing education encourages an acceptance of holistic approaches to health care, perhaps explaining why DNP faculty view these practices as neither alternative or mainstream. That anesthesia is practiced by providers from varying health-care backgrounds (medicine, nursing, osteopathy, etc.) may further explain the difference, as these backgrounds may influence a provider's belief in holistic versus conventional medicine.

Effects of acupuncture and acupressure. Most anesthesia providers reported that acupuncture has a beneficial impact on decreasing anxiety, PONV, acute postoperative pain, and chronic pain. Acupressure use yielded mixed results. The majority of providers stated that acupressure is successful at decreasing anxiety, PONV, and chronic pain; however, they report it is not effective on acute postoperative pain. Here again, there appears to be support

for the use of acupuncture and acupressure as a complement to improving anesthesia-related patient outcomes.

General attitudes and spirituality. The majority of providers showed favorability toward acupuncture and acupressure on all attitude questions. This included the themes:

- Conventional medicine could benefit from acupuncture/acupressure and similarly clinical care should integrate the best of conventional and alternative practices.
- Acupuncture and acupressure transcend beyond placebo care.
- Acupuncture and acupressure may influence the treatment of symptoms, conditions, and/or diseases.
- Anesthesia providers desire knowledge about acupuncture /acupressure.
- Anesthesia providers want the ability to advise patients about acupuncture/acupressure use, and also want these modalities as part of their practice or referral network.

Spirituality exhibited little to no influence over a provider's beliefs. The responding clinicians appear to base their medical decisions exclusively on the perceived quality and quantity of scientific evidence.

This study reveals an apparent disconnect between perception and clinical use. The majority of anesthesia providers report that acupuncture/acupressure are relevant to anesthesia practice (and in fact have the potential to enhance perioperative care) and yet they are not currently used. This disconnect may be explained by the unavailability of credentialed providers, although most providers report a desire to learn more about acupuncture and acupressure. The data show that providers are interested in more education.

Education and mentoring from providers with a known practice will provide the opportunity for personal use or the clinical knowledge to refer patients to trained CAM practitioners.

Limitations

This study was limited by (a) poor response rates, (b) reliance on the goodwill of individual chairmen, and (c) study instruction confusion. Even with material incentive, the study still yielded only a 17% response rate. Ninety-six anesthesiology departments were selected for participation based on subject recruitment feasibility; a larger sample might prove more representative of the universe of American anesthesia providers. A back-up or alternate list may have mitigated areas of nonresponse or refusal, but there was a limitation in identifying institutions that fit all of the study inclusion/exclusion criteria. Greater anesthesia department and subsequent individual participation would have yielded a higher study response rate.

Another limitation concerned relying solely on the goodwill of the departmental chairmen to distribute the survey. Two chairmen declined participation and 57 did not respond to the personal letter, e-mail, or follow-up e-mail. Inclusion of their departments had the potential to increase both provider participation and overall response rates.

Contacting the chairmen personally was a challenge, as between the subject identification and study implementation, three departments had changed their executive leadership. The researcher personally addressed each of these situations.

Limitation was found also with the study instructions. Two chairmen wrote that they had completed the survey, without clarifying whether they had distributed the survey to their staff. Follow-up with both of these chairmen went unanswered raising the question of study instruction clarity.

Additionally, three anesthesiologists informed the researcher that their institution did not use acupuncture or acupressure. They enquired as to whether they should still complete the survey. Five individuals opened the survey but did not complete any questions. Their reasoning is unknown, but perhaps they did not feel the study had personal relevance since they do not practice acupuncture or acupressure. A more detailed clarification of the study's intention may have helped with participant's understanding and yielded a higher response rate.

Applications

Application to theory. Rodger's diffusion of innovations (DOI) theory, specifically the constructs of awareness-knowledge and attitude, framed the research study (Rodgers, 2003). A total of $n = 80$ (27%) of providers have used acupuncture and $n = 52$ (18%) have used acupressure with success. While there were positive reports of acupuncture/acupressure use, the majority of providers demonstrated a weak awareness-knowledge of acupuncture/acupressure and yet exhibited a favorable attitude toward these alternative medicine modalities.

