Perceptions of Acupuncture and Acupressure by Anesthesia Providers: A Quantitative Descriptive Study

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ABSTRACT

Background: Randomized controlled trials show that 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 but have not yet diffused into mainstream anesthesia practice. To determine why, this study assessed U.S. anesthesia provider's perceptions of acupuncture and acupressure.

Methods: After institutional review board approval, 96 anesthesiology departments stratified by geographic region (Northeast, South, West, and Midwest) and institution type (university medical centers, community hospitals, children's hospitals, and veterans affairs hospitals) were selected for participation in an anonymous, pretested, online survey. The target sample was 1728 providers, of whom 292 (54% anesthesiologists, 44% certified registered nurse anesthetists, 2% anesthesiologist assistants) responded, yielding an overall 17% response rate.

Results: Spearman correlation coefficient revealed a statistically significant correlation between acupuncture and geographic region, with the West having the highest predisposition toward acupuncture use ($r_s = 0.159$, $p = 0.007$). Women are more likely to use acupuncture than men ($r_s = -0.188$; $p = 0.002$). 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 have not used these modalities, but would consider using them (54%, SD = 1.44; acupressure: 60%, SD = 1.32). Seventy-six percent of respondents would like acupuncture education and 74% would like acupressure education (SDs of 0.43 and 0.44, respectively).

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

Key Words: Acupressure, Complementary and Alternative Medicine, Nausea and Vomiting, Pain Management, Traditional Chinese Medicine

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INTRODUCTION

“And there never was in the world two opinions alike, no more than two hairs, or two grains. The most universal quality is diversity.”

—Michel de Montaigne (1533–1592)¹

NOW, LET ME TELL YOU ABOUT MY APPENDECTOMY IN Peking.” This seminal *New York Times* article, published by James Reston, introduced the United States to the concept of acupuncture.² In 1971, Mr. Reston underwent an appendectomy in China while covering President Nixon’s diplomatic visit, and physicians used acupuncture to successfully treat his postoperative pain. After publication of his article, teams of U.S. physicians took tours of Chinese operating rooms to witness firsthand acupuncture’s role in anesthesia.^{3,4}

The World Health Organization⁵ recognizes acupuncture as an effective treatment for nausea, vomiting, and postoperative pain. Internationally, randomized controlled trials show that acupuncture and acupressure can enhance an anesthetic by decreasing anxiety and opioid requirements and treating postoperative nausea and vomiting (PONV).^{6,7}

In the United States, both the Defense Department and the National Institutes of Health recognize acupuncture and acupressure as credible practices. The U.S. military uses acupuncture to relieve pain in military personnel, who must avoid opioids because of potential interference with alertness.⁸ The National Institutes of Health⁹ conducted 45 clinical trials examining the effect of acupuncture on various medical conditions. In spite of this government-supported research, U.S. anesthesia literature is limited regarding these Eastern medicine modalities.

Despite reports of positive perceptions of complementary and alternative medicine (CAM) among health educators; physical therapy faculty; and pharmacy, medicine, and nursing students,^{10–13} a void exists in surveying the perceptions of anesthesia providers toward CAM. This study focused on a subset of CAM: acupuncture and acupressure. We chose these practices for their reference in the international literature as a complement to anesthesia practice.

In 2013, *Anesthesia and Analgesia* published a pro/con editorial^{14,15} examining the controversy surrounding acupuncture and acupressure in the context of anesthesia management. The authors are familiar with the debate surrounding alternative medicine; however, their own personal, positive, experiences with acupuncture and acupressure provided the basis for this research. The goals of the current study were to examine: (1) the usage patterns of and attitudes toward acupuncture and acupressure among anesthesia providers, (2) any barriers to the wider use of these techniques, and (3) whether regional differences surround these modalities. This article does not discuss mechanisms of action;* rather, it provides a present-day snapshot of U.S.

anesthesia providers’ perceptions of these alternative medicine modalities.

MATERIALS AND METHODS

This institutional review board (IRB) approved, quantitative, descriptive study used a cross-sectional research survey of U.S. anesthesia providers, including physician anesthesiologists, certified registered nurse anesthetists (CRNAs), and anesthesiologist assistants (AAs). Primary data were collected via a validated, pretested, pilot-tested survey tool distributed over the Internet via the survey software company Qualtrics® (Provo, Utah).

