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KNOWLEDGE, ATTITUDES, AND USE OF COMPLEMENTARY AND
ALTERNATIVE THERAPIES BY PROVIDERS CARING FOR SERVICE MEMBERS
WITH LOW BACK PAIN

by

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“A dream doesn't become reality through magic;
it takes sweat, determination, and hard work.” – Colin Powell

DEDICATION

I would like to dedicate this dissertation to the healthcare providers who care for service members with low back pain. Your dedication to service is invaluable. Thank you for all you do.

ABSTRACT

Background: Complementary and alternative medicine (CAM) offer service members with low back pain (LBP) a non-opioid alternative to manage pain. Availability of CAM is varied across MTFs, and the reason is unknown. The Diffusion of Innovation explains that knowledge, attitudes, and communication influence the rate of adoption (use). Therefore, the purpose of the proposed study was to examine providers' knowledge, attitudes, and use of CAM therapies for managing LBP.

Aims: This study aimed to: (a) describe knowledge, attitudes, and use of CAM therapies by providers and student providers who care for service members with LBP, and (b) examine relationships between knowledge, attitudes, and use of CAM therapies.

Methods: This study utilized a quantitative, cross-sectional survey design. A convenience sample of 868 students from Uniformed Services University of the Health Sciences was recruited via email. Data were analyzed with descriptive and inferential statistics.

Results: A total of 122 participants completed the survey (response rate 14.1%). CAM knowledge scores were low for most therapies. Approximately 85% of participants were interested in learning more. Overall attitude scores were positive. Advanced Practice Registered Nurses ($p < 0.05$) and Graduate School of Nursing students ($p < 0.05$) had statistically more positive attitudes than physicians and students in the School of Medicine. Almost 70% of participants with clinical experience used at least one CAM therapy for the management of LBP. Both knowledge and attitudes were positively correlated with use of CAM.

Conclusions: Certain CAM therapies are being adopted at higher rates than others.

Findings suggest that efforts to increase CAM adoption further should be focused on increasing education and supporting positive attitudes. Educators may use the results to collaborate with other educators and revise curriculum. Policy makers may use the results to write policy on screening patients about CAM use and increasing provider continuing education. Quantitative and qualitative research is needed to examine knowledge and attitudes over time, identify best practices to increase knowledge, and explore the perceived characteristics and social norms of CAM therapies within the military health system.

Keywords: Complementary and Alternative Medicine, pain, military, policy, healthcare providers

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CHAPTER 1: Introduction

As the nation's warfighters, service members in the United States military are expected to be healthy, pain-free, and ready for war. However, low back pain (LBP) is highly prevalent and impairs operational readiness. Complementary and Alternative Medicine (CAM) therapies have been used to improve pain. Prompting, the Department of Defense (DoD) to call for more nonpharmacological interventions for the management of acute and chronic pain (Department of Defense, 2017) with a focus on acupuncture, battlefield acupuncture, yoga, massage, and physical therapy. Complementary and Alternative Medicine therapies are "a group of diverse medical and healthcare systems and products that are not presently considered to be a part of conventional medicine" (National Library of Medicine, 2020, p. 63). Considering that not all military treatment facilities (MTFs) have integrated CAM therapies into their facilities, this dissertation focused on CAM therapies as opposed to Integrative Medicine.

A general lack of provider awareness and interest have been cited as possible reasons for low adoption rates in MTFs with no CAM services (Herman, Sorbero, & Sims-Columbia, 2017). The Diffusion of Innovation theory proposes that adoption is determined after an organization has gained knowledge about the innovation to be persuaded to form an attitude and then make a decision about its use. Over time users determine if an innovation should be adopted for continued use. Literature on knowledge, attitudes, and use of CAM therapies in civilian populations is contradictory across medical specialties, country, age, and gender and little is known about the provider's perspective on CAM therapies for service members with LBP. To address this gap, this study surveyed current providers and student providers who care for service members

with acute and chronic LBP in MTFs about their knowledge, attitudes, and use of CAM therapies to describe the provider's perspective on CAM therapies and identify relationships between the variables. Data was analyzed according to the framework proposed by the Diffusion of Innovation Theory (Rogers, 2003).

BACKGROUND OF THE PROBLEM

The Military Health System (MHS) is tasked with caring for service members at the highest level of care amidst a culture that praises the warrior's ethos—a collective mindset to place the mission above all else, never quit, and never leave another American behind (Redmond et al., 2015). As a community, service members stand for strength, selflessness, and service before self. However, LBP threatens the health and well-being of service members as one most common reasons service members seek medical care (Defense Health Agency, 2017). All of which have the potential to lead to LBP.

Low back pain is difficult to manage and results in reduced deployment readiness, increased healthcare costs, reduced human performance and function, increased duty limitations, and additional psychosocial stressors (Booth-Kewley, Larson, & Highfill-McRoy, 2009; Buckenmaier, Galloway, Polomano, & Deuster, 2016; Gaskin & Richard, 2012). Occupational duties in the military may place physical strain on the body that can lead to injuries or aggravate back pain (MacGregor, Dougherty, Mayo, Rauh, & Galarneau, 2012). Infantry occupations face the physical rigors of engaging the enemy and carrying heavy combat loads. Certain logistic occupations require repetitive motions such as driving vehicles or continuous heavy lifting of supplies. Construction and maintenance personnel may also be required to do heavy lifting and repetitive motions;

maintenance personnel may be required to remain in awkward positions for extended periods while working on machinery, aircraft, or tanks (MacGregor et al., 2012).

Low back pain represents the second most common reason service members seek medical care (Defense Health Agency, 2017) and ranks among the top reasons for service members separating from military service (Patzkowski, Rivera, Ficke, & Wenke, 2012). The annual incidence of LBP is 40.5 to 54.2 per 1000 person-years (Defense Health Agency, 2017; Knox et al., 2011; Knox et al., 2014) with a 17% five-year cumulative risk of chronic disability (Lincoln, Smith, Amoroso, & Bell, 2002). Following deployment, 44% of service members report musculoskeletal or back pain for more than three months, compared to 26% of the general public, and 15% of those service members with chronic pain report using an opioid in the past month, compared to 4% of the general population (Toblin, Quartana, Riviere, Walper, & Hoge, 2014). In one cohort of 1230 soldiers, researchers found that 42.1% were found to have at least one episode of low back pain over a two-year period (George et al., 2012).

In civilian populations, LBP has been correlated with lost work time, increased disability, decreased work productivity, and reduced quality of life (Gaskin & Richard, 2012). In service members with LBP, this is seen as lower rates of deployment compared to service members without a diagnosis of LBP (MacGregor et al., 2012).

Musculoskeletal disorders, to include low back pain, represent the most common reason that service members are medically evacuated from deployed locations (Cohen et al., 2010). However, being fit for duty is a standard condition of employment for service members. During his time as Defense Secretary, Secretary of Defense Jim Mattis told

reporters that “You’re either deployable, or you need to find something else to do...” (Mehta, 2018).

Pain management strategies that offer safe, effective, and long-term treatment options are needed as opioids are not compatible within the combat environment due to side effects (Madsen, Vaughan, & Koehlmoos, 2017). Service members with pain need pain management strategies that are compatible with continued military service. Therefore, understanding optimal pain management strategies aside from opioids and nonsteroidal anti-inflammatory drugs (NSAIDs) is a key priority for the military health system.

Complementary and Alternative Medicine is one strategy being promoted by the DoD to reduce acute and chronic musculoskeletal and back pain and maximize treatment outcomes. Today, CAM therapies may be provided within conventional medicine as a form of Integrative Medicine. However, services are not covered by TRICARE and access is dependent upon credentialed providers providing the service. The range of CAM therapies is broad. CAM therapies are divided into five categories: natural products, mind and body interventions, biologically based treatments, manipulative and body-based methods, and energy therapies (Institute of Medicine, 2005). As patients and providers transfer to different facilities, access to services may change. Both active duty members and beneficiaries have reported use of CAM therapies.

Researchers at one MTF found that almost half of all beneficiaries reported non-specified use of a CAM therapy currently or in the past (Ross & Darracq, 2015). In another study, fifteen percent of veterans reported use of a CAM therapy within the last month (Reinhard et al., 2014); a finding that is lower than previously reported studies

(Davis, Mulvaney-Day, Larson, Hoover, & Mauch, 2014). In a study with 1,005 participants in a Navy MTF Emergency Department, Ross found that massage, followed by chiropractic services, yoga, prayer, nutrition, and meditation were the most commonly used CAM therapies (Ross & Darracq, 2015). In another study acupuncture, one of the most commonly used CAM therapies in the civilian environment, was used by less than 10% of surveyed service members (Park, Finkelstein-Fox, Barnes, Mazure, & Hoff, 2016). These findings highlight some differences between civilian and military use of CAM therapies. In a convenience sample of patients in an MTF emergency department, Ross and Darracq (2015) found that 88% of participants believed that MTFs should offer CAM services and 80% of those surveyed were willing to use acupuncture in the emergency department.

The majority of MTFs (80%) offer at least one CAM therapy, although the number of available services across MTFs differs substantially (Herman et al., 2017). Slightly more than half of MTFs offer CAM services for relaxation therapy, acupuncture, chiropractic services, biofeedback, guided imagery, and progressive muscle relaxation; however less than 20% offer yoga, massage therapy, animal-assisted therapy, music therapy, dry needling, or herbal medicines (Herman et al., 2017). The number of facilities offering acupuncture (69%) exceeds those offering chiropractic care (55%) or osteopathic manipulative therapy (10%). However, these numbers do not translate to increased utilization. For example, acupuncture is available at more MTFs than chiropractic care, however, patients receive chiropractic care more often than acupuncture. Of the 133 MTFs surveyed by Herman et al. (2017), 18 do not have plans to offer CAM services due to a lack of provider availability and proficiency. This raises the question—what is the

provider's perspective on CAM and what provider specific factors influence the adoption of CAM for the management of LBP?

Providers are at the forefront to promote the adoption (use) of CAM as part of the patient's overall plan of care. The Diffusion of Innovation theory offers a conceptual framework to explore the diffusion or process of adoption of a new idea (innovation) by members of a social system (Rogers, 2003). The theory is presented as five sequential stages in which an innovation passes first from knowledge, then through a persuasion, decision, implementation, and confirmation stage. Members of a social system obtain knowledge about the innovation in order to progress into the next stage of persuasion, where an attitude is formed. Attitudes are then used to make a decision about use (adoption) of the innovation. Therefore, the purpose of this study was to examine providers' knowledge, attitude, and use of CAM therapies in order to obtain a baseline understanding of the adoption of CAM therapies as proposed by the Diffusion of Innovation theory.

THEORETICAL FRAMEWORK

The Diffusion of Innovation (DOI) theory provides the theoretical framework for this study. This theory is used to understand the diffusion of innovations and their adoption into a social system. The model is not intended to be predictive; rather it serves to explore the process of adopting or rejecting an innovation within a social system. It is comprised up of four main elements: the innovation, communication channels, time, and the members of a social system (see Figure 1).

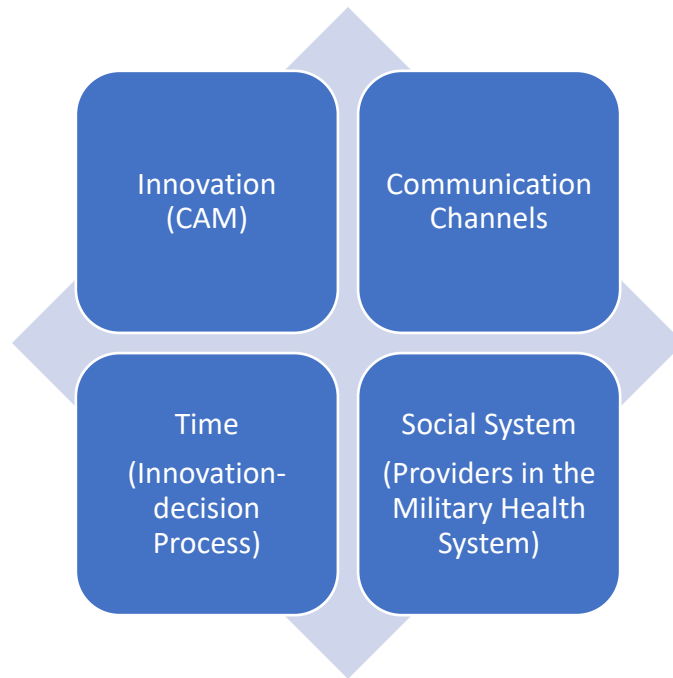


Figure 1 Four main elements of the Diffusion of Innovation theory as a framework for this study.

According to Rogers (2003), an innovation is an “idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behavior is concerned, whether or not an idea is “objectively” new as measured by the lapse of time since its first use or discovery” (p. 12). Once an innovation has been discovered, information about the innovation is spread through communication channels over time to members of a system through the process of diffusion. Time is represented by the innovation-decision period which occurs as individuals pass through the innovation-decision process in five steps (knowledge, persuasion, decision, implementation, and confirmation) (see Figure 2). This study represents a first step in examining the diffusion of CAM into practice for providers in the military. Specifically, this study examines the diffusion of CAM in the first two steps of the innovation-decision process (knowledge and persuasion).

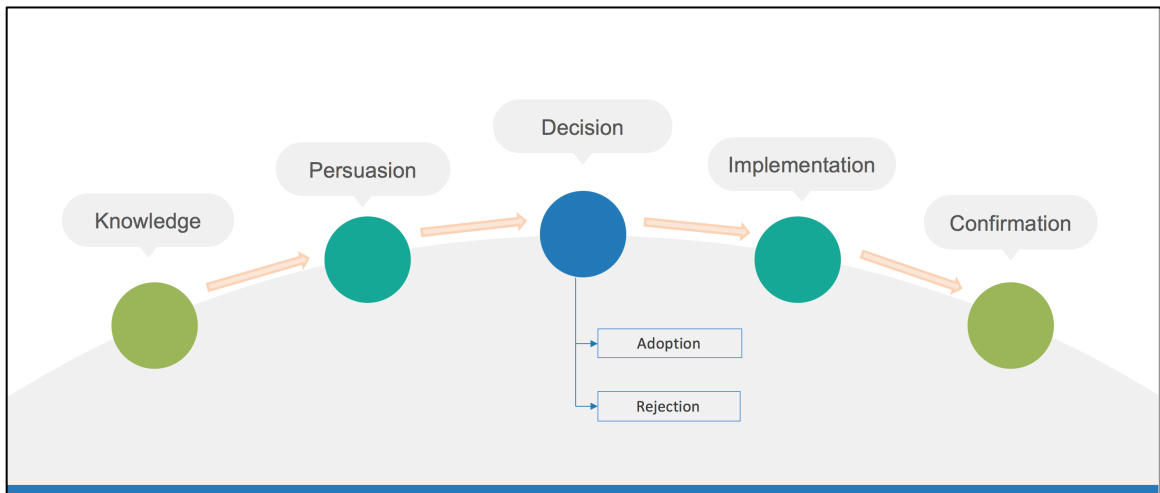


Figure 2 Diffusion of Innovation Model adapted from Rogers, 2003.