Through gaining further education and knowledge about these practices, providers may move onto the next DOI stage of making a decision to accept or reject acupuncture and/or acupressure as part of their anesthesia practice. The data shows that providers are interested in receiving education and using acupuncture and acupressure; it is too preliminary, however, to estimate whether these alternative medicine modalities will, in actuality, diffuse into U.S. anesthesia practice.

Application to the literature. This is the first study to investigate anesthesia providers' perceptions of acupuncture/acupressure. Perceptions of acupuncture and

acupressure have been studied by other health-care providers, but without the specificity of anesthetic perspective. All of the other health-care provider studies (health educators, physical therapy faculty, pharmacy, medicine, and nursing students, DNP faculty, nursing faculty, internal medicine physicians) have reported favorable perceptions of both CAM and acupuncture/acupressure (Avino, 2011; Harris et al., 2006; Johnson et al., 2008; Kreitzer et al., 2008; Liggett, 2009; Voight, 2012; Wahner-Roedler et al., 2006). Likewise, this study reports a positive perception of these alternative medicine modalities. This study adds to the body of acupuncture and acupressure research by providing insight into anesthesia providers' perceptions of these alternative medicine modalities.

Implications

Theoretical. The positive response toward wanting acupuncture and acupressure education, and the desire to use these modalities demonstrates a cultural shift and overall acceptance of acupuncture/acupressure among anesthesia providers. Theoretically, these favorable results will translate into an increase in providers seeking out acupuncture/ acupressure education and perhaps an increase in clinical use. Ideally, researchers in anesthesia will begin to conduct more clinical acupuncture and acupressure research.

Practical. The practical implications are indeterminate. Five chairmen and three clinical staff participating from various institutions expressed that this study aligned with their research interests. All eight of these anesthesia providers expressed a desire to receive study results. This interest, along with the favorable study results, show that some providers may begin seeking measures to incorporate acupuncture/acupressure into their clinical practice.

Ultimately, practical implications have the potential to improve perioperative patient outcomes (especially in the areas of anxiety, PONV, and chronic pain management) and possibly decrease health care-related costs. Pain has been estimated to cost the U.S. economy between $560 to $635 billion a year (Zhang, Lao, Ren, & Berman, 2014). Vickers and Linde (2014) report that acupuncture can decrease chronic pain by up to 50%. Additionally, acupuncture can decrease perioperative opioid use (Arai et al., 2013; Chang et al., 2012; Kotani et al., 2001; Wong et al., 2006). Even a marginal decrease in expenditures in one area such as pain management has the potential for enormous U.S. health-care savings.

Recommendations for Future Research

The perception of acupuncture and acupressure has been reported for DNP faculty, physical therapy faculty, and now anesthesia providers. As health care moves toward interdisciplinary collaboration, the framework exists for future researchers to assess the perception of these alternative medicine modalities in their specific discipline.

This study has provided a cultural snapshot of how providers view these modalities in 2014. Hopefully, the positive perceptions will encourage future researchers to build upon this momentum and pursue clinical research. There are very few acupuncture/acupressure anesthesia clinical studies in the U.S. literature. Stanford University Medical Center has an acupuncture fellowship and ideally the personnel in this center along with others using acupuncture and acupressure in anesthesia will begin to publish manuscripts describing their techniques and results.

Future researchers may also consider replicating this study internationally. The United States lags behind Australia, the United Kingdom, Norway, and Denmark in

acupuncture use (Zhang et al., 2012, p. 1). Additionally, the Western countries of Austria, Germany, Greece, Norway, Romania, and Sweden have all published studies on acupuncture and acupressure and their impact on an anesthetic (Chapter 2, Tables 1-5). Researchers may administer this survey abroad in one of the aforementioned countries to see if the results are replicated or differ among Western colleagues, especially in Western countries with a known practice.

Replicating this study in 5 to 10 years to compare the results and determine if there has been a change in practice would allow future researchers to benchmark dissemination of knowledge and whether expanded knowledge has led to an increase in acupuncture/acupressure use. Or it may reveal that the reported barriers remain as constraints. The only way to accurately measure cost assessment on acupuncture/acupressure use is for future studies to conduct a cost analysis, and that analysis can be done only if anesthesia providers begin using or expand their use of acupuncture and/or acupressure.