Survey Design

The authors adapted a survey developed by Mary Jo Kreitzer (University of Minnesota) to study medical, nursing, and pharmacy faculty and student perceptions of CAM;¹⁶ some previous investigators (Avino¹⁷ and Voight¹⁸) had also modified and used Kreitzer’s survey. Kreitzer, Avino, and Voight gave their permission to tailor the survey and make it appropriate for anesthesia providers in this study. The current survey used 43 questions that were Likert scale, Likert-type, or partially closed format.

Internal consistency was measured in IBM SPSS software, version 22.0 (SPSS, Armonk, NY) via the test reliability technique, Cronbach α . Sixteen anesthesia providers, evenly dispersed across the country, volunteered to pretest the instrument, yielding a reliability coefficient of $\alpha = 0.812$.

Study Sample

The target population was U.S. anesthesia providers currently practicing, estimated at 80,000 providers.¹⁹ A geographic cluster sampling design was chosen to represent the target population, and clusters were obtained from four geographic regions: West, Midwest, Northeast, and South (as defined by the U.S. Census Bureau).

Inclusion criteria involved adult anesthesia providers, male or female, of any ethnicity or race, who currently practice anesthesia in the United States. University medical centers, community hospitals, and children’s hospitals were purposefully selected from a comprehensive Internet search of institutions that fit the institutional criteria and employed anesthesiologists, CRNAs, and/or AAs. Veterans Affairs (VA) anesthesiology departments were accessed from the VA listing available online. Departments with a known acupuncture or acupressure practice were included in the study.

The Cochran formula for categorical data was used to approximate the sample size: $(n = [(t)^2 \times (p)(q)] / (d)^2)$. The alpha was set a priori at $\alpha = 0.05$. For a population of 80,000, with a 95% confidence interval (CI), the required minimum sample size was $n = 267$.

*There is a plethora of articles available in the literature describing acupuncture and acupressure’s mechanisms of action.

The logistical impossibility of surveying all anesthesia providers (>80,000) precipitated the selection of a smaller sample. The target sample in each region was composed of anesthesiology departments from six university medical centers, six community hospitals, six children's hospitals, and six VA hospitals. On the basis of this composition, 96 anesthesiology departments (approximately 18 providers/facility) were identified. A sample of 1728 anesthesia providers was surveyed; this was the target for solicitation to reach an appropriate sample size.

Data Collection

This study used mixed modes of data collection. The authors personally contacted the chair of each institution's department of anesthesiology via a mailed introductory letter. One week after the letter was mailed, the authors sent an e-mail to each chair, which included a PDF file of the introductory letter, an explanation of the study, a request for departmental involvement, and the hyperlink to the Qualtrics survey. One week after the initial e-mail, the authors sent a follow-up reminder e-mail to chairs who had not responded in order to address any nonresponse issues. To encourage participation and higher response rates, an award of 12 Apple TVs® was offered via raffle. The study had a completion timetable of 1 month.

Electronic results were uploaded from Qualtrics into 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. Descriptive statistics, Spearman correlation coefficients, and contingency tables provided analysis as appropriate for the type of data under consideration. An alpha level of 0.05 was used for all statistical tests.

RESULTS

A total of 292 anesthesia providers participated in the study (17% response rate). Responses were fairly evenly split between men (51%) and women (49%), and between anesthesiologists (54%) and CRNAs (44%). AAs comprised the remaining 2% of the respondents.

The majority of anesthesia providers received their pre-anesthesia training in the United States (88%), had doctoral degrees (53%), and practiced in a university medical center (69%) working with general surgery (54%), orthopedic (47%), or ambulatory (43%) patients. Most respondents indicated that they had not used acupuncture or acupressure but would consider using the modalities (acupuncture: $n=157$ [54%]; acupressure: $n=175$ [60%]) (Table 1).

A Kolmogorov-Smirnov test was conducted to ensure the data were nonparametric, indicating that Spearman's correlation coefficient was appropriate. Spearman's correlation coefficient was computed on the following variables to see whether they served as covariates: sex, age, anesthesia provider type, institution, and country of pre-anesthesia training. A subgroup analysis was also conducted among the 12 physicians who self-identified as pain management specialists.

Stratifying the data by covariates revealed that sex had a significant effect on acupuncture use ($r_s=-0.188$; $N=292$; $p=0.002$), with women (61%) more likely to favor acupuncture use than men (39%). The data were inconclusive for sex and acupressure use ($r_s=-1.05$, $n=280$, $p=0.08$).