The first step of the innovation-diffusion process is knowledge. This step involves awareness-knowledge (the information needed to know that an innovation exists), how-to-knowledge (the information needed to use the innovation), and principles-knowledge (the information needed to understand how the innovation works) (Rogers, 2003).

Individuals take in information about the innovation to build knowledge.

With knowledge, the individual goes through a step called persuasion. Here the individual forms favorable or unfavorable attitudes towards the innovation based on perceived characteristics. Perceived characteristics of the innovation are determined by the innovation's relative advantage (benefits versus barriers), compatibility, complexity (ease of use), trialability, and observability. Based on the perceived characteristics of an innovation, individuals make a decision to adopt or reject the innovation. Prior to making a decision about adoption both knowledge and persuasion (attitudes towards the innovation) must be assessed. The persuasion stage is where individuals find themselves interested in the innovation and looking for more information. Once a decision to adopt

the innovation occurs, the next communication stage is implementation. It is here that the social system adopts the implementation. Over time the social system will confirm this decision with continued adoption or discontinuance in the final communication stage—confirmation (Rogers, 2003). The theory has been used in nursing research to determine the diffusion of evidence based practice (Mohammadi, Poursaberi, & Salahshoor, 2018).

The proposed study seeks to describe the diffusion of CAM therapies by providers who care for service members with LBP. The study will quantify *knowledge* as providers' self-reported knowledge about CAM therapies available in MTFs and *persuasion* as provider attitudes towards the CAM therapies. These constructs were used to frame the research questions. The data from this study will be used to provide data to policy and healthcare leaders so that it may be used to explain the diffusion of CAM therapies in military medicine. The findings from this study will identify variables associated with CAM use to guide patient care, policies, and future research. Findings from this study may be used to guide future research to build upon the remaining stages of implementation and confirmation as well as the perceived characteristics of individual therapies and the decision-making process for providers.

STATEMENT OF THE PROBLEM

Low back pain is a significant problem for the military as it directly influences deployment readiness and occupational duties. Researchers have found that service members are using CAM therapies for the management of pain; however, access to CAM is varied across MTFs as services are dependent upon the availability of providers to provide the service. The Diffusion of Innovation theory provides a framework to explore the adoption of CAM therapies at the provider level. Knowledge on military provider

knowledge, attitudes, and use will inform leaders, policy makers, and researchers about provider perspectives to increase access to CAM therapies.

Previous studies on provider knowledge, attitudes, and use have focused on civilian populations. Studies with providers who treat service members have focused on providers at the Veterans Affairs (VA). There is a gap in the literature on the active duty service member's perspective as a military provider caring for service members with low back pain. This study serves to fill that gap by obtaining baseline data by surveying new providers and student providers. Beginning with these providers allows for researchers, clinicians, and policy makers to understand the provider perspective at the onset of training to the provider's first assignment as a provider. This study of knowledge, attitudes, and use of CAM therapies at the provider and student provider level is needed to describe provider knowledge and attitudes and identify relationships between attitudes and use which may influence the use of CAM therapies. Understanding these concepts and relationships has the potential to improve patient care and the adoption of CAM therapies for the treatment of LBP for service members. This study serves to advance research on the adoption of CAM therapies by military providers caring for service members with LBP.

PURPOSE OF THE STUDY

The purpose of this study was to examine providers' and student providers' knowledge, attitudes, and use of CAM therapies. Data were collected through an online survey on SurveyMonkey (premier) using a previously published valid and reliable questionnaire to understand the provider's perspective regarding CAM. This research was designed to quantitatively establish baseline data to describe provider knowledge and

attitudes, explore relationships between the variables, and identify areas to further study to increase access to CAM.

RESEARCH QUESTIONS

The proposed research study will examine provider knowledge, attitudes, and use of CAM therapies in a large military treatment setting as outlined by the Diffusion of Innovation theory to answer the following research questions:

1. What are the general attitudes towards CAM therapies of providers and student providers who may care for service members with acute or chronic low back pain?
2. How do surveyed providers and student providers rate their knowledge of CAM therapies?
3. What CAM therapies are being used in clinical practice for patients with LBP by provider type?
4. Is there a relationship between knowledge, attitude, personal use, and professional use of CAM therapies in clinical practice?
5. What sociodemographic variables are associated with use of CAM therapies in practice?

SPECIFIC AIMS

This study aimed to (a) describe knowledge, attitudes, and use of CAM therapies by providers who care for service members with LBP and (b) examine relationships between knowledge, attitudes, and use of CAM therapies.

SIGNIFICANCE OF THE STUDY

This study extended previously conducted research in civilian populations by examining the knowledge, attitudes, and use of CAM in a military population. This study further extended research in military/veteran populations by expanding on previously investigated concepts such as attitudes using a quantitative survey design. This study was unique in that it examines the baseline perspectives of students from both the Graduate School of Nursing (GSN) and the School of Medicine (SOM) at various points in their respective programs, who are still learning about how to care for patients and beginning their careers as providers. This young provider perspective represents the future care patients will receive and provides insight for educators in both nursing and medicine at Uniformed Services University of the Health Sciences (USU) and with policymakers. Opportunities to use knowledge from this study exist for (a) researchers to design longitudinal studies on use of CAM therapies and interventions aimed at increasing access to CAM through the provider's perspective, (b) educators to develop CAM curriculum, and (c) for military leaders to develop policies aimed at increasing access to CAM therapies.

DEFINITIONS

Active Duty Service Member—Full time occupation as part of a military force as opposed to reserve duty serving in the Army, Air Force, or Navy (Redmond et al., 2015).

Alternative Medicine—“...a non-mainstream practice is used in place of conventional medicine, it's considered *alternative*” (National Center for Complementary and Integrative Health, 2018).

CAM— “A group of diverse medical and healthcare systems, practices, and products that are not presently considered to be part of conventional medicine” (National Library of Medicine, 2020, p. 63). CAM therapies may be found in conventional medical settings through integrative medical practices.

Complementary medicine—“...a non-mainstream practice that is used together with conventional medicine, it’s considered complementary” (National Center for Complementary and Integrative Health, 2018).

Integrative Health— The combination of conventional and complementary approaches in a coordinated manner to emphasize holistic, patient-focused care to healthcare and wellness (National Center for Complementary and Integrative Health, 2018).

Military treatment facility— A hospital or clinic found at military bases and posts which provides direct care to beneficiaries (Tricare, 2020).

SUMMARY

A variety of CAM therapies offer a valuable, safe and effective treatment for patients with LBP. Service members are utilizing CAM therapies. Providers serve as gatekeepers to the delivery of services, such as the use of CAM therapies by service members in the MTF. Providers need to have sufficient knowledge to interact with patients about CAM therapies and provide access to these therapies. Prior research has shown that knowledge and attitudes correlate with the use of CAM therapies among providers in civilian populations. However, less is known about military providers. Given the unique culture within the military healthcare system, it is important to understand the military provider’s perspective. This study examined the knowledge, attitudes, and use of

CAM therapies for the management of LBP by military providers and current student providers. Knowledge gained from this study can be used to design future research studies, develop curriculum for advanced practice nursing students and medical students, and write policies aimed at increasing access to CAM therapies. This study serves as a baseline in examining provider knowledge, attitudes, and use by providers.

This dissertation is presented as five chapters. This chapter provided a background description of the problem as well as the study's purpose, research questions, and significance. Chapter 2 is a comprehensive literature review on the historical context of CAM and CAM therapies in the military, in addition to provider and student knowledge, attitudes, and use of CAM therapies. Chapter three is a detailed description of the methods used in this study to include the research design and methodology. Chapter four provides the results of the statistical analysis. Lastly, this dissertation concludes with Chapter five, which provides a discussion of the results.

CHAPTER 2: Review of the Literature

A review of the related literature was conducted in PubMed, CINAHL, and PsychInfo with the following keywords and MESH headings, chosen around the main constructs of the research topic (knowledge, attitudes, use of CAM therapies by service members) with the assistance of a librarian to identify similar terms and phrases that may be relevant: perceptions, attitudes, beliefs, knowledge, CAM therapies, acupuncture, yoga, military, service members, active duty, provider, physician, nurse, medical student, nursing student, nurse practitioner student. The purpose of the literature review was to describe the history of CAM, use of CAM in the military, and provider perceptions and use of CAM therapies. To maximize a return of articles, the search criteria was not limited by sample (military or civilian), study designs, or type of CAM therapy. All articles were screened by title and abstract for inclusion and exclusion criteria. Inclusion criteria: (a) knowledge, attitude, or use of CAM by APRNs, advanced practice nursing students, physicians, and medical students; (b) CAM use by service members. Exclusion criteria: (a) providers other than those listed in inclusion criteria. The search was limited to articles written in English. The search was not limited by year.

HISTORICAL CONTEXT FOR COMPLEMENTARY AND INTEGRATIVE THERAPIES IN THE MILITARY

In 1998, the National Institutes of Health (NIH) established the National Center for Complementary and Alternative Medicine (NCCAM), which was later changed to the National Center for Complementary and Integrative Health (NCCIH) (National Center for Complementary and Integrative Health, 2020). In 2000, the White House Commission on Complementary and Alternative Medicine Policy (WHCCAMP) was created to

develop legislative and administrative recommendations to maximize consumer benefits from CAM therapies (National Institute of Health, n.d.). The Commission called for research to increase CAM knowledge and awareness. Complementary therapies are used together alongside conventional medicine. Since then, the World Health Organization has prioritized the integration of CAM into traditional health care (World Health Organization, 2013).

Integrative healthcare is an approach to healthcare which coordinates conventional and complementary approaches (National Center for Complementary and Integrative Health, 2018); it focuses on holistic, patient-centered health and wellness (Madsen et al., 2017). Following a review of the literature, Madsen et al. (2017) found that the military health system offered 23 integrative therapies within 15 categories, which are not standardized across facilities. Within these therapies, there are eight CAM therapies available for beneficiaries at up to 83% of MTFs (Herman et al., 2017). CAM therapies in MTFs have been shown to improve quality of life, reduce pain, stress, and anxiety; and improve patient satisfaction (Herman et al., 2017). The most commonly used CAM therapies for pain were acupuncture, chiropractic, mind-body medicine combinations, acupressure, and mixed combinations (Herman et al., 2017). More than half of MTFs report that the use of CAM therapies is associated with reduced pain medication use (Herman et al., 2017).

Within the civilian population, there is a growing popularity of CAM therapies by patients, which has motivated researchers to explore provider knowledge, attitudes, and use of CAM therapies. Policy makers and researchers acknowledge the important role that provider knowledge and attitudes play in patient outcomes. The NCCIH, the DoD,

and Veterans Affairs have called for research on knowledge and attitudes to ensure that CAM therapies are safe and effective.

CAM THERAPY FOR SERVICE MEMBERS

The use of CAM therapies has been reported to be higher in the military than in the civilian population (Goertz et al., 2013). Utilization rates vary by study depending on population of interest and definitions. Examining CAM use and deployment, Reinhard et al. (2014) did not find a relationship between CAM use and deployment status. However, of the Operation Enduring Freedom and Operation Iraqi Freedom veterans surveyed, CAM users were more likely to receive care at the Veterans Affairs. In a large secondary analysis, Denneson, Corson, and Dobscha (2011) found that the majority of veterans (82%) reported using a CAM service at least once in the previous 12 months with 99% willing to try CAM for pain. In a synthesis of studies on CAM use among veterans and military personnel, Davis et al. (2014) found that CAM use varied from 37 to 46% and Jacobson et al. (2009) found that active and reserve service members, 30% of participants used at least one CAM practitioner in the past year and 27% used at least one self-administered CAM therapy (Jacobson et al., 2009). The authors also found that service members who used CAM therapies reported more health-related symptoms and health conditions than service members not using CAM (Jacobson et al., 2009).

Duration of pain is one health-related symptom which differs among users and non-users of CAM (Denneson et al., 2011) as well as overall general poor mental and physical health (Park et al., 2016). In a study with 100 veterans in focus groups, Kroesen, Baldwin, Brooks, and Bell (2002) found that patients were not necessarily dissatisfied with conventional health care; however, they connected CAM use to dissatisfaction with

specific aspects of conventional health care. Participants reported a desire for holistic health care and an emphasis on prevention measures through nutrition and exercise. Patients using CAM therapies are not replacing conventional medicine. They have started to expend their medical care to meet their needs (Kroesen et al., 2002). Among Navy and Marine service members, lower levels of satisfaction with conventional care and higher rates of pain were associated with increased use of CAM (Smith et al., 2007).

Evaluating safety and efficacy of CAM therapies remains challenging. Hundreds of clinical trials on CAM therapies exists. However, research is limited by the lack of controls available to conduct randomized controlled trials. In a program evaluation, Schulz-Heik et al. (2017) yoga was found to be feasible, acceptable, and effective at reducing pain for veterans, while battlefield acupuncture has demonstrated beneficial effects on acute and chronic pain (Federman, Radhakrishnan, Gabriel, Poulin, & Kravetz, 2018; Fox, Murakami, Danesh, & Manini, 2018). However, Federman and Gunderson (2017) highlights the need to apply caution to interpreting these findings given the small sample sizes and potential for reporting bias.

In the review of the literature rates of disclosure of CAM use by service members to their providers could not be identified and rates of disclosure in the civilian population are inconsistent. Approximately half of the respondents in a large U.S. survey with 21,849 patients using CAM disclosed use of CAM to a healthcare provider (Shim, Schneider, & Curlin, 2014). Patients were more likely to disclose use of a CAM therapy when the therapy had been recommended by a health professional or was intended to treat a specific medical condition (Shim et al., 2014). A second, large U.S. survey found that more than 40% of patient respondents did not disclose CAM use with yoga and

meditation being the most common therapies not disclosed (Jou & Johnson, 2016).

Connor et al. (2020) found that of more than half of the patients who did not discuss their use of CAM with their providers, 58% listed lack of physician inquiry as the main reason. A large meta-analysis by Foley, Steel, Cramer, Wardle, and Adams (2019) concluded that patients did not disclose their use of CAM therapies because of a lack of inquiry from providers, fear of disapproval by providers, perceived lack of provider knowledge about CAM, and the belief that CAM was safe. Common reasons for disclosing use of CAM were patient concerns about safety, patient desires to seek advice from the provider about a specific therapies, and patient beliefs that the provider would support their CAM use (Foley et al., 2019).

CAM IN ADVANCED NURSING AND MEDICAL EDUCATION

Since the 2000's, the White House Commission on Complementary and Alternative Medicine (WHCCA) and the NCCIH have supported integrating CAM instruction within standard nursing and medical school curriculum through position statements and funding because of the rising number of patients using CAM therapies (White House Commission on Complementary and Alternative Medicine Policy, 2002). In 2000, NCCIH formerly known as the National Center for Complementary and Alternative Medicine, awarded 15 grants to academic institutions to incorporate CAM content into the curriculum for health professional students (Pearson & Chesney, 2007). The Institute of Medicine (2005) encourages health profession schools to use an unspecified amount of time on CAM to facilitate the health professional's ability to advise patients on the risks and benefits of CAM therapies.