Conclusion

The Patient Protection and Affordable Care Act (PPACA) recognizes the importance of alternative medicine, and California, Maryland, New Mexico, and Washington states have all included acupuncture as a covered, essential health benefit, indicating that insurance plans are mandated to cover acupuncture (Duran, 2013; Hao & Mittelman, 2014). The PPACA mandates nondiscrimination among health-care providers (as long as they function within their state-defined scope of practice), opening the door for CAM practitioners to serve as part of the healthcare team (Duran, 2013; Hao & Mittelman; Kreitzer & Koitham, 2014). Additionally, the PPACA allows for nonphysicians to train and become licensed in

acupuncture, which may encourage CRNAs and/or AAs to receive alternative medicine training.

The following schools of acupuncture are taught in the United States: French energetic acupuncture, TCM (modern and ancient), five element acupuncture, Japanese meridian acupuncture, French and Chinese ear acupuncture, Korean hand acupuncture, and scalp acupuncture (Mok, 2014). Integrative medicine centers, which combine conventional, evidence-based medicine with alternative medicine, are gaining popularity and credibility in the United States. There are currently 48 U.S. centers, many of which are affiliated with major, academic medical institutions (American Holistic Medical Association, 2014). Acupuncture has become one of the most widely used forms of integrative medicine (Hao & Mittelman, 2014). While these centers apply CAM techniques, there remains a lack of anesthesia representation in integrative medicine and a lack of acupuncture/acupressure related research in the U.S. anesthesia literature.

Anesthesia is a dynamic field that continues to evolve with technological advancements and pharmaceutical developments. This study asked providers to step beyond conventional Western thought and open their minds to ancient and yet clinically relevant techniques. As the results reveal, some providers have already embraced acupuncture/acupressure with positive outcomes. While most U.S. anesthesia providers have not used these modalities, they still report a favorable perception of acupuncture/acupressure's role as part of an anesthetic. Is this a paradigm shift in anesthesia practice—or have providers been open to these modalities all along without the resources and education to act? Only future research will be able to answer these questions, and the dialogue has just begun.

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Appendix A

Acupuncture and Acupressure Survey

Acupuncture and Acupressure Survey

Default Block

WELCOME!

You are invited to participate in a doctoral research study entitled "Perceptions of acupuncture and acupressure by anesthesia providers." This nationwide survey is the first of its kind in the US and your participation is greatly appreciated!

The survey is designed to be completed in one sitting, with an estimated time commitment of less than 10 minutes. Your participation is voluntary and you may choose to skip any questions you do not wish to answer. Responses will be recorded and stored anonymously. The VCU Medical Center Institutional Review Board (IRB) approved this study. A copy of the approval is included: https://sites.google.com/site/dissertationvcuirb/

At the conclusion of the survey you will have the option to be entered into a raffle to **win** one of 12 Apple TVs®.

In order to progress through the survey, please use the navigation buttons.
If you experience any technical difficulties or have any questions regarding the study, please contact: Amanda Faircloth, CRNA, DNAP at afaircloth@vcu.edu.

Would you like to proceed with the survey?

(an answer of ***yes*** implies consent to participate)

- ◯ Yes
- ◯ No

"ALTERNATIVE" or "MAINSTREAM"

1. Historically, some "alternative" approaches reach a point where they are considered orthodox or "mainstream." For each of the modalities listed below, indicate how you think of each therapy at the present time.

	Clearly Mainstream	Neither Clearly Mainstream or Alternative	Clearly Alternative	No Opinion
Acupuncture	◯	◯	◯	◯
Acupressure	◯	◯	◯	◯

2. Do you believe acupuncture has a beneficial effect on decreasing:

Anxiety

Postoperative nausea and vomiting (PONV)

Acute postoperative pain

Chronic pain (depression, migraines, cancer pain, etc.)

3. Do you believe acupressure has a beneficial effect on decreasing:

Anxiety	
Postoperative nausea and vomiting (PONV)	
Acute postoperative pain	
Chronic pain (depression, migraines, cancer pain, etc.)	

4. **PERSONAL USE**: For each of the following modalities, have you used it personally?