Age yielded a moderate effect size [95% CI=2.79, 3.06], indicating a moderate correlation between age and acupuncture use. Providers aged 31–50 years experienced the most positive outcomes with acupuncture. Age and acupressure use did not yield a statistically significant relationship ($r_s=0.094$, $n=281$, $p=0.116$). In addition, there was no correlation between anesthesia provider type (MD, CRNA, AA) and the use of acupuncture ($r_s=0.012$, $n=285$, $p=0.84$) or acupressure ($r_s=0.017$, $n=285$, $p=0.77$).

Similar to both age and provider type, Spearman correlation coefficient revealed no association between institution type and the use of acupressure ($r_s=0.001$, $n=287$, $p=0.98$) and showed no statistically significant association between institution type and the use of acupuncture ($r_s=-0.094$, $n=287$, $p=0.11$).

Spearman's correlation coefficient did not reveal a significant relationship between pre-anesthesia training and acupuncture use ($r_s=1.00$, $n=284$, $p=0.09$); however, there was a strong effect size [95% CI=1.08, 1.16]. Sixty-seven (85%) U.S. trained anesthesia providers have used acupuncture with

TABLE 1. PERSONAL USE OF ACUPUNCTURE AND ACUPRESSURE

Modality	Mean $\pm$ SD	Personal use				
		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	2.93 $\pm$ 1.44	25 (9)	157 (54)	3 (1)	27 (9)	80 (27)
Acupressure	2.62 $\pm$ 1.32	34 (12)	175 (60)	2 (<1)	29 (10)	52 (18)

Unless otherwise noted, values are the number (percentage).

SD, standard deviation.

TABLE 2. ACUPUNCTURE AND ACUPRESSURE APPROACHES TO CLINICAL PRACTICE

Modality	Mean $\pm$ SD	Clinical practice			
		Do not practice	Would not recommend	Would refer to a CAM provider	Would personally provide
Acupuncture	2.11 $\pm$ 1.10	137 (47)	14 (5)	114 (39)	27 (9)
Acupressure	1.99 $\pm$ 1.06	148 (51)	18 (6)	107 (37)	19 (7)

Unless otherwise noted, values are the number (percentage).

CAM, complementary and alternative medicine; SD, standard deviation.

positive outcomes, and 137 (90%) of U.S.-trained providers have no experience but would consider acupuncture use. Similar to findings related to acupuncture use, Spearman's correlation coefficient showed an insignificant correlation between pre-anesthesia training and acupressure use ($r_s=0.091$, $n=284$, $p=0.13$).

Amongst physicians specializing in pain management ($n=12$), all have used acupuncture/acupressure with good results or are receptive toward using these modalities. The majority of pain management providers (67%) reported using acupuncture with positive outcomes. Acupressure was less frequently used; however, pain specialists still showed an interest in considering its use (42%).

With regard to clinical practice, 137 (47%) respondents do not practice acupuncture and 148 (51%) do not practice acupressure; however, providers reported they are open to referring their patients to a CAM practitioner: One hundred fourteen (39%) would refer for acupuncture and 107 (37%) would refer for acupressure (mean $\pm$ standard deviation [SD], 2.11 $\pm$ 1.10 and 1.99 $\pm$ 1.06, respectively) (Table 2).

The majority of anesthesia providers reported no acupuncture or acupressure education ($n=127$ [44%] and $n=155$ [53%], respectively). A total of 218 (76%) respondents asserted with a "yes" response that they would like to receive education about acupuncture (mean $\pm$ SD, 1.24 $\pm$ 0.43). Likewise, a strong majority of respondents ($n=212$ [74%]) would like acupressure education (1.26 $\pm$ 0.44) (Table 3).

Anesthesia providers reported lack of scientific evidence ($n=187$ [64%]), unavailability of credentialed providers ($n=159$ [55%]), and lack of reimbursement ($n=139$ [48%])

as the primary reasons why acupuncture and acupressure may not be used in U.S. anesthesia practice (mean $\pm$ SD, 3.88 $\pm$ 0.73, 3.72 $\pm$ 0.92, and 3.77 $\pm$ 0.87, respectively). Respondents were also given the opportunity to provide free-text responses to identify barriers. The overarching theme in these free-text responses was that lack of education, knowledge deficits, and public perception (including provider skepticism) constitute further barriers to integration of acupuncture/acupressure into "Western" anesthesia practice.

There was a statistically significant correlation between acupuncture use and geographic region ($r_s=-0.135$, $N=292$, $p=0.02$), with the West having the highest tendency toward acupuncture use ($r_s=0.159$, $n=291$, $p=0.007$). There was no correlation between acupressure use and U.S. geographic region ($r_s=-0.008$, $N=292$, $p=0.892$).