In a study published in 2015, Cowen and Cyr (2015) found that half of the 127 medical schools in the United States had at least one CAM course or clerkship in their curriculum. In a study of nursing programs, Burman (2003) found that 98.5% of advanced practice nursing schools who were surveyed about their curriculum had incorporated CAM into their curriculum. Of these schools, more than 80% added CAM-related context to existing courses. Burman (2003) highlighted the challenges of incorporating CAM into advanced nursing education to include: dense curriculum focused on biomedical knowledge, different medical philosophies on health, and a lack of research on CAM. While this review of the literature reflects that complementary therapies are taught in nursing and medical schools, the literature did not reflect the depth and breadth of this content.

Although the American Association of Medical Colleges (AAMC) has not published a statement on competencies for CAM therapies for medical students, the official website of the American Medical Student Association (2019) offers an Integrative, Complementary, and Alternative Medicine Resource Center which is focused on giving student health professionals information about CAM and how to integrate CAM into holistic, patient-centered clinical practice. In a position statement, the organization writes that pursuing CAM education allows medical students and physicians to better facilitate patient education, treatment, and counseling. The American College of Rheumatology (2012) also recognizes that interest in CAM is growing and supports scientific study of CAM therapies. In a position statement, the organization (a) emphasizes that new information can be discovered through the scientific inquiry of CAM to improve patient care for patients with rheumatic and musculoskeletal diseases;

(b) recommends that providers and patients openly discuss the risks and benefits of CAM use; (c) and encourages providers to be proactive in inquiring about CAM and referring patients to reliable source.

These position statements are carried over into nursing. The American Association of Colleges of Nursing (2008) wrote that “knowledge acquisition related to wellness, health promotion, illness, disease management is core to nursing practice” (p. 30). Advanced practice nurses are “characterized by the use of a holistic perspective... [and] advanced practice thinking, judgment, and skillful performance” (American Association of Colleges of Nursing, 2006, p. 18). The American Nurses Association defines holistic as an understanding that the person is seen as a whole system that has interconnected physical, mental, social, and spiritual factors (American Nurses Association, 2015). The next generation of providers needs sufficient education on CAM to treat patients holistically. Next this review of the literature will focus on providers’ and student providers’ knowledge, attitudes, and use of CAM therapies.

PROVIDER AND STUDENT KNOWLEDGE, ATTITUDES, AND USE OF CAM THERAPIES

A total of 21 articles with providers and 14 articles with students were included in this review of the literature on knowledge, attitudes, and use of CAM therapies. There were six qualitative provider studies with individual interviews, one qualitative study with focus groups, and 13 quantitative studies with surveys. Provider types were primarily physicians. There were three studies with nurse practitioners (Aveni et al., 2016; Geisler, Cheung, Johnson Steinhagen, Neubeck, & Brueggeman, 2015; Neri, Beeson, Mead, Darbari, & Meier, 2016) and no studies with physician assistants. Patients, nurses, administrators, and CAM practitioners were studied along with

credentialed providers in nine of the included studies. There were three studies with providers who cared for veterans or service members (Fletcher, Mitchinson, Trumble, Hinshaw, & Dusek, 2017; Fletcher, Mitchinson, Trumble, Hinshaw, & Dusek, 2014; Niemtzow et al., 2018). Niemtzow et al. (2018) did not provide demographics for participants; therefore, provider types are unknown. And both Fletcher et al. (2017) and Fletcher et al. (2014) were qualitative studies with small samples of credentialed providers.

Fourteen studies were focused on medical students and one on nurse practitioners in the United States (Bowden & Ball, 2016). Because the majority of studies of medical students in the United States were more than ten years old, this review of the literature also included studies on medical students from Ireland (Loh, Ghorab, Clarke, Conroy, & Barlow, 2013); Europe (Flaherty, Fitzgibbon, & Cantillon, 2015); Turkey, (Yildirim et al., 2010), Africa (Ameade, Amalba, Helegbe, & Mohammed, 2016; James, Bah, & Kondorvoh, 2016), and Kuwait (Awad, Al-Ajmi, & Waheedi, 2012), Canada (Wong et al., 2013). Three studies in this review of the literature reported the reliability and validity of the instrument used in their survey (Lie & Boker, 2004; Lie & Boker, 2006; Rees, Wearn, Dennis, Amri, & Greenfield, 2009). All studies with students used a survey methodology.

Because of the limited availability of studies with providers caring for service members, this review includes studies with both civilian providers and civilian/military providers in MTFs. It is divided into four areas knowledge, attitudes, use, and source of information. First, studies investigating knowledge will be discussed.

Knowledge

Several studies measured knowledge with perceived self-rated knowledge on a Likert scale. In general, providers and students perceived their knowledge about CAM therapies to be fair or low (Ameade et al., 2016; Awad et al., 2012; Bahall & Legall, 2017; Bowden & Ball, 2016; Chaterji et al., 2007; Loh et al., 2013; Neri et al., 2016; Wahner-Roedler et al., 2014). Chaterji et al. (2007) and Flaherty et al. (2015) found that students wanted to learn more about CAM and believed that increased knowledge about CAM was important to their future roles as advanced practice nurses or physicians. A study conducted in Ireland found that medical students had lower confidence to advise their patients on CAM when they had low self-reported knowledge and low objective knowledge based on nine true/false statements about CAM (Loh et al., 2013). This study also found that once medical students entered clinical rotations, they had less desire to use CAM therapies. The authors suggested that students had less desire to use CAM because they did not have the knowledge to be able to advise patients on the use of CAM (Loh et al., 2013). Another study concluded that knowledge increased as year in school increased among medical students (Ameade et al., 2016) and another identified differences in knowledge between nursing and medical students where medical students reported higher knowledge than nursing students (James et al., 2016).

During interviews, Sharp et al. (2018) found that providers reported a wide range of definitions for CAM therapies and desired more information about CAM therapies to expand their knowledge. Only two studies found that physicians and nurses (Aveni et al., 2016) and osteopathic medical students did not report a lack of knowledge about CAM therapies (Kanadiya, Klein, & Shubbrook, 2012). Exploring knowledge on individual

CAM therapies rather than CAM therapies in general, Geisler et al. (2015) reported that providers were most knowledgeable about prayer (40%) and mind-body practices (32%); and reported some knowledge on acupuncture (79%); aromatherapy (75%); and homeopathy (73%).

Rather than exploring perceived self-rated knowledge, Pirotta et al. (2010) and Tilburt et al. (2009) investigated knowledge differently. Pirotta et al. (2012) defined knowledge about CAM therapies as correct answers to questions about specific herbs in a survey. The authors found that most respondents could not correctly identify common side effects and potential interactions of black cohosh, glucosamine, and ginkgo biloba. Tilburt et al. (2009) asked participants if they were aware of two popular studies about CAM therapies in prominent journals as identified by the researchers. The first article compared acupuncture and sham acupuncture and was published in the *Annals of Internal Medicine* in 2004. The second article compared glucosamine with and without chondroitin and was published in the *New England Journal of Medicine* in 2006. The authors found that 59% of those surveyed were aware of one trial; while only 23% were aware of both trials. Rheumatologists and internists were more likely to know about the studies presented. Rheumatologists were the most likely to report that they were the “very confident” in interpreting research results; followed by naturopaths (25%), acupuncturists (17%), and internists (17%). The authors of the study suggest that differences in training, attitudes, professional culture, and clinical experiences explain the differences between the types of providers.

In a study with 69 healthcare providers and 468 patients, Zhang, Peck, Spalding, Jones, and Cook (2012) found that the most commonly used CAM therapies by patients

were not the modalities that providers were most knowledgeable about. For example, patients most commonly used prayer and natural herb therapy (75% and 49% respectively); however, only 32% and 20% respectively of providers understood these therapies clearly and felt comfortable talking to patients about them. Massage was the most understood modality by providers (39%) (Zhang et al., 2012). Nearly 45% of patients surveyed did not discuss their use of CAM with their providers. The authors concluded that lack of knowledge and familiarity with CAM therapies may hinder patient-provider discussions about CAM use (Zhang et al., 2012). In a study with physicians and nurses, Aveni et al. (2016) found that most respondents (82.5%) agreed that they lacked knowledge about CAM and 65% reported that it was the patient who initially started discussions about CAM use.

None of the studies included in this review explored knowledge of providers caring for service members with LBP. It is unknown if providers for service members have the knowledge that they need to be able to have conversations about CAM, refer patients for CAM, or understand the risks and benefits of CAM. This is important to know because CAM services are only a covered benefit when services are provided within the MTF. CAM services received outside of the MTF are not reimbursed. Information about provider knowledge is the first step towards understanding the diffusion of CAM therapies into MTFs. Attitudes towards CAM therapies will be discussed next in this review of the literature.

Attitudes

Although overall provider and student attitudes have been found to be primarily positive (Aveni et al., 2016; Awad et al., 2012; Bahall & Legall, 2017; Geisler et al.,

2015; James et al., 2016; Joos, Musselmann, Szecsenyi, & Goetz, 2011; Lie & Boker, 2004; Lie & Boker, 2006; Linde et al., 2015; Neri et al., 2016; Yildirim et al., 2010), there were differences in attitudes among provider types (Aveni et al., 2016; Linde et al., 2015), student type (James et al., 2016; Yildirim et al., 2010) and gender (Aveni et al., 2016). Abbott et al. (2011) described medical students as responding more positively to the principles of CAM than individual CAM therapies. In many studies, women had more favorable attitudes towards CAM therapies compared to men (Aveni et al., 2016; Joos et al., 2011; Wahner-Roedler et al., 2014). Physicians tend to be more skeptical of nontraditional treatments than nurses (Fletcher et al., 2014) and physicians working in internal medicine are more skeptical towards CAM therapies than those working in family practice (Linde et al., 2015). Providers who worked with chronic pain patients had the most positive attitudes towards CAM therapies (Fletcher et al., 2017; Jarvis, Perry, Smith, Terry, & Peters, 2015; Neri et al., 2016). In a study with multiple provider types, midwives were found to have the most positive attitudes among providers (Aveni et al., 2016).

Several studies have highlighted osteopathic treatments, yoga, and massage as the most useful therapies for the management of pain (Geisler et al., 2015; Rodondi et al., 2018; Tilburt et al., 2009; Tilburt et al., 2010). However, some providers do not believe there is enough evidence to support the use of CAM therapies (Sharp et al., 2018). The authors did not specify which CAM therapies were lacking evidence according to their participants. While many providers do not view CAM therapies as placebo effects (Geisler et al., 2015; Olchowska-Kotala & Baranski, 2016), providers with more experience are more likely to believe that CAM effects are due to placebo effects

(Olchowska-Kotala & Baranski, 2016). The need for evidence in the form of randomized controlled trials prior to recommending a CAM therapy is necessary for many providers (Tilburt et al., 2009).

Investigating differences in attitudes by years of experience, Olchowska-Kotala and Baranski (2016) found that established physicians had more positive attitudes and rates of CAM use than junior physicians. In another study, younger providers were more likely to prescribe CAM (Rodondi et al., 2018). A third study did not find that years of practice was associated with attitudes and use of CAM therapies (Joos et al., 2011).

A study by Frank, Ratanawongsa, and Carrera (2010) with 4,764 medical students from 16 medical schools in the United States found that most students agreed/strongly agreed that alternative medicine could be as effective as conventional medicine. However, as the participant's year in school increased, the number of students going from neutral in their belief to negative (disagreed) increased (Frank et al., 2010). Other studies with students have found that students believed physicians should be knowledgeable about CAM and conventional medicine could benefit from ideas about CAM (Chaterji et al., 2007; Frank et al., 2010).

The majority of the studies included in this review investigated attitudes of providers towards CAM therapies. There were two studies which investigated attitudes among providers who care for veterans (Fletcher et al., 2017; Fletcher et al., 2014). Many of the studies found that attitudes were dependent upon provider type, gender, and age. These differences and the association between use of CAM therapies and these sociodemographic variables, prompts the need for future research on attitudes by specific

groups of providers as proposed in this study. Use of CAM therapies will be discussed next in this review of the literature.

Use

Niemtzow et al. (2018) was the only study to investigate the adoption of a specific CAM therapy by providers caring for service members. Niemtzw et al. (2018) found that after 2,712 MTF providers completed Battlefield Acupuncture (BFA) training, less than 30% of surveyed participants were using BFA in their clinical practice. Of these, 92% were satisfied using BFA as a treatment for pain. However, providers reported difficulty in getting credentialed, lack of sufficient resources, and lack of supervisors with privileges for BFA as the most common reason for not integrating BFA in their clinical practice (Niemtzow et al., 2018). This study was limited in that it did not identify provider types or look at relationships to draw more conclusions about the adoption of CAM therapies for future research on practice patterns in a military setting. Other researchers have found that provider type is associated with clinical use and referrals for CAM therapies.

In one study, orthopedists were more likely to use chiropractic therapy (91%) compared to family physicians (29%) and internists (11%) (Linde et al., 2015). In another study comparing physicians' and nurses' use of CAM therapies, more than half of those surveyed referred patients to CAM providers with midwives being the most likely to initiate discussions about CAM therapies with patients (Aveni et al., 2016). A contrasting study found that physicians were more likely to ask their patients about CAM use (67.5%) versus nurses (44.2%), pharmacists (46.7%), and other (53.3%) (Bahall & Legall, 2017).

However, these findings do not extrapolate into providers' incorporating CAM therapies into their professional practice. There is concern that providers are not consistently initiating discussions about CAM therapies with patients. Some providers may not be comfortable talking to patients about CAM therapies (Neri et al., 2016). Physicians were the least likely to recommend CAM therapies (26%) compared to nurses (39.5%), pharmacists (50%), and other (32.5%) (Bahall & Legall, 2017). Low rates of physicians recommending CAM therapies have been supported by other studies (Olchowska-Kotala & Baranski, 2016). However, rates of recommendation among nurse practitioners have been reported at higher rates by other researchers. Geisler et al. (2015) found that 85% of nurse practitioners refer for massage, 81% refer for vitamins, and 78% refer for dietary supplements.

Moving from referral rates to understanding the rate of personal use of CAM therapies among providers, in a qualitative study with different types of providers at the Veterans Affairs, providers who personally used CAM therapies were more likely to recommend CAM therapies to their patients (Fletcher et al., 2014). Flaherty et al. (2015) reported a similar finding with students. Students who were current CAM users or who had family members who used CAM had an overall higher openness to the use of CAM. Many providers have personally tried CAM therapies and found them to be helpful (Neri et al., 2016). High personal use of CAM therapies has been reported by many providers. In one study, the authors found that personal use was greater than 90% for nurses and about 65% for physicians (Bahall & Legall, 2017), while another study found that approximately 80% of nurse practitioners use at least one CAM therapy personally

(Geisler et al., 2015). Specifically, this study found that more than 80% of nurse practitioners surveyed have personally used vitamins and massages (Geisler et al., 2015).