	No, and would not consider using it	No, but would consider using it	Yes, and have used it with negative outcomes	Yes, and have used it with neutral outcomes	Yes, and have used it with positive outcomes
Acupuncture	○	○	○	○	○
Acupressure	○	○	○	○	○

5. What primary worldview or framework guides your personal health views?

- ○ Western biomedicine
- ○ Traditional Chinese Medicine
- ○ Combination of Western biomedicine and Traditional Chinese Medicine

ATTITUDES

General Attitudes Toward Acupuncture and Acupressure: For each of the following statements, indicate how closely it represents your general feelings about acupuncture and acupressure.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6. Clinical care should integrate the best of conventional and acupuncture/acupressure practices.	○	○	○	○	○
7. Acupuncture and acupressure include ideas and methods from which conventional medicine could benefit.	○	○	○	○	○
8. While we need to be cautious in our claims, acupuncture and acupressure hold promise for treatment of symptoms, conditions, and/or diseases.	○	○	○	○	○
9. The results of acupuncture and acupressure are in most cases due to a placebo effect.	○	○	○	○	○
10. Acupuncture and acupressure therapies not tested in a scientific manner should be discouraged.	○	○	○	○	○

ATTITUDES

General Attitudes Toward Acupuncture and Acupressure. For each of the following statements, indicate how closely it represents your general feelings about acupuncture and acupressure.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11. While a few acupuncture and acupressure approaches may have limited benefits, they have no true impact on treatment of symptoms, conditions, and/or diseases.	○	○	○	○	○
12. Acupuncture and acupressure are a threat to public health.	○	○	○	○	○
13. I hope to have acupuncture and acupressure available to patients in my practice or referral network.	○	○	○	○	○

14. Anesthesia providers should be able to advise their patients about acupuncture and acupressure.	○	○	○	○	○
15. Knowledge about acupuncture/acupressure is important to me as an anesthesia provider.	○	○	○	○	○

Reasons why acupuncture and acupressure may not work in Western medical settings include:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16. Perceived lack of scientific evidence for acupuncture and acupressure.	○	○	○	○	○
17. Unavailability of credentialed acupuncture and acupressure providers.	○	○	○	○	○
18. Lack of reimbursement for acupuncture and acupressure.	○	○	○	○	○
19. Lack of available equipment to perform acupuncture and acupressure.	○	○	○	○	○
20. Too time consuming to perform acupuncture and acupressure.	○	○	○	○	○
21. Other (please specify):	○	○	○	○	○

CLINICAL USE

22. **Acupuncture and Acupressure Approaches in Anesthesia Practice**: How do you use each of the following approaches in your practice?

	Do not practice	Would not recommend	Would refer to a complementary and alternative medicine (CAM) provider	Personally provide
Acupuncture	○	○	○	○
Acupressure	○	○	○	○

EDUCATION

23. Acupuncture and Acupressure Education: For each of the following modalities, how much education have you received?

	None	Some, but not sufficient to advise patients about use	Sufficient to advise patients about use	Sufficient to personally provide
Acupuncture	○	○	○	○
Acupressure	○	○	○	○

24. Further Acupuncture and Acupressure Education: For each of the following modalities, would you like further education?

Acupuncture

Acupressure

EVIDENCE

Evidence for Use of Practice of Acupuncture and Acupressure: How important is each of the following types of evidence to you, to consider when recommending or using acupuncture and acupressure?

	Somewhat	Somewhat

	Unimportant	Important	Essential	Essential
25. Proven mechanism.	○	○	○	○
26. Proposed mechanism of action.	○	○	○	○
27. Randomized controlled clinical trials involving animals.	○	○	○	○
28. Randomized controlled clinical trials involving humans.	○	○	○	○
29. Epidemiological studies.	○	○	○	○
30. Published case studies.	○	○	○	○
31. Successful use in my own practice.	○	○	○	○
32. Colleague recommendations.	○	○	○	○
33. Personal experience.	○	○	○	○

SPIRITUALITY

34. Do you believe your spiritual or religious beliefs influence your attitudes toward acupuncture or acupressure?

- ○ Yes, very much
- ○ Yes, somewhat
- ○ No
- ○ No opinion

35. Which US region best describes where you are employed?

DEMOGRAPHICS

36. What best describes your institution?

- ◯ University or Academic Medical Center
- ◯ Children's Hospital
- ◯ Department of Veteran's Affairs (VA) Hospital
- ◯ Community or Regional Hospital
- ◯ Other (please specify):