The majority of anesthesia providers reported that acupuncture had a beneficial effect on decreasing anxiety ($n=212$ [75%]), PONV ($n=209$ [73%]), acute postoperative pain ($n=165$ [58%]), and chronic pain ($n=245$ [85%]) (Table 4). Acupressure use yielded mixed results. Most providers stated that acupressure is successful at decreasing anxiety ($n=178$ [65%]), ($n=175$ [63%]), and chronic pain ($n=169$ [61%]); however, they reported its ineffectiveness in managing acute postoperative pain ($n=165$ [60%]) (Table 5).

DISCUSSION

This research provides insight into how acupuncture and acupressure are currently perceived and being used by

TABLE 3. ACUPUNCTURE AND ACUPRESSURE EDUCATION RECEIVED

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

Unless otherwise noted, values are the number (percentage).

SD, standard deviation.

TABLE 4. ACUPUNCTURE'S EFFECTS ON DECREASES IN CONDITIONS

Condition	Mean $\pm$ SD	Effect	
		Yes	No
Anxiety	1.25 $\pm$ 0.43	212 (75)	71 (25)
Postoperative nausea and vomiting	1.27 $\pm$ 0.45	209 (73)	78 (27)
Acute postoperative pain	1.42 $\pm$ 0.50	165 (58)	120 (42)
Chronic pain	1.15 $\pm$ 0.35	245 (85)	42 (15)

Unless otherwise noted, values are the number (percentage).
SD, standard deviation.

anesthesia providers in the United States. While most providers have not used acupuncture/acupressure, a majority are open to receiving education about these services, learning how to personally provide them, or learning what patients to refer to CAM practitioners. Additionally, most providers recognize the favorable impact acupuncture can have on decreasing anxiety, PONV, and chronic pain.

Women are more likely than their male counterparts to personally provide acupuncture or refer patients for acupuncture/acupressure. These findings are replicated in the literature. Wahner-Roedler et al.²⁰ report that female physicians were 2.4 times more likely than male physicians to refer patients for CAM. Three other studies examining CAM also found that women have a greater personal use of CAM than men.^{21,22}

Anesthesia providers who use acupuncture are more likely to be middle-aged. This result is similar to the findings of Zhang et al.²³ that middle-aged practitioners have a higher acupuncture use than other age groups. Most U.S. providers who have successfully used acupuncture received their pre-anesthesia training in the United States.

There is a statistically significant correlation between acupuncture use and geographic region, with the West having the highest tendency toward acupuncture use. Zhang et al.²³ also found that the West, followed by the South, were the dominant regions where health care providers had a greater predisposition towards using acupuncture.

TABLE 5. ACUPRESSURE'S EFFECTS ON DECREASES IN CONDITIONS

Condition	Mean $\pm$ SD	Effect	
		Yes	No
Anxiety	1.35 $\pm$ 0.45	178 (65)	96 (35)
Postoperative nausea and vomiting	1.37 $\pm$ 0.48	175 (63)	102 (37)
Acute postoperative pain	1.60 $\pm$ 0.49	111 (40)	165 (60)
Chronic pain	1.39 $\pm$ 0.49	169 (61)	108 (39)

Unless otherwise noted, values are the number (percentage).
SD, standard deviation.

Anesthesia providers identified lack of scientific evidence and unavailability of credentialed providers as the primary barriers against acupuncture/acupressure use in the United States. These results were similar to those in Avino's¹⁷ 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 et al.²⁴ found the same result, citing lack of knowledge and unavailability of CAM practitioners as the primary barriers against CAM use among health care providers.

The majority of anesthesia providers want acupuncture/acupressure education (76% and 74%, respectively). These percentages show receptiveness toward acupuncture/acupressure education and present a strong argument in favor of potential incorporation of alternative medicine education into anesthesia curriculum.

This study reveals an apparent disconnect between perception and clinical use of acupuncture and acupressure. The majority of anesthesia providers reported 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. The data show that providers are interested in more education.

This study supports an absence of U.S. acupuncture/acupressure use due to both a deficiency of credentialed providers and a lack of education in anesthesia curriculum. Alternative medicine education and mentoring from providers who are experienced and credentialed will provide the opportunity for personal use by anesthesia providers or the clinical knowledge to refer patients to trained CAM practitioners.

This study was limited by (1) a low response rate and (2) reliance on the goodwill of individual department chairs. Even with offering material incentive, the response rate was only 17%; however, the minimum required sample size for transferability of results was obtained. Population homogeneity can contribute to sampling bias;²⁵ however, the current 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. Self-report response bias is also inherent in survey research; nevertheless, these results are representative of the target population.