In one study, patients expected to see CAM therapies integrated in primary care setting, more often than providers were providing directly or prescribing CAM therapies (Ben-Arye, Frenkel, Klein, & Scharf, 2008). The findings from Niemtzow et al. (2018) highlight the low rates of adoption for an available CAM therapy in a MTF. This combined with MTF rates of adoption ranging from 26 to over 85% across MTFs, suggests that more data is needed about the rates of adoption at the provider level within the MTF. While general data is available about the availability of CAM therapies in the MTF (Herman et al., 2017), the rate of CAM use and referrals among providers caring for service members with low back pain is unknown. The high association between personal use of CAM therapies and use of CAM therapies in clinical practice (Geisler et al., 2015; Neri et al., 2016), as well as the association between clinical use and level of comfort in discussing CAM therapies with patients (Pirotta et al., 2010) highlight the need to assess provider's personal use of CAM therapies as well as their clinical use of CAM therapies in order to be able to fully understand the rates of CAM adoption. Bowden and Ball (2016) found that NP students were interested in learning more about chiropractic care and were uncertain if chiropractic care was seen as mainstream or alternative. Students with prior experience of receiving chiropractic care had higher attitudes towards the therapy than those without. There is not enough evidence to be able to make assumptions about the rates of adoption and the relationships between knowledge, attitudes, and use among providers caring for service members with LBP. More research would be needed

to further understand how providers make decisions about the use of CAM and their view of CAM as mainstream or alternative.

The challenge in making assumptions about the rates of adoption among providers is compounded by the contradictory findings from Perry, Dowrick, and Ernst (2014) and Wahner-Roedler et al. (2014). To better understand rates of adoption over time, Perry et al. (2014) surveyed providers about their attitudes and level of comfort with CAM therapies over five years. They found that the number of providers endorsing CAM therapies decreased from 38% to 19%; and the number of referrals for CAM services decreased from 31% to 17%.

In addition to researchers examining use of CAM via referrals, researchers observed providers discussing CAM with patients. These researchers did not specify if the provider-led discussions were to recommend or discourage CAM use with their patients. This research was important to see if providers recognized the impact of CAM on patient outcomes and the need to talk to patients about the use of CAM. Thirty-six percent of physicians surveyed routinely asked patients about their CAM use and only 5% were comfortable discussing herbal medicines with patients (Perry et al., 2014). With contrasting findings, Wahner-Roedler et al. (2014) found that physicians were initiating more discussions with their patients from 26% in 2004 to 41% in 2012. Aveni et al. (2016) in which physicians were more likely to ask their patients about CAM use. A study by Neri et al. (2016) found that some providers may not be comfortable talking to patients about CAM therapies

This review of the literature did not identify rates of adoption by providers in MTFs. The overall mixed findings presented throughout this section of the review of the

literature, highlight the need to investigate personal and professional use of CAM therapies in specific provider settings. No studies of students identified their professional use of CAM in a clinical setting or with preceptors. The next section in this review of the literature is written to provide a foundation on where providers obtain information about CAM therapies to be able to make recommendations to patients or incorporate CAM therapies into their clinical practice.

Sources of Information

Only one study explored where providers sought information about CAM therapies to make recommendations to patients. Wahner-Roedler et al. (2014) found that physicians looked at randomized controlled trials to provide information about CAM therapies and make recommendations to patients. Knowledge and attitudes are developed as providers are exposed to information (Rogers, 2003). Communication channels provide information about where a person learns about new ideas. It is unknown how students and providers who care for military service members with LBP obtain information about CAM therapies. This data is needed to identify gaps in communication about CAM therapies in military settings.

SUMMARY

This literature review highlighted inconsistencies in the current literature to understand military provider knowledge, attitudes, and use of CAM therapies. The majority of the studies presented were conducted with civilian populations. Most of the student provider research within the United States was more than ten years old. Researchers have shown that there are differences in knowledge, attitudes, and use of CAM therapies among providers and student providers with respect to provider type,

gender, culture, and age, which highlights the need to investigate knowledge, attitudes, and use of CAM therapies in providers and student providers caring for service members with low back pain. In studies of military providers, there is a lack of quantitative studies with validated questionnaires measuring the constructs of knowledge, attitudes, and use of CAM therapies. As the DoD promotes the use of CAM therapies, understanding the influence of provider and student provider knowledge and attitudes on adoption (use) of CAM must be investigated. These perspectives must be considered to ensure that providers have the knowledge necessary to deliver safe patient care and provide access to CAM therapies for the management of LBP. Establishing a baseline of literature—with direct input from providers—to understand how CAM is diffused through the military health system via knowledge and attitudes is essential to providing safe care to service members and increasing access to therapies for the management of LBP. Chapter 3 presents the methods that this study used to investigate knowledge, attitudes, and use of CAM therapies by providers caring for service members with LBP.

CHAPTER 3: Methods

OVERVIEW

This study was a quantitative, non-experimental, descriptive correlational study. It sought to examine knowledge, attitudes, and use as proposed by the diffusion of innovation theory to examine the adoption of CAM therapies by healthcare providers who care for service members with low back pain.

STUDY DESIGN

This study utilized a cross-sectional design to obtain recent graduate and student provider input on their knowledge, attitudes, and use of CAM therapies. Cross-sectional designs are intended to collect data at one point in time to identify differences in groups of participants (Sutherland, 2017). This type of design is appropriate for descriptive studies in which there is little known about the phenomenon. Cross-sectional designs allow for researchers to investigate relationships between variables as well as describe a phenomenon. Future research can build on cross-sectional designs (Sutherland, 2017).

Inclusion criteria

Inclusion criteria include: (a) Active duty student currently enrolled in the Graduate School of Nursing or School of Medicine at USU, (b) may provide medical care for service members with acute or chronic low back pain currently or in the future, and (c) English language proficiency.

Exclusion criteria

There were no exclusion criteria.

Sample

A determination statement from the HRPP office stated the research was exempt from IRB review. A convenience sample of students was recruited from Uniformed Services University of the Health Sciences (USU) from the Graduate School of Nursing and the School of Medicine. Uniformed Services University supports the military community through education and training for future advanced practice nurses and physicians to care for service member. All students and providers may currently or in the future care for service members with acute or chronic LBP.

The Primary Investigator (PI) obtained an email list for eligible providers from the leadership at USU. Eligible participants were emailed a survey link and an explanation of the study's aims, purpose, eligibility requirements, risks, and benefits. Participants were given a contact email address for the PI to ask any questions. Participants were notified that their consent was implied with the submission of the survey. In person recruiting was not permitted due to COVID-19 restrictions.

Sample size

The anticipated number of participants was 196 from the GSN and 659 from the SOM. To obtain a sample size that closely captured a population of 850 students within a 10% margin of error at a 95% confidence, 86 participants needed to be recruited (Survey System, 2012).

Setting

This research took place at USU. Participants were required to have access to the internet and the link from the original email in order to access the questionnaires.

Questionnaires were completed in the location and time of the participants' choice to maintain privacy and anonymity to minimize response bias.

Instrument

Gyasi, Abass, Adu-Gyamfi, Accam, and Nyamadi (2018) validated a questionnaire to measure complementary and traditional medicine (CTM) knowledge, attitudes, and professional use among nurses in Africa. The questionnaire was divided into two parts and comprised of closed-ended questions. Part 1 obtained demographic data. Part 2 investigated knowledge, attitudes, and use of CTM therapies.

Operationalizing CAM therapies is challenging as a set of CAM therapies has been established by the research community (Wieland, Manheimer, & Berman, 2011). The list of CTM therapies identified in the questionnaire was based on the most commonly used therapies within the African national healthcare system. These therapies are also identified as popular CAM therapies by the NCCIH (National Center for Complementary and Integrative Health, 2018). Both face and content validity were established through a comprehensive review of the literature and international expert consultation. Reliability was measured using Cronbach's alpha for knowledge about CTM therapies (0.865), personal use of CTM therapies (0.872), and professional practice of CTM therapies (0.853). The questionnaire has not been used in other studies.

Written permission to use and make modifications was obtained from the primary author, Gyasi et al. (2018). Modifications were made to tailor the questions appropriately to providers in the military, available therapies in the MTF, and ease of reading:

- The word nurse was changed to healthcare provider.
- Battlefield acupuncture was added to the list of CAM therapies.

- Unsure was changed to neutral/I don't know to reflect a more common median between strongly agree and strongly disagree, which is neither positive nor negative.
- Two questions were added to explore communication channels about CAM therapies among providers.
- Two questions were added to investigate provider's communication with patients about CAM therapies.
- One question was added to determine the degree providers attribute CAM outcomes with placebo effects.
- One question was added to determine the providers overall perception of their attitude towards CAM therapies.

Measures

Demographics

A demographic questionnaire was administered after participant with consent serving as submission of the survey (see Appendix A). Demographic information was obtained to describe the study population and identify potential covariates which may influence the findings. General information about age, sex, rank, years of service, years working in specialty, and deployment history were collected. Providers were classified as recent graduate or student provider. Students who had graduated within the last month were given the option to self-classify as a current APRN or physician provider with year of graduation.

Knowledge

Self-rated perceived knowledge was measured using a 4-point Likert scale from none to a lot. Knowledge responses were coded as 0 for none, 1 for very little, 2 for some, and 3 for a lot. Scores for 17 individual therapies were summed for a cumulative score. Cumulative scores may range from 0 to 51. Higher cumulative scores indicate higher perceived knowledge.

Attitudes

Attitudes were be measured by degree of self-reported agreement with 24 provided statements on CAM therapies based on a 5-point Likert scale ranging from strongly agree to strongly disagree. Attitudes were not seen as right or wrong answers. Attitudes were viewed as the participant's degree of agreement with the statements provided. Responses were coded as 1 for strongly disagree, 2 for disagree, 3 for neutral/I don't know, 4 for agree and 5 for strongly agree. Question numbers (15, 17, 18, 23) were reverse coded for the cumulative score. Scores for each statement were summarized for an overall attitude score. Cumulative scores may range from 24 to 120. The higher the cumulative score the more positive the attitudes towards CAM therapies.

CAM use

Use of CAM therapies were measured by self-reported personal use and professional use. Professional use of CAM was defined as providing a service directly or through referrals of therapies in clinical practice or clinical rotations. Clinical rotations were classified as professional use for current students. Students at USU have the ability to order therapies under the supervision of their preceptor during clinical rotations. These professional practices are expected to be reflective of their practice patterns for the time

in which the survey was completed. Students were given the option to select not applicable for professional use of CAM therapies as some students may not have begun their clinical rotations.

Each CAM therapy was presented individually within a list for three questions: a) which of the following therapies do you currently use or recommend for your patients in clinical practice for the management of musculoskeletal or back pain, b) which of the following therapies do you currently use for your personal use for the management of pain, c) which of the following therapies do you currently refer your patients for care with another provider. Participants indicated all therapies which they currently use. A cumulative tally of each therapy used was calculated for correlational analyses.

Reliability

On average, the survey took 7 minutes to complete. Cronbach's α was used to measure internal consistency. Reliability was determined to be good for knowledge (Cronbach's $\alpha = 0.894$), attitudes (Cronbach's $\alpha = 0.915$), and professional use (Cronbach's $\alpha = 0.812$). The reliability score was lower for personal use Cronbach's $\alpha = 0.692$.

Data Collection

All questionnaires, described as measures within this paper, were delivered via an email link to Survey Monkey Premier version with a follow-up invitation sent two weeks after the initial email invitation to invitees which had not completed the survey. Survey Monkey (Premier) allowed unlimited surveys to be sent without SurveyMonkey branding and data to be exported to Excel. Participants were required to complete the entire questionnaire in one sitting. Data was collected for two weeks following the two-week

invitation reminder for a total of four weeks for each group of students. All study materials were stored electronically in Survey Monkey on a password-protected computer. Questionnaire responses were anonymous. Surveys were identified by a participant number. Participant names and email addresses were not collected.

Data Analysis

Electronic data from questionnaires were analyzed using IBM SPSS version 25. Missing data were coded as missing and not included in cumulative scores for knowledge and attitudes. Surveys with missing data were included in individual question analyses. Data were cleaned to identify outliers such as repetitive answers across an individual survey and erroneous answers such as age 100. Descriptive statistics were completed for each question, including demographics, to determine frequencies, means, and standard deviations. Relationships were analyzed between knowledge, attitudes, provider type, and use using Spearman Correlations and a Linear Regression Model. Data were analyzed for normality prior to correlational analysis. Details for the analysis specific to each research question are found below.

Research Question 1: What are the general attitudes towards CAM therapies of providers and student providers who may care for service members with acute or chronic low back pain?

This question was answered using descriptive statistics to include frequencies, and medians with Interquartile Range for individual questions on the questionnaire. Scores for all questions were summed to create one composite score, indicating overall positive or negative attitudes. The higher the composite score, the more positive the attitudes towards CAM therapies are. Subgroup analyses with the Kruskal-Wallis, for

non-normally distributed data, were performed to explore differences in total scores between all provider types (recent graduate APRN, recent graduate physician, GSN student, SOM student) and specialty (recent graduate providers only).

Research Question 2: How do surveyed providers and student providers rate their knowledge of CAM therapies?

This question was answered using descriptive statistics to include frequencies and medians with interquartile range (IQR) for individual questions on the questionnaire. Composite scores for all questions were summed to create an overall knowledge score.

Research Question 3: What CAM therapies are being used in clinical practice for patients with LBP by provider type?

This question was answered using descriptive statistics, tabulated by provider type.

Research Question 4: Is there a relationship between knowledge, attitude, personal use, and professional use of CAM therapies in clinical practice?

The relationship between attitude, knowledge, and use of CAM therapies was explored using the Spearman Rank correlation for non-normally distributed data. The variable representing the use of CAM therapies was a tally of all marked therapies in Part 2 of the questionnaire. An a priori sample size calculation indicated that with 82 participants, the study will have 80% power to detect a medium effect size of at least $\rho=0.3$ between each pair of variables.

A linear regression was performed to examine the relationship between knowledge, attitudes, personal use, and professional use while controlling for each of the variables and provider type.

Research Question 5: What sociodemographic variables are associated with use of CAM therapies in practice?

CAM use data were not normally distributed which required the use of non-parametric tests. The relationship between provider type and rank with use of CAM was analyzed with the Kruskal-Wallis test. Sociodemographic variables that had two categories (gender) were analyzed with the Mann-Whitney U test. The correlation between continuous sociodemographic variables and CAM use to include age and years of practice were analyzed with Spearman correlation.

Ethics and Human Subjects

The research protocol was submitted to the Human Research Protections Program (HRPP) office at Uniformed Services University of the Health Sciences (USU) to ensure the protection of human subjects. Command approval from a hospital leadership was obtained. Then, DoD approval survey research approval for survey research on Navy service members was obtained in consultation with the HRPP office at USU. A determination statement from the HRPP office stated the research was exempt from IRB review and a DoD survey number was provided from the Navy approval center for survey research.

A modification to the original proposal was completed with the HRPP office to expand recruiting to students. A determination statement from the HRPP office stated the research was exempt from IRB review and permission was obtained from the Dean, GSN; Associate Dean of Student Affairs, GSN; Commandant, GSN; Dean, SOM; Associate Dean of Student Affairs, SOM; and Commandant, SOM at USU.