37. Your age is:

38. Sex:

- ◯ Female
- ◯ Male

DEMOGRAPHICS

39. Highest level of education (please select all that apply):

- ☐ MD
- ☐ DO
- ☐ PhD
- ☐ EdD
- ☐ DNAP
- ☐ DNP
- ☐ MMSc
- ☐ MSN
- ☐ BSN
- ☐ Other (please specify): _____

40. What type of anesthesia provider are you?

Anesthesiologist	CRNA	AA
◯	◯	◯

41. In what country did you receive your pre-anesthesia training? (medical, nursing, or undergraduate degree)

- ◯ United States
- ◯ Other (please specify): _____

DEMOGRAPHICS

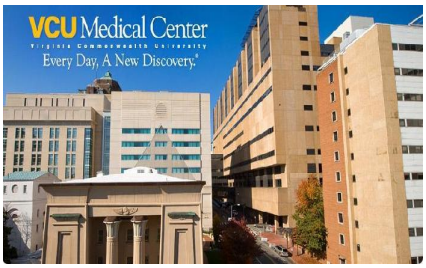
42. Which best describes your years of practice:

43. What best describes your patient population focus? (please select all that apply)

- ☐ Pediatrics
- ☐ Orthopedics
- ☐ Oncology
- ☐ Obstetrics
- ☐ Gynecology
- ☐ General Surgery
- ☐ Neurosurgery
- ☐ Otolaryngology
- ☐ Oral and Maxillofacial Surgery
- ☐ Plastic Surgery
- ☐ Intensive Care Unit
- ☐ Cardiac
- ☐ Ambulatory
- ☐ All the above
- ☐ Other (please specify):

THANK YOU!

This concludes the survey.



Would you like to be entered into the raffle to win an Apple TV®?

- ◯ Yes
- ◯ No

Appendix B

Permission From Authors to Use Surveys

Written permission from Dr. Voight to use her validated survey:

---------- Forwarded message ----------
From: **Becke Voight** <rwv@nebrwesleyan.edu>
Date: Sat, Jan 19, 2013 at 3:55 PM
Subject: Re: Request for survey use and citation.
To: "Amanda C. Faircloth" <acf9g@alumni.virginia.edu

Amanda,
Yes, I am honored to receive your request and give you permission to use my dissertation survey. In reviewing the literature for my dissertation, I noted a lack of research concerning the use of acupuncture and acupressure particularly related to nurse anesthetists. Your research will address a significant gap and contribute to the advancement of nursing knowledge in advanced nursing practice.

As mentioned in Chapter 3 of my dissertation, most of my dissertation survey was a modification of a survey developed and used in a federal grant (R 25) by the University of Minnesota by Dr. Mary Jo Kreitzer. A portion of my dissertation survey was also based on a research instrument developed by Dr. Karen Avino from the University of Delaware. You may want to request their permission as well. I wish you the best as you complete your dissertation. I would be very interested in the results of your study when it is completed. If I can be of any further assistance, please let me know.

Sincerely,

Rebecca (Becke) Voight PhD, RN .

Written permission from Dr. Kreitzer:

---------- Forwarded message ----------

On Sun, Jan 20, 2013 at 11:59 AM, Mary Jo Kreitzer <kreit003@umn.edu> wrote:
You have my permission as requested below. Best wishes. MJ

Sent from my iPhone

Written permission from Dr. Avino:

On Jan 20, 2013, at 9:00 PM, Karen Avino <kavino@udel.edu> wrote:

Dear Amanda- Of course please use the materials. Yes, Dr. Kreitzer was the original author and I believe many of us tweaked the survey along the way. I wish you luck in completing your doctoral degree. I hope you are beginning to see the light at the end of the tunnel! Karen Avino.

Appendix C

Introductory Letter Sent to the Department Chair

VCU
MCV Campus
Virginia Commonwealth University

Health System
MCV Hospitals and Physicians

Dr. (insert chair name): April 1, 2014

I write to introduce myself and seek your assistance in promoting participation in a dissertation survey. As a CRNA at VCU Medical Center and doctoral candidate in the VCU Health Related Sciences PhD program, I am conducting a dissertation study titled, "Perceptions of acupuncture and acupressure by anesthesia providers." The purpose of this quantitative, non-experimental, descriptive study is to examine the cultural perceptions, barriers, and attitudes of anesthesia providers toward acupuncture and acupressure. This will be the first study of its kind to assess the perceptions of US anesthesia providers toward these alternative medicine modalities.