Another limitation concerned relying solely on the goodwill of the departmental chairs to distribute the survey. Two chairs 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.

The Patient Protection and Affordable Care Act (PPACA) recognizes the importance of including alternative medicine as a health benefit.²⁶ Additionally, California, Maryland, New Mexico, and Washington all embrace acupuncture as a covered, essential health benefit, indicating that insurance plans are mandated to cover acupuncture.²⁷ 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 health care team.^{27,28} Additionally, the PPA-CA allows for non-physicians to train and become licensed in acupuncture, which may encourage CRNAs and/or AAs to receive alternative medicine training.

CONCLUSION

Anesthesia is a dynamic field that continues to evolve with technological advancements and pharmaceutical developments. This study assessed the extent to which providers may step beyond conventional Western thought to explore and potentially incorporate these ancient and yet clinically relevant techniques into their practice.

As the results reveal, some providers have already embraced acupuncture/acupressure and have experienced positive outcomes with these techniques. Although many U.S. anesthesia providers have not used these modalities, this study revealed a favorable perception of acupuncture/acupressure's role as part of an anesthetic. Is this a new change in anesthesia practice, or have anesthesia providers always been receptive to these modalities but have lacked the resources and education to act? Future research should address these questions.

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AUTHOR DISCLOSURE STATEMENT

No competing financial interests exist.

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CME Quiz Questions

Article learning objectives:

After studying this article, participants should be able to identify and evaluate current perceptions of acupuncture and acupressure by anesthesia providers in the United States; identify those types of clinical problems for which anesthesia providers recognize acupuncture as having value; and understand perceived barriers to use of acupuncture by anesthesia providers.

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1. Of the various aspects of anesthesia practice surveyed, which of the following features or attributes were not assessed:
  - a) Region of the country and anesthesia practice setting
  - b) Age and sex categories of those responding
  - c) Level of anesthesia training and degree obtained
  - d) Number of completed hours of acupuncture or acupressure training
  - e) Perceptions and attitudes of providers towards acupressure and acupuncture
2. A finding of this survey is that acupuncture is more likely to be utilized:
  - a) In a university based anesthesia group
  - b) At a community hospital
  - c) By those anesthesiologists subspecializing in pain management
  - d) In a private anesthesiology practice
  - e) At a VA medical center
3. In this study a barrier to identifying legitimate conclusions was:
  - a) Failure to achieve a minimum sample size using the Cochran formula
  - b) Almost 60% of anesthesia department Chairs did not respond to participation requests
  - c) Material awards were offered to all responders
  - d) Providers with acupuncture training were more likely to complete the survey
  - e) Follow up phone calls to anesthesia department Chairs were rarely answered
4. Based on the results of this survey we may conclude that the following group of individuals is more likely to refer patients for acupuncture:
  - a) Providers who have recently completed anesthesia training
  - b) Male providers

- c) Providers who have completed a full acupuncture training program
  - d) Middle aged providers
  - e) CRNA's refer more than other anesthesiology providers
5. In reviewing the results of this survey, choose the false statement from the following:
- a) More surveyed providers feel that they are sufficiently educated to provide acupuncture than acupressure.
  - b) More providers identify themselves as being sufficiently educated to provide acupuncture than those who identify as actually providing acupuncture.
  - c) Acupressure was identified by 60% of providers as being likely not helpful to decrease acute postoperative pain.
  - d) The percentage of providers who have used acupressure or acupuncture and found that the outcomes are neutral is almost the same in the acupressure group as compared with the acupuncture group.
  - e) In spite of the surveyed 57% who either do not practice acupressure or do not recommend acupressure, the majority of the surveyed group identified acupressure to be effective for decreasing chronic pain.
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Continuing Medical Education – Journal Based CME Objectives:

Articles in *Medical Acupuncture* will focus on acupuncture research through controlled studies (comparative effectiveness or randomized trials); provide systematic reviews and meta-analysis of existing systematic reviews of acupuncture research and provide basic education on how to perform various types and styles of acupuncture. Participants in this journal-based CME activity should be able to demonstrate increased understanding of the material specific to the article featured and be able to apply relevant information to clinical practice.

CME Credit

You may earn CME credit by reading the CME-designated article in this issue of *Medical Acupuncture* and taking the quiz online. A score of 75% is required to receive CME credit. To complete the CME quiz online, go to <http://www.medicalacupuncture.org/cme> – AAMA members will need to login to their member account. Non-members have opportunity to participate for small fee.

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