The research team did not influence a participant's decision to participate based on rank, military duties, or patient status. Participants were not recruited from waiting rooms, cafeterias, hospital phone records, or hallways. Participants were informed that participation is voluntary. Submission of the survey served as consent. This study did not have any foreseen risks to the participants. Participants may not have had any direct benefits from participation. However, participants may have discovered that they felt encouraged to seek more information about CAM therapies following participation. This study was intended to be descriptive and not necessarily reflective of the type of care that participants may receive in the clinic or the type of care that will be available in the future. No personally identifiable information was obtained from the participants.

To protect the participant's right to privacy, only the PI had access to data obtained from the questionnaires. Surveys were completed anonymously and stored on a password protected computer in a secured room. In the unlikely event that there is a data breach, participants will be notified.

CHAPTER 4: Results

DATA PREPARATION

One hundred ninety-six students from the Graduate School of Nursing and 672 students from the School of Medicine (SOM) at USU were invited to participate in the study. Forty-three students from the GSN and 85 students from the SOM completed the online survey, resulting in a response rate of 21.9%, and 12.6% respectively. Six surveys were removed for not completing two or more complete sections for a final sample of 122 and a combined response rate of 14.1%.

Data were exported to Excel where it was analyzed for missing data and outliers from SurveyMonkey (premier). Missing values for individual questions was coded as missing data. There was no more than 15% of data missing for any one variable after questionnaires were removed for multiple missing sections. No outliers were removed. Students were classified as current provider if they selected type of current provider and graduation year 2020. Students were classified as student provider by selecting student status as provider type.

FINDINGS

Demographics

Seven APRNs, 36 students from the GSN, 20 physicians, and 59 medical students from the SOM completed the survey. The sample was primarily male among SOM students (59.3%) and physicians (70%) and primarily female among GSN students (58.3%) and APRNs (71.4%). The average age in years for respondents was 37.71 (SD = 5.648) for APRNs, 35.5 (SD = 4.355) for GSN students, 29.6 (SD = 5.725) for

physicians, and 28.53 (SD = 6.599) for SOM students. Most participants were White: SOM students (72.9%), physicians (80%), GSN students (52.8%), and APRNs (71.4%). All participants were active duty with an average of 12.57 years (SD= 4.35) for APRNs, 11.65 years (SD = 4.592) for GSN students, 5.33 years (SD = 5.369) for physicians, and 4.57 years (SD = 4.280) for SOM students. Most APRNs and GSN students were in the military grade of O4 (71.4% and 50% respectively). All physicians were in the military grade of O3 (100%) and most SOM students were in the military grade of O1 (98.3%). Most APRNs were in family practice (71.4%). Most physicians were in Internal Medicine (35%), followed by Family Practice (20%). Table 1 displays a complete table of demographic responses.

Table 1 Provider Demographics

Sample Characteristic	Current Providers		Student Providers	
	APRN N=7	Physician N=20	GSN Students N=36	SOM Student N=59
Age (years, mean/SD)	37.71 (5.648)	29.6 (5.725)	35.5 (4.355)	28.53 (6.599)
Sex				
Male	2 (28.6)	14 (70.0)	15 (41.7)	35 (59.3)
Female	5 (71.4)	6 (30.0)	21 (58.3)	24 (40.7)
Race				
White	5 (71.4)	16 (80)	19 (52.8)	43 (72.9)
Black/African American	1 (14.3)	0 (0)	6 (16.7)	1 (1.7)
Hispanic	0 (0)	0 (0)	5 (13.9)	2 (3.4)
Asian/Asian American	0 (0)	2 (10)	3 (8.3)	6 (10.2)
American Indian/Alaskan Native	0 (0)	0 (0)	0 (0)	1 (1.7)
Native Hawaiian/Pacific Islander	1 (14.3)	0 (0)	2 (5.6)	2 (3.4)
Not disclosed/Missing	0 (0)	2 (10)	0 (0)	4 (6.8)
Specialty				
Family Practice	5 (71.4)	4 (20)	n/a	n/a
Internal Medicine	0 (0)	7 (35)		
Pain and Anesthesia	2 (28.6)	2 (10)		
Other	0 (0)	5 (30)		
Rank				
O1	0 (0)	0 (0)	0 (0)	57 (98.3)
O2	0 (0)	0 (0)	1 (2.8)	0 (0)

O3	2 (28.6)	20 (100)	17 (47.2)	1 (1.7)
O4	5 (71.4)	0 (0)	18 (50)	0 (0)
O5	0 (0)	0 (0)	0 (0)	0 (0)
O6	0 (0)	0 (0)	0 (0)	0 (0)
Year in School				
1 st	n/a	n/a	9 (25)	10 (16.9)
2 nd	n/a	n/a	18 (50)	10 (16.9)
3 rd	n/a	n/a	8 (22.2)	16 (27.1)
4 th	n/a	n/a	n/a	22 (37.3)
2020 graduate	7	20 (100)	0 (0)	1 (1.7)
Years in Military (mean, SD)	12.57 (4.35)	5.33 (5.369)	11.65 (4.592)	4.57 (4.280)
Years in School (mean, SD)	n/a	n/a	1.97 (0.707)	2.91 (1.140)

Data presented as n (%)

Abbreviations: APRN, Advanced Practice Registered Nurse; CRNA, Certified Registered Nurse Anesthetist; GSN, Graduate School of Nursing; n, number; n/a, not applicable; SOM, School of Medicine; SD, standard deviation

Research Question 1

What are the general attitudes towards CAM therapies of providers and student providers who may care for service members with acute or chronic low back pain?

APRN Attitudes

APRNs had a cumulative attitude score of 99.5 (IQR 13.5) out of 120 (see Table 2). APRNs had the high agreement scores (agree or strongly agree) for most of the statements provided (see Table 2). All of the APRNs surveyed responded with agree or strongly agree to the statement “CAM promotes a holistic approach to health” (median = 4.5, IQR = 1). The group had an overall median of 4.5 (IQR = 1) to the statement “Acupuncture (to include auricular and battlefield acupuncture) is an effective therapy”. APRNs were in strong agreement with a median score of 5 to the statements “evidence of effectiveness is important to my choice of CAM” and “CAM therapies could be used as a complement to the treatments used in conventional healthcare.” All of the APRNs

surveyed responded with agree or strongly agree to the statement “I think CAM can be integrated into our current clinical practice” (median = 4.5, IQR = 1).

APRNs had lower scores of agreement (neutral, disagree, or strongly disagree) for the statement “I think people should not use CAM when taking western medicines” (median = 1, IQR = 1) and “CAM therapies are offered just for financial gain by quack health caregivers” (median = 1, IQR = 0.25). The overall median score for the statement CAM outcomes are largely due to placebo effects was 3 (IQR = 1.25).

Table 2 APRN Attitudes Towards CAM Statements

Statement	Strongly Agree	Agree	Neutral/I don't know	Disagree	Strongly Disagree	Median (IQR)
CAM is an important aspect of my own family's health care	6 (85.7)	2 (28.6)	0 (0)	1 (14.3)	0 (0)	4.5 (2)
CAM boosts my immune system/resistance	3 (42.9)	3 (42.9)	0 (0)	0 (0)	0 (0)	4.5 (1)
CAM promotes a holistic approach to health	3 (42.9)	3 (42.9)	0 (0)	0 (0)	0 (0)	4.5 (1)
CAM gives me more control over my health/body	2 (28.6)	2 (28.6)	2 (28.6)	0 (0)	0 (0)	4 (2)
Acupuncture (to include auricular and battlefield acupuncture) is an effective therapy	3 (42.9)	3 (42.9)	0 (0)	0 (0)	0 (0)	4.5 (1)
Evidence of effectiveness is important to my choice of CAM	5 (71.4)	1 (14.3)	0 (0)	0 (0)	0 (0)	5 (0)
My personal experience of the effectiveness of CAM is more important than clinical evidence	0 (0)	2 (28.6)	2 (28.6)	1 (14.3)	1 (14.3)	3 (2)
Patients should have the right to choose between conventional medicines and CAM therapies	4 (57.1)	2 (28.6)	0 (0)	0 (0)	0 (0)	5 (1)
Patients are not adequately informed about CAM therapies in the hospital/clinic	3 (42.9)	3 (42.9)	0 (0)	0 (0)	0 (0)	4.5 (1)
Surgical patients can be helped by CAM therapies	2 (28.6)	3 (42.9)	1 (14.3)	0 (0)	0 (0)	4 (1)
CAM needs to be tested for safety/side-effects	3 (42.9)	2 (28.6)	1 (14.3)	0 (0)	0 (0)	4.5 (1)
Some forms of CAM therapies are as effective as conventional medicines	1 (14.3)	3 (42.9)	2 (28.6)	0 (0)	0 (0)	4 (1)
CAM has fewer side-effects than conventional medicines	1 (14.3)	2 (28.6)	3 (42.9)	0 (0)	0 (0)	3.5 (1)
CAM therapies are completely safe	1 (14.3)	0 (0)	4 (57.1)	1 (14.3)	0 (0)	3 (1)
CAM therapies could be used as a complement to the treatments used in conventional health care	4 (57.1)	2 (28.6)	0 (0)	0 (0)	0 (0)	5 (1)
I think people should not use CAM when taking western medicines ^a	0 (0)	0 (0)	0 (0)	2 (28.6)	4 (57.1)	1 (1)
CAM is a better preventive measure than conventional medicine	2 (28.6)	1 (14.3)	3 (42.9)	0 (0)	0 (0)	3.5 (2)

The use of CAM therapies may delay the patient's decision to contact conventional health professionals ^a	0 (0)	2 (28.6)	1 (14.3)	3 (42.9)	0 (0)	2.5 (2)
CAM therapies are offered just for financial gain by quack health caregivers ^a	0 (0)	0 (0)	0 (0)	1 (14.3)	5 (71.4)	1 (0.25)
I think all health care professionals should accept that patients are using CAM	2 (28.6)	2 (28.6)	2 (28.6)	0 (0)	0 (0)	4 (2)
Healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM	3 (42.9)	2 (28.6)	1 (14.3)	0 (0)	0 (0)	4.5 (1)
I think that CAM can be integrated into our current clinical practice	3 (42.9)	3 (42.9)	0 (0)	0 (0)	0 (0)	4.5 (1)
CAM outcomes are largely due to placebo effects ^a	0 (0)	0 (0)	0 (0)	6 (85.7)	0 (0)	2 (0)
Overall, how would you describe your attitude toward CAM therapies?	3 (42.9)	3 (42.9)	0 (0)	0 (0)	0 (0)	4.5 (1)
Cumulative Attitude Score	99.5 (13.5)					

n=6

Data presented as n (%) for available data

^a Data reverse coded in calculation of cumulative score

Abbreviations: IQR, interquartile range; APRN, Advanced Practice Registered Nurse; CAM, Complementary and Alternative Medicine; n, number.

Physician Attitudes

Physicians had a cumulative overall attitude score of 83 (IQR= 15) out of 120 (see Table 3). Physicians had high agreement scores (agree or strongly agree) for more than half of the statements provided (see Table 3). Seventy percent of physicians surveyed responded with agree or strongly agree to the statement “CAM promotes a holistic approach to health” (median = 4, IQR = 1). As a group, physicians had a median score of 4 (IQR = 1) to the statement “CAM therapies could be used as a complement to the treatments used in conventional health care.” The majority agreed (n=11, 55%) or strongly agreed (n = 3, 15%) that “CAM can be integrated into our current clinical practice” (median = 4, IQR = 1). In addition, the majority agreed (n = 9, 45%) or strongly agreed (n= 6, 30%) that “healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM” (median 4, IQR 1). Physicians

had a median score of 5 (IQR = 1) for the statement “CAM needs to be tested for safety/side effects.”

Physicians had the lower scores of agreement (neutral, disagree, or strongly disagree) for the statement “I think people should not use CAM when taking western medicines” (median = 2, IQR = 0.75) and “CAM therapies are offered just for financial gain by quack health caregivers” (median 3, IQR 1). The overall median score for the statement “CAM outcomes are largely due to placebo effects” was 3 (IQR = 1).

Table 3 Physician Attitudes Towards CAM Statements

Statement	Strongly Agree	Agree	Neutral/I don't know	Disagree	Strongly Disagree	Median (IQR)
CAM is an important aspect of my own family's health care	0 (0)	8 (40)	6 (30)	2 (10)	3 (15)	3 (2)
CAM boosts my immune system/resistance	0 (0)	5 (25)	8 (40)	3 (15)	3 (15)	3 (2)
CAM promotes a holistic approach to health	2 (10)	12 (60)	2 (10)	1 (5)	2 (10)	4 (1)
CAM gives me more control over my health/body	1 (5)	9 (45)	6 (30)	0 (0)	3 (15)	4 (1)
Acupuncture (to include auricular and battlefield acupuncture) is an effective therapy	2 (10)	11 (55)	3 (15)	3 (15)	0 (0)	4 (1)
Evidence of effectiveness is important to my choice of CAM	9 (45)	7 (35)	2 (10)	1 (5)	0 (0)	4 (1)
My personal experience of the effectiveness of CAM is more important than clinical evidence	0 (0)	1 (5)	5 (25)	8 (40)	5 (25)	2 (2)
Patients should have the right to choose between conventional medicines and CAM therapies	6 (30)	5 (25)	4 (20)	4 (20)	0 (0)	4 (2)
Patients are not adequately informed about CAM therapies in the hospital/clinic	1 (5)	13 (65)	2 (10)	3 (15)	0 (0)	4 (1)
Surgical patients can be helped by CAM therapies	1 (5)	11 (55)	5 (25)	0 (0)	2 (10)	4 (1)
CAM needs to be tested for safety/side-effects	10 (50)	8 (40)	1 (5)	0 (0)	0 (0)	5 (1)
Some forms of CAM therapies are as effective as conventional medicines	2 (10)	10 (50)	5 (25)	0 (0)	2 (10)	4 (1)
CAM has fewer side-effects than conventional medicines	0 (0)	5 (25)	10 (50)	3 (15)	1 (5)	3 (1)
CAM therapies are completely safe	0 (0)	0 (0)	5 (25)	10 (50)	4 (20)	2 (1)
CAM therapies could be used as a complement to the treatments used in conventional health care	6 (30)	10 (50)	2 (10)	0 (0)	1 (5)	4 (1)
I think people should not use CAM when taking western medicines ^a	0 (0)	1 (5)	4 (20)	10 (50)	4 (20)	2 (1)
CAM is a better preventive measure than conventional medicine	1 (5)	2 (10)	8 (40)	4 (20)	4 (20)	3 (1)
The use of CAM therapies may delay the patient's decision to contact conventional health professionals ^a	4 (20)	12 (60)	1 (5)	2 (10)	0 (0)	4 (0)

CAM therapies are offered just for financial gain by quack health caregivers ^a	1 (5)	3 (15)	6 (30)	8 (40)	1 (5)	3 (1)
I think all health care professionals should accept that patients are using CAM	1 (5)	10 (50)	6 (30)	2 (10)	0 (0)	4 (1)
Healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM	6 (30)	9 (45)	4 (20)	0 (0)	0 (0)	4 (1)
I think that CAM can be integrated into our current clinical practice	3 (15)	11 (55)	3 (15)	1 (5)	1 (5)	4 (1)
CAM outcomes are largely due to placebo effects ^a	3 (15)	3 (15)	11 (55)	2 (10)	0 (0)	3 (1)
Overall, how would you describe your attitude toward CAM therapies?	1 (5)	8 (40)	7 (35)	2 (10)	1 (5)	3 (1)
Cumulative Attitude Score	83 (15)					

n=20

Data presented as n (%) for available data

^a Data reverse coded in calculation of cumulative score

Abbreviations: IQR, interquartile range CAM, Complementary and Alternative Medicine; n, number.