With appreciation for your time and expertise, I request your department's participation in this nationwide survey. In the upcoming week you will receive an e-mail containing an electronic link to the survey. If you agree to participate, please forward the survey to your department staff (anesthesiologists, CRNAs, and/or AAs). Results will be available upon completion of the study.

This voluntary study is part of doctoral research and responses will be recorded and stored anonymously. Institutional Review Board (IRB) approval has been received from the VCU IRB. As an incentive, study participants will have the opportunity to win one of twelve Apple TVs® via a raffle.

Thank you for your consideration in support of this research. Please contact me with any questions: afaircloth@vcu.edu.

Sincerely,

Amanda Faircloth, CRNA, DNAP
Doctoral Candidate
Virginia Commonwealth University
Richmond, Virginia

"Perceptions of acupuncture and acupressure by anesthesia providers" is endorsed by the VCU Department of Anesthesiology:

John Butterworth, IV, MD
Professor and Chairman
Department of Anesthesiology
VCU Medical Center

Arkadiy Dubovoy, MD
Assistant Professor
Department of Anesthesiology
VCU Medical Center

Appendix D

List of Anesthesiology Departments Contacted

REGION	TYPE	INSTITUTION NAME
NORTHEAST	MC	Yale-New Haven Hospital
NORTHEAST	MC	Mass. General Hospital
NORTHEAST	MC	Tufts Medical Center
NORTHEAST	MC	Pennsylvania Presbyterian Medical Center
NORTHEAST	MC	Dartmouth-Hitchcock MC
NORTHEAST	MC	Jefferson Univ. Hospital
NORTHEAST	Community	Memorial Sloan Kettering Cancer Center
NORTHEAST	Community	Mount Sinai Hospital
NORTHEAST	Community	Montefiore Medical Center
NORTHEAST	Community	Westchester Medical Center
NORTHEAST	Community	LIJ Medical Center
NORTHEAST	Community	Newton-Wellesley Hospital
NORTHEAST	Children's	The Children's Hospital of Philadelphia
NORTHEAST	Children's	Boston Children's Hospital
NORTHEAST	Children's	Children's Hospital of Pittsburg
NORTHEAST	Children's	NYP Morgan Stanley Children's Hospital
NORTHEAST	Children's	Connecticut Children's H
NORTHEAST	Children's	Hasbro Children's Hospital
NORTHEAST	VA	VA Connecticut Healthcare System: West Haven Medical Center
NORTHEAST	VA	Northport VA Medical Center
NORTHEAST	VA	Philadelphia VA Medical Center
NORTHEAST	VA	Baltimore VA Medical Center
NORTHEAST	VA	VAPHCS
NORTHEAST	VA	Providence VAMC
SOUTH	MC	Duke Univ. Medical Center
SOUTH	MC	Johns Hopkins Hospital
SOUTH	MC	Vanderbilt U. Medical Center
SOUTH	MC	Univ. of MD Medical Center
SOUTH	MC	UVA
SOUTH	MC	University of KY

SOUTH	Community	Medstar Washington Hospital Center
SOUTH	Community	Grady Memorial Hospital
SOUTH	Community	Houston Methodist Hospital
SOUTH	Community	Mission Hospital
SOUTH	Community	Presbyterian Hospital
SOUTH	Community	Greater Baltimore Medical Center
SOUTH	Children's	Carell Children's Hospital at Vanderbilt
SOUTH	Children's	Children's Hospital of the Kings Daughters
SOUTH	Children's	Children's Medical Center Dallas
SOUTH	Children's	Children's National MC
SOUTH	Children's	Brenner Children's Hospital
SOUTH	Children's	UNC Children's Hospital
SOUTH	VA	Birmingham VA Medical Center
SOUTH	VA	Ralph H. Johnson VA Medical Center
SOUTH	VA	Durham VA Medical Center
SOUTH	VA	Michael E. DeBakey VA Medical Center
SOUTH	VA	Dallas VAMC
SOUTH	VA	Washington DC VAMC
MIDWEST	MC	University of Kansas Medical Center
MIDWEST	MC	Cleveland Clinic
MIDWEST	MC	University of Michigan Health System
MIDWEST	MC	University Hospital Case Medical Center
MIDWEST	MC	Ohio State Wexner MC
MIDWEST	MC	U. of Wisconsin
MIDWEST	Community	Fairview Hospital
MIDWEST	Community	Henry Ford Hospital
MIDWEST	Community	Cook County Health & Hospital System
MIDWEST	Community	Froedtert Hospital
MIDWEST	Community	Truman Medical Center
MIDWEST	Community	Metro Health Medical Center