GSN Student Attitudes

GSN students had a cumulative positive attitude score of 92 (IQR = 14) out of 120 (see Table 4). GSN students had the high agreement scores (agree or strongly agree) for most of the statements provided (see Table 4). More than 90% of GSN students surveyed responded with agree or strongly agree to the statement “CAM promotes a holistic approach to health” (median = 4, IQR = 1). Other statements with an overall median of 4 include statements pertaining to the need for evidence to support therapies and the need for CAM to be tested for safety/side effects. More than 90% of GSN students scored the statement “patients should have the right to choose between conventional medicines and CAM therapies” as agree or strongly agree (median = 4, IQR = 0). And most GSN students agreed or strongly agreed with the statement that “CAM can be incorporated into clinical practice” with an overall median score of 4 (IQR = 1) and “healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM” (median = 4, IQR = 1).

GSN Students had lower scores of agreement (neutral, disagree, or strongly disagree) for the statement “I think people should not use CAM when taking western medicines” (median = 2, IQR = 2) and “CAM therapies are offered just for financial gain by quack health caregivers” (median = 2, IQR = 2). The overall median score for the statement “CAM outcomes are largely due to placebo effects was 3” (IQR = 1.25).

Table 4 GSN Student Attitudes Towards CAM Statements

Statement	Strongly Agree	Agree	Neutral/I don't know	Disagree	Strongly Disagree	Median (IQR)
CAM is an important aspect of my own family's health care	6 (16.7)	11 (30.6)	10 (27.8)	5 (13.9)	3 (8.3)	3 (1)
CAM boosts my immune system/resistance	1 (2.8)	15 (41.7)	16 (44.4)	2 (5.6)	1 (2.8)	3 (1)
CAM promotes a holistic approach to health	9 (25)	22 (61.1)	3 (8.3)	0 (0)	0 (0)	4 (1)
CAM gives me more control over my health/body	7 (19.4)	16 (44.4)	10 (27.8)	1 (2.8)	1 (2.8)	4 (1)
Acupuncture (to include auricular and battlefield acupuncture) is an effective therapy	7 (19.4)	15 (41.7)	10 (27.8)	3 (8.3)	0 (0)	4 (1)
Evidence of effectiveness is important to my choice of CAM	16 (44.4)	18 (50)	1 (2.8)	0 (0)	0 (0)	4 (1)
My personal experience of the effectiveness of CAM is more important than clinical evidence	3 (8.3)	9 (25)	6 (16.7)	15 (41.7)	0 (0)	3 (2)
Patients should have the right to choose between conventional medicines and CAM therapies	16 (44.4)	16 (44.4)	2 (5.6)	1 (2.8)	0 (0)	4 (1)
Patients are not adequately informed about CAM therapies in the hospital/clinic	6 (16.7)	21 (58.3)	6 (16.7)	2 (5.6)	0 (0)	4 (0)
Surgical patients can be helped by CAM therapies	10 (27.8)	16 (44.4)	8 (22.2)	1 (2.8)	0 (0)	4 (1)
CAM needs to be tested for safety/side-effects	16 (44.4)	16 (44.4)	3 (8.3)	0 (0)	0 (0)	4 (1)
Some forms of CAM therapies are as effective as conventional medicines	6 (16.7)	19 (52.8)	8 (22.2)	1 (2.8)	1 (2.8)	4 (1)
CAM has fewer side-effects than conventional medicines	4 (11.1)	17 (47.2)	9 (25)	3 (8.3)	2 (5.6)	4 (1)
CAM therapies are completely safe	0 (0)	9 (25)	14 (38.9)	7 (19.4)	5 (13.9)	3 (2)
CAM therapies could be used as a complement to the treatments used in conventional health care	16 (44.4)	16 (44.4)	3 (8.3)	0 (0)	0 (0)	4 (1)
I think people should not use CAM when taking western medicines ^a	0 (0)	4 (11.1)	4 (11.1)	14 (38.9)	13 (36.1)	2 (1)
CAM is a better preventive measure than conventional medicine	2 (5.6)	7 (19.4)	16 (44.4)	4 (11.1)	4 (11.1)	3 (2)
The use of CAM therapies may delay the patient's decision to contact conventional health professionals ^a	3 (8.3)	10 (27.8)	11 (30.6)	9 (25)	1 (2.8)	3 (2)
CAM therapies are offered just for financial gain by quack health caregivers ^a	0 (0)	5 (13.9)	8 (22.2)	12 (33.3)	9 (25)	2 (2)
I think all health care professionals should accept that patients are using CAM	4 (11.1)	17 (47.2)	9 (25)	1 (2.8)	2 (5.6)	4 (1)

Healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM	15 (41.7)	17 (47.2)	2 (5.6)	0 (0)	0 (0)	4 (1)
I think that CAM can be integrated into our current clinical practice	12 (33.3)	16 (44.4)	6 (16.7)	0 (0)	0 (0)	4 (1)
CAM outcomes are largely due to placebo effects ^a	2 (5.6)	6 (16.7)	11 (30.6)	12 (33.3)	3 (8.3)	3 (1.25)
Overall, how would you describe your attitude toward CAM therapies?	11 (30.6)	14 (38.9)	6 (16.7)	3 (8.3)	0 (0)	4 (2)
Cumulative Attitude Score						92 (14)

n=36

Data presented as n (%) for available data

^a Data reverse coded in calculation of cumulative score

Abbreviations: IQR, interquartile range; GSN, Graduate School of Nursing; CAM, Complementary and Alternative Medicine; n, number.

SOM Student Attitudes

SOM students had a cumulative overall positive attitude score of 84 (IQR = 6.75) out of 120 (see Table 5). SOM students had high agreement scores (agree or strongly agree) for half of the statements provided (see Table 5). Nearly 75% of SOM students surveyed responded with agree or strongly agree to the statement “CAM promotes a holistic approach to health” (median = 4, IQR = 0). SOM students had a median score of 5 (IQR = 1) for the statement “CAM needs to be tested for safety/side effects.” The majority of students agreed (57.6%) or strongly agreed (10.2%) that “CAM can be integrated into our current clinical practice” (median = 4, IQR = 0). The majority also agreed (n = 31, 52.5%) or strongly agreed (n= 13, 22%) that “healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM” (median 4, IQR 1).

SOM students had the lower scores of agreement (neutral, disagree, or strongly disagree) for the statement “I think people should not use CAM when taking western medicines” (median = 2, IQR = 0.025) and “CAM therapies are offered just for financial gain by quack health caregivers” (median 2, IQR 1). SOM had an overall neutral median

score of 3 (IQR = 2) for the statement “some forms of CAM therapies are as effective as conventional medicine.” The overall median score for the statement “CAM outcomes are largely due to placebo effects was 3” (IQR = 1.25).

Table 5 SOM Student Attitudes Towards CAM Statements

Statement	Strongly Agree	Agree	Neutral/I don't know	Disagree	Strongly Disagree	Median (IQR)
CAM is an important aspect of my own family's health care	3 (5.1)	14 (23.7)	14 (23.7)	12 (20.3)	8 (13.6)	3 (2)
CAM boosts my immune system/resistance	2 (3.4)	11 (18.6)	26 (44.1)	6 (10.2)	6 (10.2)	3 (1)
CAM promotes a holistic approach to health	8 (13.6)	35 (59.3)	6 (10.2)	0 (0)	2 (3.4)	4 (0)
CAM gives me more control over my health/body	5 (8.5)	27 (45.8)	16 (27.1)	0 (0)	3 (5.1)	4 (1)
Acupuncture (to include auricular and battlefield acupuncture) is an effective therapy	6 (10.2)	25 (42.4)	20 (33.9)	0 (0)	1 (1.7)	4 (1)
Evidence of effectiveness is important to my choice of CAM	25 (42.4)	16 (27.1)	8 (13.6)	0 (0)	2 (3.4)	4 (1)
My personal experience of the effectiveness of CAM is more important than clinical evidence	1 (1.7)	10 (16.9)	14 (23.7)	13 (22)	13 (22)	2 (2)
Patients should have the right to choose between conventional medicines and CAM therapies	9 (15.3)	29 (49.2)	11 (18.6)	2 (3.4)	0 (0)	4 (1)
Patients are not adequately informed about CAM therapies in the hospital/clinic	5 (8.5)	27 (45.8)	16 (27.1)	2 (3.4)	0 (0)	4 (1)
Surgical patients can be helped by CAM therapies	4 (6.8)	21 (35.6)	19 (32.2)	6 (10.2)	0 (0)	3.5 (1)
CAM needs to be tested for safety/side-effects	26 (44.1)	21 (35.6)	3 (5.1)	0 (0)	0 (0)	5 (1)
Some forms of CAM therapies are as effective as conventional medicines	4 (6.8)	16 (27.1)	23 (39)	6 (10.2)	1 (1.7)	3 (1)
CAM has fewer side-effects than conventional medicines	5 (8.5)	10 (16.9)	26 (44.1)	8 (13.6)	1 (1.7)	3 (1)
CAM therapies are completely safe	0 (0)	1 (1.7)	16 (27.1)	21 (35.6)	12 (20.3)	2 (1)
CAM therapies could be used as a complement to the treatments used in conventional health care	17 (28.8)	28 (47.5)	4 (6.8)	1 (1.7)	0 (0)	4 (1)
I think people should not use CAM when taking western medicines ^a	0 (0)	2 (3.4)	7 (11.9)	29 (49.2)	12 (20.3)	2 (0.25)
CAM is a better preventive measure than conventional medicine	0 (0)	6 (10.2)	21 (35.6)	15 (25.4)	6 (10.2)	3 (1)
The use of CAM therapies may delay the patient's decision to contact conventional health professionals ^a	7 (11.9)	17 (28.8)	20 (33.9)	4 (6.8)	0 (0)	3.5 (1)
CAM therapies are offered just for financial gain by quack health caregivers ^a	2 (3.4)	2 (3.4)	12 (20.3)	28 (47.5)	4 (6.8)	2 (1)
I think all health care professionals should accept that patients are using CAM	5 (8.5)	22 (37.3)	20 (33.9)	1 (1.7)	0 (0)	4 (1)
Healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM	13 (22)	31 (52.5)	4 (6.8)	0 (0)	0 (0)	4 (1)
I think that CAM can be integrated into our current clinical practice	6 (10.2)	34 (57.6)	7 (11.9)	1 (1.7)	0 (0)	4 (0)

CAM outcomes are largely due to placebo effects ^a	3 (5.1)	9 (15.3)	26 (44.1)	9 (15.3)	1 (1.7)	3 (0.75)
Overall, how would you describe your attitude toward CAM therapies?	2 (3.4)	25 (42.4)	18 (30.5)	1 (1.7)	2 (3.4)	4 (1)
Cumulative Attitude Score						84 (6.75)

n=50

Data presented as n (%) for available data

^a Data reverse coded in calculation of cumulative score

Abbreviations: IQR, interquartile range; SOM, School of Medicine; CAM, Complementary and Alternative Medicine; n, number.

Differences in Attitudes Between Provider Types

There was a statistically significant difference in attitude among provider types ($\chi^2(3), 26.726, p = 0.000$) (see Table 5). APRNs had statistically higher scores when compared to physicians ($p = .002$) and SOM students ($p = 0.001$). GSN students had statistically higher scores when compared to physicians ($p = .007$) and SOM students ($p = 0.001$). There were no statistically significant differences in attitudes between APRNs and GSN students ($p = 0.527$) and physicians and SOM students ($p = 1.000$). All reported significance values have been adjusted for multiple tests using the Bonferroni correction.

Table 5 Pairwise comparisons of attitude scores following Independent-Samples Kruskal-Wallis Test by provider type

	APRNs	Physicians	GSN Students	SOM students
Cumulative Attitude Score median (IQR)	99.5 (13.5)*	83 (15)	92 (14)**	84 (6.75)

* Significant versus physicians ($p = 0.002$) and SOM students ($p = 0.001$)

** Significant versus physicians ($p = 0.007$) and SOM students ($p = 0.001$)

Abbreviations: IQR, interquartile range; APRN, advanced practice registered nurse; GSN, Graduate School of Nursing; SOM, School of Medicine; p, probability

Differences in attitudes among current providers by specialty.

Among current providers, there was no statistically significant difference in attitude by specialty (χ^2 (3), 7.609, $p = 0.055$) (see Table 6).

Table 6 Independent-Samples Kruskal-Wallis Test for cumulative attitude scores by provider specialty

	Family Practice	Internal Medicine	Pain and Anesthesia	Other
Cumulative Attitude Score median (IQR)	93 (19)	79.5 (18)	91 (0)	85 (18.75)

No statistically significant difference in attitudes by specialty, $p = 0.055$
Abbreviations: IQR, interquartile range; p, probability

Research Question 2

How do surveyed providers and student providers rate their knowledge of CAM therapies?

APRN Knowledge.

APRNs had a median cumulative knowledge score of 33 (IQR = 25) out of a possible 51 (see Table 7). All of the APRNs surveyed self-reported some or a lot of knowledge about acupuncture (including battlefield acupuncture). Nearly two-thirds reported at least some knowledge about yoga, aromatherapy, and meditation. APRNs reported a low knowledge of biofeedback, osteopathy, chiropractic care, and massage. All APRNs ($n=7$, 100%) who were surveyed responded yes, they were interested in learning more about CAM therapies. Most APRNs learned about CAM through class ($n=7$, 100%), publications ($n=5$, 71.4%), colleagues ($n=5$, 71.4%), and conferences ($n=3$, 42.9%) (see Table 8).

Table 7 APRN Self-Reported Knowledge for Individual CAM Therapies

Therapy	None	A little	Some	A lot	Median (IQR)
Herbal/botanical therapies	0 (0)	2 (28.6)	4 (57.1)	1 (14.3)	2 (1)
Non-herbal supplements	0 (0)	3 (42.9)	4 (57.1)	0 (0)	2 (1)
Homeopathy	1 (14.3)	2 (28.6)	4 (57.1)	0 (0)	2 (1)
Aromatherapy	0 (0)	2 (28.6)	5 (71.4)	0 (0)	2 (1)
Acupuncture (including battlefield acupuncture)	0 (0)	0 (0)	4 (57.1)	3 (42.9)	2 (1)
Naturopathy	3 (42.9)	0 (0)	4 (57.1)	0 (0)	2 (2)
Relaxation techniques	0 (0)	2 (28.6)	4 (57.1)	1 (14.3)	2 (1)
Spiritual healing/prayer therapy	1 (14.3)	2 (28.6)	2 (28.6)	2 (28.6)	2 (2)
Imagery techniques	1 (14.3)	2 (28.6)	3 (42.9)	1 (14.3)	2 (1)
Music therapy	2 (28.6)	1 (14.3)	3 (42.9)	1 (14.3)	2 (2)
Yoga	1 (14.3)	1 (14.3)	5 (71.4)	0 (0)	2 (1)
Biofeedback	2 (28.6)	3 (42.9)	2 (28.6)	0 (0)	1 (2)
Meditation	1 (14.3)	1 (14.3)	3 (42.9)	2 (28.6)	2 (2)
Dance therapy	2 (28.6)	1 (14.3)	4 (57.1)	0 (0)	2 (2)
Osteopathy	2 (28.6)	3 (42.9)	1 (14.3)	1 (14.3)	1 (2)
Chiropractic care	2 (28.6)	2 (28.6)	1 (14.3)	2 (28.6)	1 (3)
Massage	2 (28.6)	2 (28.6)	1 (14.3)	2 (28.6)	1 (3)
Cumulative knowledge score (median, IQR)					33 (25)

n=7

Data presented as n (%) for available data unless otherwise noted

Abbreviations: IQR, interquartile range; n, number

Table 8 Methods Used to Learn About CAM for APRNs

Method	n (%)
Publications	5 (71.4)
Conference	3 (42.9)
Staff meetings	1 (14.3)
Colleagues	5 (71.4)
Friends	1 (14.3)
Family	1 (14.3)
Class	7 (100)
Other	6 (85.7)

n=7

Abbreviation: n, number

Physician Knowledge

Physicians had a median cumulative knowledge score of 17 (IQR, 13) out of a possible 51 (see Table 9). More than half of physicians surveyed reported at least some knowledge of acupuncture (including battlefield acupuncture, relaxation techniques, yoga, and meditation). More than half of physicians reported a little to no knowledge of herbal/botanical therapies, non-herbal supplements, homeopathy, aromatherapy, naturopathy, spiritual healing/prayer therapy, imagery techniques, music therapy, biofeedback, dance therapy, osteopathy, and chiropractic care.

Most physicians (n=14, 70%) were interested in learning more about CAM therapies. Physicians most commonly learned about CAM through colleagues (n=15, 75%), friends (n=14, 70%), publications (n=9, 45%), family (n= 8, 40%), and class (n=12, 60%) (see Table 10).

Table 9 Physician Self-Reported Knowledge for Individual CAM Therapies

Therapy	None	A little	Some	A lot	Median (IQR)
Herbal/botanical therapies	8 (40)	8 (40)	4 (20)	0 (0)	1 (1)
Non-herbal supplements	5 (25)	6 (30)	9 (45)	0 (0)	1 (2)
Homeopathy	11 (55)	5 (25)	4 (20)	0 (0)	0 (1)
Aromatherapy	9 (45)	10 (50)	1 (5)	0 (0)	1 (1)
Acupuncture (including battlefield acupuncture)	0 (0)	4 (20)	14 (70)	4 (2)	2 (0)
Naturopathy	11 (55)	8 (40)	1 (5)	0 (0)	0 (1)
Relaxation techniques	1 (5)	6 (30)	11 (55)	2 (10)	2 (1)
Spiritual healing/prayer therapy	5 (25)	7 (30)	11 (55)	2(10)	1 (2)
Imagery techniques	9 (45)	4 (20)	7 (35)	0 (0)	1 (2)
Music therapy	5 (25)	9 (45)	5 (25)	1 (5)	1 (1.25)
Yoga	2 (10)	6 (30)	8 (40)	4 (20)	2 (1)
Biofeedback	3 (15)	11 (55)	4 (20)	2 (10)	1 (1)
Meditation	0 (0)	9 (45)	8 (40)	3 (15)	2 (1)
Dance therapy	12 (60)	7 (35)	1 (5)	0 (0)	0 (1)
Osteopathy	6 (30)	10 (50)	4 (20)	0 (0)	1 (1)
Chiropractic care	4 (20)	10 (50)	5 (25)	1 (5)	1 (1)
Massage	1 (5)	11 (55)	8 (40)	0 (0)	1 (1)
Cumulative knowledge score (median, IQR)					17 (13)

n=20

Data presented as n (%) for available data unless otherwise noted

Abbreviations: IQR, interquartile range; n, number

Table 10 Methods Used to Learn About CAM for Physicians

Method	n (%)
Publications	9 (45)
Conferences	3 (15)
Staff meetings	0 (0)
Colleagues	15 (75)
Friends	14 (70)
Family	8 (40)
Class	12 (60)
Other	5 (25)

n=20

Abbreviation: n, number

GSN Student Knowledge

GSN students had a median cumulative knowledge score of 22 (IQR, 9) out of a possible 51 (see Table 11). GSN students had the highest knowledge scores for non-herbal supplements, acupuncture, relaxation techniques, yoga, and massage. They had the lowest knowledge scores for homeopathy, naturopathy, music therapy, biofeedback, dance therapy, osteopathy, and chiropractic care.

Most GSN students (n=28, 77.8%) were interested in learning more about CAM therapies. GSN students learn about CAM therapies most through class (n=30, 83.3%), publications (n=24, 66.7%), colleagues (n=17, 47.2%), and friends (n=14, 38.9%) (see Table 12).

Table 11 GSN Student Self-Reported Knowledge for Individual CAM Therapies

Therapy	None	A little	Some	A lot	Median (IQR)
Herbal/botanical therapies	2 (5.6)	18 (50)	15 (41.7)	1 (2.8)	1 (1)
Non-herbal supplements	3 (8.3)	13 (36.1)	18 (50)	2 (5.6)	2 (1)
Homeopathy	6 (16.7)	21 (58.3)	9 (25)	0 (0)	1 (1)
Aromatherapy	3 (8.3)	19 (52.8)	11 (30.6)	2 (5.6)	1 (1)
Acupuncture (including battlefield acupuncture)	1 (2.8)	2 (5.6)	28 (77.8)	5 (13.9)	2 (0)
Naturopathy	15 (41.7)	17 (47.2)	3 (8.3)	1 (2.8)	1 (1)
Relaxation techniques	0 (0)	12 (33.3)	19 (51.8)	5 (13.9)	2 (1)
Spiritual healing/prayer therapy	1 (2.8)	13 (36.1)	18 (50)	4 (11.1)	2 (1)
Imagery techniques	4 (11.1)	13 (36.1)	15 (41.7)	3 (8.3)	2 (1)
Music therapy	3 (8.3)	17 (47.2)	13 (36.1)	3 (8.3)	1 (1)
Yoga	2 (5.6)	14 (38.9)	17 (47.2)	3 (8.3)	2 (1)
Biofeedback	5 (13.9)	22 (61.1)	9 (25)	0 (0)	1 (0.75)
Meditation	1 (2.8)	16 (44.4)	17 (47.2)	2 (5.6)	1 (1)
Dance therapy	15 (41.7)	13 (36.1)	8 (22.2)	0 (0)	1 (1)
Osteopathy	9 (25)	22 (61.1)	3 (8.3)	1 (2.8)	1(1)
Chiropractic care	7 (19.4)	15 (41.7)	11 (30.6)	3 (8.3)	1 (1)
Massage	4 (11.1)	10 (27.8)	19 (52.8)	3 (8.3)	2 (1)
Cumulative knowledge score (median, IQR)					22 (9)

n=36

Data presented as n (%) for available data unless otherwise noted

Abbreviations: IQR, interquartile range; n, number

Table 12 Methods Used to Learn About CAM for GSN Students

Method	n (%)
Publications	24 (66.7)
Conferences	8 (22.2)
Staff meetings	6 (16.7)
Colleagues	17 (47.2)
Friends	14 (38.9)
Family	8 (22.2)
Class	30 (83.3)
Other	33 (91.7)

n=36

Abbreviation: n, number

SOM Student Knowledge

SOM students had a median cumulative knowledge score of 19 (IQR, 10) out of a possible 51 (see Table 13). SOM students had the highest scores of knowledge for acupuncture, relaxation techniques, yoga, and meditation. SOM students had the lowest scores of knowledge for naturopathy and dance therapy. Nearly than two-thirds of SOM students rated knowledge on herbal/botanical therapies, non-herbal supplements, homeopathy, aromatherapy, spiritual healing/prayer therapy, imagery techniques, music therapy, biofeedback, osteopathy, chiropractic care, and massage as none to a little.

Most SOM students (n=50, 86.2%) were interested in learning more about CAM therapies. SOM students learn about CAM therapies most through colleagues (n=38, 65.5%), friends (n=35, 60.3%), class (n=34, 58.6), and publications (n=23, 39.7%) (see Table 14).

Table 13 SOM Student Self-Reported Knowledge for Individual CAM Therapies

Therapy	None	A little	Some	A lot	Median (IQR)
Herbal/botanical therapies	16 (27.6)	32 (55.2)	9 (15.5)	1 (1.7)	1 (1)
Non-herbal supplements	9 (15.5)	28 (48.3)	19 (32.8)	2 (3.4)	1 (1)
Homeopathy	25 (43.1)	22 (37.9)	9 (15.5)	1 (1.7)	1 (1)
Aromatherapy	27 (46.6)	21 (36.2)	10 (17.2)	9 (15.5)	1 (1)
Acupuncture (including battlefield acupuncture)	4 (6.9)	22 (37.9)	29 (50)	3 (5.2)	2 (1)
Naturopathy	32 (55.2)	21 (36.2)	4 (6.9)	1 (1.7)	0 (1)
Relaxation techniques	5 (8.6)	19 (32.8)	26 (44.8)	7 (12.1)	2 (1)
Spiritual healing/prayer therapy	21 (36.2)	24 (41.4)	13 (22.4)	0 (0)	1 (2)
Imagery techniques	20 (34.5)	24 (41.4)	12 (20.7)	2 (3.4)	1 (1.25)
Music therapy	21 (36.2)	22 (37.9)	14 (24.1)	1 (1.7)	1 (2)
Yoga	2 (3.4)	17 (29.3)	29 (50)	10 (17.2)	2 (1)
Biofeedback	15 (25.9)	26 (44.8)	13 (22.4)	2 (3.4)	1 (2)
Meditation	2 (3.4)	25 (43.1)	23 (39.7)	8 (13.8)	2 (1)
Dance therapy	33 (56.9)	22 (37.9)	2 (3.4)	1 (1.7)	0 (1)
Osteopathy	16 (27.6)	23 (39.7)	15 (25.9)	2 (3.4)	1 (2)
Chiropractic care	12 (20.7)	31 (53.4)	9 (15.5)	5 (8.6)	1 (0.5)
Massage	7 (12.1)	31 (53.4)	16 (27.6)	4 (6.9)	1 (1)
Cumulative knowledge score (median, IQR)					19 (10)

n=59

Data presented as n (%) for available data unless otherwise noted

Abbreviations: IQR, interquartile range; n, number

Table 14 Methods used to learn about CAM for SOM Students

Method	n (%)
Publications	23 (39.7)
Conferences	5 (8.6)
Staff meetings	4 (6.9)
Colleagues	38 (65.5)
Friends	35 (60.3)
Family	23 (39.7)
Class	34 (58.6)
Other	48 (82.8)

n=59

Abbreviation: n, number

Differences in Knowledge by Provider Type

There was a statistically significant difference in knowledge between provider types ($X^2(3)$, 9.807, $p = 0.020$). However, pairwise comparisons following the Kruskal-Wallis test did not show a statistical difference by provider types (APRNs, physicians, GSN Students, and SOM students) when adjusted by the Bonferroni correction for multiple tests (see Table 15). There was a statistically significant difference in knowledge when current providers and students were grouped by school (GSN and SOM). The median GSN score was 22.5 and the median SOM score was 18. There was a statistically significant difference in knowledge by school ($p = 0.002$) (see Table 16).

Table 15 Pairwise Comparisons of Knowledge Following Independent-Samples Kruskal-Wallis Test by Provider Type

	APRNs	Physicians	GSN Students	SOM students
Cumulative Knowledge Score median (IQR)	33 (25)	17 (13)	22 (9)	19 (10)

No statistically significant difference in knowledge by provider type, $p > 0.05$ following Bonferroni correction

Abbreviations: IQR, interquartile range; APRN, advanced practice registered nurse; GSN, Graduate School of Nursing; SOM, School of Medicine; p, probability

Table 16 Independent-Samples Mann-Whitney U Test for knowledge by school

	GSN Students	SOM students
Cumulative Knowledge Score median (IQR)	22.5 (10)*	18 (10.25)

* Statistically significant versus SOM students ($p = 0.002$)

Abbreviations: IQR, interquartile range; GSN, Graduate School of Nursing; SOM, School of Medicine; p, probability

Research Question 3

What CAM therapies are being used in clinical practice for patients with LBP by provider type?

APRN Professional Use

No APRNs were excluded from this analysis nor responded that the question was not applicable for them. For the management of LBP, APRNs professionally use a median of 4 (IQR = 6) CAM therapies CAM for low back pain. Two APRNs (28.6%) responded that they never professionally use CAM therapies for the management of LBP. When APRNs who reported that they do not professionally use CAM therapies were

removed from the analysis, the median score rose to 4 (IQR = 3). APRNs professionally use acupuncture (n =5, 71.4%), massage (n=5, 71.4%), yoga (n=4, 57.1%), and chiropractic care (n=4, 57.1%) the most (see Table 17). APRNs professionally use homeopathy, aromatherapy, naturopathy, imagery techniques, music therapy, biofeedback, dance therapy, and osteopathy the least (0%). Some APRNs professionally use relaxation techniques (n = 2, 28.6%) and spiritual healing/prayer (n=2, 28.6%). Only one of seven professionally used herbal/botanical therapies, non-herbal supplements, and meditation (14.3%).

Table 17 APRN Professional Use

CAM therapy	n (%)
Herbal/botanical therapies	1 (14.3)
Non-herbal supplements	1 (14.3)
Homeopathy	0 (0)
Aromatherapy	0 (0)
Acupuncture (including battlefield acupuncture)	5 (71.4)
Naturopathy	0 (0)
Relaxation techniques	2 (28.6)
Spiritual healing/prayer therapy	2 (28.6)
Imagery techniques	0 (0)
Music therapy ¹⁰	0 (0)
Yoga	4 (57.1)
Biofeedback	0 (0)
Meditation	1 (14.3)
Dance therapy	0 (0)
Osteopathy	0 (0)
Chiropractic care	4 (57.1)
Massage	5 (71.4)
Median (IQR) cumulative professional use score	4 (6)

n=7

Abbreviations: n, number; IQR, interquartile range

More than half of the APRNs (n=4, 57.1%) surveyed responded yes to the question, “do you currently advise your patients to consult a CAM therapist” (see Table 18). Most APRNs (n = 5, 71.4%) surveyed responded always or often to the question

“how often do you currently ask about the use of herbal medicines as part of your patient exam” (see Table 18). Three APRNs (42.9%) percent responded always or often to the question “how often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam.”