MIDWEST	Children's	Cincinnati Children's Hospital
MIDWEST	Children's	Nationwide Children's Hospital
MIDWEST	Children's	Ann & Robert Lurie Children's Hospital of Chicago
MIDWEST	Children's	Children's Hospital of Wisconsin
MIDWEST	Children's	Akron Children's Hospital
MIDWEST	Children's	Children's Hospital of Michigan
MIDWEST	VA	Minneapolis VA MC
MIDWEST	VA	Zablocki VA Medical Center
MIDWEST	VA	Jesse Browne VA Medical Center
MIDWEST	VA	Boise VA Medical Center
MIDWEST	VA	Indianapolis VAMC
MIDWEST	VA	Oklahoma VAMC
WEST	MC	Washington Medical Center
WEST	MC	Univ. of Utah Medical Center
WEST	MC	UCLA Medical Center
WEST	MC	Loma Linda University Medical Center
WEST	MC	University of Arizona
WEST	MC	OHSU
WEST	Community	Harborview Medical Center
WEST	Community	Sandoval Regional Medical Center
WEST	Community	Virginia Mason Medical Center
WEST	Community	Oroville Hospital
WEST	Community	Providence Portland MC
WEST	Community	St. Alphonsus Regional MC
WEST	Children's	Seattle Children's Hospital
WEST	Children's	Children's Hospital of Colorado
WEST	Children's	Rady Children's Hospital of San Diego
WEST	Children's	Children's Hospital of LA
WEST	Children's	UC Davis Children's Hospital
WEST	Children's	UNM Carrie Tingley Hospital

WEST	VA	VA Puget Sound Health Care System- Seattle Division
WEST	VA	SF VA Medical Center
WEST	VA	VA Palo Alto Health Care System
WEST	VA	Southern AZ VA Health Care System
WEST	VA	Greater LA VAMC
WEST	VA	VAMC San Diego

Appendix E

Draft of Initial E-mail Sent to the Chairs

Dear (insert chair name):

Recently a letter was mailed to you describing the doctoral research study entitled "Perceptions of acupuncture and acupressure by anesthesia providers." A copy of the same letter is attached here as a PDF. The purpose of the study is to assess the perceptions of anesthesia providers toward acupuncture and acupressure.

I am writing to ask if you would encourage your department to participate in this voluntary, anonymous study. The survey should take fewer than 10 minutes to complete. Comprehensive results will be available upon completion of the study. If you are willing to distribute the study, please forward the following Qualtrics link to all departmental staff (anesthesiologists, CRNAs, and/or AAs):

https://survey.co1.qualtrics.com/SE/?SID=SV_1NxhCRc9Fuy8LiJ

Thank you for your acknowledgement of this contact and for your consideration in this doctoral research.

Sincerely,

Amanda Faircloth, CRNA, DNAP
afaircloth@vcu.edu
PhD Candidate
Virginia Commonwealth University

"Perceptions of acupuncture and acupressure by anesthesia providers" is endorsed by the

VCU Department of Anesthesiology

Vita

Amanda Caroline Faircloth was born in Wiesbaden, Germany, and is a U.S. citizen. She obtained her Bachelor of Science in Nursing from the University of Virginia in 2000, her Master of Science in Nursing from Duke University in 2005, and her Doctor of Nurse Anesthesia Practice from Virginia Commonwealth University in 2011. Amanda has practiced as a Certified Registered Nurse Anesthetist since 2005. She is adjunct faculty in the VCU Department of Nurse Anesthesia and clinical staff at VCU Medical Center. Amanda received the A.D. Williams Scholarly Achievement Award (2011), and was recipient of the AANA Foundation Hugh and Maria Roach Doctoral Fellowship (2013), a grant which supported this research. In 2013, Amanda traveled to Hangzhou, China to lecture at Sir Run Run Shaw Hospital and to discuss anesthesia practice, including acupuncture use, with providers in China.