Table 18 APRN Responses to Questions on Patient Exam

	Always	Often	Sometimes	Rarely	Never
How often do you currently ask about the use of herbal medicines as part of your patient exam?	1 (14.3)	4 (57.1)	2 (28.6)	0 (0)	0 (0)
How often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam?	1 (14.3)	2 (28.6)	2 (28.6)	2 (28.6)	0 (0)

n=7

Data presented as n (%) for available data

Abbreviations: CAM, Complementary and Alternative Medicine; n, number

Physician Professional Use

Seven physicians were excluded from this analysis because they responded that the question was not applicable for them. Seven physicians (53.8%) reported that they never professionally use CAM therapies for the management of LBP. As a group, physicians professionally use a median of 0 (IQR = 4) CAM therapies for LBP. When physicians who do not professionally use any CAM therapies were removed from the analysis, the median score rose to 3.5 (IQR = 2). Physicians professionally use acupuncture (n =3, 23.1%), massage (n=5, 38.5%), yoga (n=5, 38.5%), and chiropractic care (n=4, 30.8%) the most (see Table 19) for the management of LBP. No physicians surveyed professionally use herbal/botanical therapies, homeopathy, aromatherapy,

naturopathy, spiritual healing/prayer therapy, imagery techniques, music therapy, biofeedback, osteopathy, dance therapy.

Table 19 Physician Professional Use

CAM therapy	n (%)
Herbal/botanical therapies	0 (0)
Non-herbal supplements	1 (7.7)
Homeopathy	0 (0)
Aromatherapy	0 (0)
Acupuncture (including battlefield acupuncture)	3 (23.1)
Naturopathy	0 (0)
Relaxation techniques	1 (7.7)
Spiritual healing/prayer therapy	0 (0)
Imagery techniques	0 (0)
Music therapy ¹⁰	0 (0)
Yoga	5 (38.5)
Biofeedback	0 (0)
Meditation	3 (23.1)
Dance therapy	0 (0)
Osteopathy	0 (0)
Chiropractic care	4 (30.8)
Massage	5 (38.5)
Median (IQR) cumulative professional use score	0 (4)

n=13

Abbreviations: n, number; IQR, interquartile range

Half of the physicians surveyed responded not applicable to the question, “do you currently advise your patients to consult a CAM therapist.” Of those remaining 4 (20%) responded yes and 5 (25%) responded no to the previous statement. Forty-five percent of physicians surveyed responded always or often to the question “how often do you currently ask about the use of herbal medicines as part of your patient exam” (see Table 20) Thirty percent responded always or often to the question “how often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam.”

Table 20 Physician Responses to Questions on Patient Exam

	Always	Often	Sometimes	Rarely	Never
How often do you currently ask about the use of herbal medicines as part of your patient exam?	4 (20)	5 (25)	3 (15)	6 (30)	0 (0)
How often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam?	1 (5)	5 (25)	6 (30)	5 (25)	1 (5)

n=18

Data presented as n (%) for available data

Abbreviations: CAM, Complementary and Alternative Medicine; n, number;

GSN Student Professional Use

Five GSN students (13.9%) were excluded from this analysis because they responded that the question was not applicable for them. For the management of LBP, GSN students professionally use for a median of 2 (IQR = 5) CAM therapies. Eight GSN students (25.8%) responded that they never professionally use CAM therapies for the management of LBP. When GSN students who do not professionally use CAM therapies were removed from the analysis, the median score rose to 4 (IQR = 2). GSN students professionally use acupuncture (n = 13, 41.9%), massage (n = 16, 51.6%), yoga (n = 11, 35.5%), and chiropractic care (n = 13, 41.9%) the most (see Table 21) for the management of LBP. GSN students use aromatherapy, imagery techniques, music therapy, and biofeedback the least. Some GSN students use relaxation techniques (n = 10, 27.8%), and meditation (n = 5, 13.9%), and osteopathy (n = 4, 12.9%). No GSN students who were surveyed professionally use herbal therapies, naturopathy, homeopathy, or dance therapy.

Table 21 GSN Student Professional Use

CAM therapy	n (%)
Herbal/botanical therapies	0 (0)
Non-herbal supplements	1 (3.2)
Homeopathy	0 (0)
Aromatherapy	2 (6.5)
Acupuncture (including battlefield acupuncture)	13 (41.9)
Naturopathy	0 (0)
Relaxation techniques	10 (32.3)
Spiritual healing/prayer therapy	3 (9.7)
Imagery techniques	4 (12.9)
Music therapy ¹⁰	1 (3.2)
Yoga	11 (35.5)
Biofeedback	2 (6.5)
Meditation	5 (16.1)
Dance therapy	0 (0)
Osteopathy	4 (12.9)
Chiropractic care	13 (41.9)
Massage	16 (51.6)
Median (IQR) cumulative professional use score	2 (5)

n=31

Abbreviations: n, number; IQR, interquartile range

More than half of the GSN students surveyed responded not applicable to the question, “do you currently advise your patients to consult a CAM therapist.” Of those remaining 7 (58.3%) responded yes and 5 (41.7%) responded no to the statement. Most GSN students responded always or often to the question “how often do you currently ask about the use of herbal medicines as part of your patient exam” and “how often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam” (see Table 22).

Table 22 GSN Responses to Questions on Patient Exam

	Always	Often	Sometimes	Rarely	Never	N/a
How often do you currently ask about the use of herbal medicines as part of your patient exam?	15 (41.7)	9 (25)	3 (8.3)	0 (0)	2 (5.6)	5 (13.9)
How often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam?	7 (19.4)	7 (19.4)	7 (19.4)	5 (13.9)	1 (2.8)	7 (19.4)

n=34

Data presented as n (%) for available data

Abbreviations: N/a, not applicable

SOM Student Professional Use

Twenty-six SOM students were excluded from this analysis because they responded that the question was not applicable for them. For the management of LBP, SOM students professionally use a median of 3 (IQR = 4) CAM therapies for the management of LBP. Six students responded that they never professionally use CAM therapies for the management of LBP (18.2%). When SOM students who do not use CAM therapies were removed from the analysis, the median score rose to 4 (IQR = 3). SOM students professionally use yoga (n= 17, 51.5%), acupuncture (including battlefield acupuncture) (n=16, 48.5%), and massage (n=14, 42.4%) the most (see Table 23) for the management of LBP. Some SOM students professionally use non-herbal supplements (n=3, 9.1%), biofeedback (n=6, 18.2%), meditation (n=8, 24.2%), osteopathy (n=7, 21.2%), and chiropractic care (n=8, 24.2%). Herbal/botanical therapy (n=1, 3%), naturopathy (n=1, 3%), spiritual healing/prayer therapy (n=1, 3%), dance therapy (n=1,

3%) were professionally used the least (see Table 23). No SOM students surveyed professionally use homeopathy, aromatherapy, or imagery techniques.

Table 23 SOM Student Professional Use

CAM therapy	n (%)
Herbal/botanical therapies	1 (3)
Non-herbal supplements	3 (9.1)
Homeopathy	0 (0)
Aromatherapy	0 (0)
Acupuncture (including battlefield acupuncture)	16 (48.5)
Naturopathy	1 (3)
Relaxation techniques	11 (33.3)
Spiritual healing/prayer therapy	1 (1.7)
Imagery techniques	0 (0)
Music therapy ¹⁰	1 (3)
Yoga	17 (51.5)
Biofeedback	6 (18.2)
Meditation	8 (24.2)
Dance therapy	1 (3)
Osteopathy	7 (21.2)
Chiropractic care	8 (24.2)
Massage	14 (42.4)
Median (IQR) cumulative professional use score	3 (4)

n=32

Abbreviations: n, number; IQR, interquartile range

More than half of the SOM students surveyed responded not applicable to the question, “do you currently advise your patients to consult a CAM therapist.” Of those remaining 8 (50%) responded yes and 8 (50%) responded no to the statement. Many SOM students responded not applicable to the questions “how often do you currently ask about the use of herbal medicines as part of your patient exam” and “how often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam.” Less than half of SOM students responded always or often to those questions (see Table 24).

Table 24 SOM Student Responses to Questions on Patient Exam

	Always	Often	Sometimes	Rarely	Never	N/a
How often do you currently ask about the use of herbal medicines as part of your patient exam?	11 (18.6)	13 (22)	8 (13.6)	1 (1.7)	6 (10.2)	18 (30.5)
How often do you currently ask about the use of CAM therapies other than herbal medicines as part of your patient exam?	3 (5.1)	7 (11.9)	13 (22)	13 (22)	5 (8.5)	16 (27.1)

n=57

Data presented as n (%) for available data

Abbreviations: CAM, Complementary and Alternative Medicine; n, number; N/a, not applicable

Research Question 4

Is there a relationship between attitude, knowledge, personal use, on professional use of CAM therapies in clinical practice?

Linear Regression Model to Predict Professional Use of CAM Therapies

A linear regression model was performed to examine the effects of attitude, knowledge, and personal use on professional use among all provider types while controlling for type of provider. Participants were excluded from the analysis if they selected not applicable for the professional use question or did not have a cumulative score for all variables included in the analysis. The linear regression model was statistically significant ($F = 2.464$ (6), $p = 0.034$) (see Table 25). While controlling for provider type, knowledge, and attitudes, the model predicted 19.8% of the variability in professional use of CAM therapies.

Table 25 Linear Regression Model for Knowledge, Attitudes, Personal Use, and Professional Use

Dependent variable	Predictor Variable	R	T	β	p
Model 1		0.198			0.034
Professional Use	APRNs		-0.711	-0.890	0.201
	Physicians		-0.666	-0.557	0.480
	GSN students		-0.699	-1.067	0.508
	SOM students			0 ^a	0.132
	Knowledge		2.064	.123	0.043
	Attitudes		2.345	0.077	0.022
	Personal Use		-0.646	-0.18	0.520

N=6 APRN, 12 physicians, 25 GSN students, 24 SOM students

Abbreviations: a, reference group; n, number; APRN, advanced practice registered nurse; R-correlation coefficient; t, t-test statistic, β , Unstandardized coefficient, p, probability.

Spearman Rank Correlations on Professional Use of CAM Therapies

Spearman Rank correlations were performed to examine correlations between attitude, knowledge, personal use of CAM therapies, on professional use of CAM therapies (see Table 26). There was a small correlation between attitude and professional use ($\rho = 0.364$, $p = 0.002$) and knowledge and professional use ($\rho = 0.306$, $p = 0.008$). All other correlations were not statistically significant ($p > 0.5$).

Table 26 Spearman Correlations Knowledge, Attitude, and Personal Use on Professional Use

		Knowledge	Attitude	Personal Use	Professional Use
Knowledge	Correlation		.134	.054	.306
	Coefficient		.279	.643	.008**
	Sig (2-tailed)		.67	.75	.75
	N				
Attitude	Correlation	.134		-.176	.364
	Coefficient	.279		.141	.002**
	Sig (2-tailed)	.67		.71	.71
	N				
Personal Use	Correlation	.054	-.176		
	Coefficient	.643	.141		
	Sig (2-tailed)	.75	.71		
	N				
Professional Use	Correlation	.306	.364	-.054	
	Coefficient	.008**	.002**	.623	
	Sig (2-tailed)	.75	.71	.84	
	N				

* Correlation is significant at the 0.01 level (2-tailed)

Abbreviations: n=number; Sig, significance;

Research Question 5

What sociodemographic variables are associated with use of CAM therapies in practice?

Differences in Professional Use by Provider Type

There were no statistically significant differences in professional use by provider type (X^2 (3), 3.444, $p = 0.328$) (see Table 27).

Table 27 Independent samples Kruskal-Wallis Test for Professional Use of CAM therapies by Provider Type

	APRNs	Physicians	GSN Students	SOM students
Cumulative Professional Use Score median (IQR)	4 (6)	0 (4)	2 (5)	3 (4)

No statistically significant differences by provider type ($p > 0.05$) following Bonferroni correction for multiple tests
Abbreviations: IQR, interquartile range; APRN, advanced practice registered nurse; GSN, Graduate School of Nursing; SOM, School of Medicine; p, probability

Differences in Professional Use of CAM Therapies by Military Grade

There was a statistically significant difference between professional use and military grade ($p = 0.011$) (see Table 28). O3s had statistically lower scores compared to O4s ($p = .007$) (see Table 28). There were no statistically significant differences between the remaining military grades ($p > 0.05$). All reported significance values have been adjusted for multiple tests using the Bonferroni correction.

Table 28 Pairwise Comparisons of Professional Use Following Independent-Samples Kruskal-Wallis Test by military grade

	O1	O2	O3	O4
Cumulative Professional Use Score median (IQR)	3 (4)	n/a	1 (3)*	4 (5)

Statistically significant versus O4 $p = 0.007$ following Bonferroni correction for multiple tests
Abbreviations: IQR, interquartile range; O1, officer grade 1; O2, officer grade 2; O3, officer grade 3; O4, officer grade 4

Differences in Professional Use by Year in School and Age

There was a statistically significant small positive correlation between age ($p = 0.275$, $p = 0.014$) and professional use (see Table 29). There was not a statistically significant correlation between year in school and professional use ($p = 0.998$).

Table 29 Spearman Correlations Age, Year in School, and Professional Use

		Professional Use
Year in School	Correlation Coefficient	.000
	Sig (2-tailed)	.998
	N	83
Age	Correlation Coefficient	.275
	Sig (2-tailed)	.014*
	N	80

* Correlation is significant at the 0.05 level (2-tailed)

Abbreviations: n=number; ageQ3, age; Sig, significance;

Differences in Professional Use by Sex

A Mann-Whitney test was performed to analyze statistical differences in professional use by sex. There was no statistically significant difference between males and females for professional use of CAM therapies ($p = 0.264$) (see Table 30).

Table 30 Differences in professional use by sex

	Females	Males
Cumulative Professional Use median (IQR)	3 (5)	3 (4)

No statistically significant difference ($p = 0.264$)

Abbreviations: IQR, interquartile range; p, probability

Differences in Attitudes by Sex

A Mann-Whitney test was performed to analyze statistical differences in attitudes by sex. There was a statistically significant difference between male and female attitudes among all participants towards CAM therapies ($p = 0.001$) (see Table 31).

Table 31 Differences in Attitudes by Sex Among All Participants

	Females	Males
Cumulative Attitude Score median (IQR)	89 (11.5)*	83 (16)

* Statistically significant versus males ($p = 0.001$)
Abbreviations: IQR, interquartile range; GSN, Graduate School of Nursing; SOM, School of Medicine; p, probability

Summary

This study found that overall attitudes towards CAM therapies were positive among APRN, physician, GSN student, and SOM student participants. Overall knowledge scores were low with higher knowledge reported on specific CAM therapies to include acupuncture (including battlefield acupuncture), yoga, relaxation techniques, and meditation. The most commonly used therapies for participants in this study included acupuncture (including battlefield acupuncture), yoga, massage, relaxation techniques, chiropractic care, and meditation. There were statistically significant differences in attitudes by provider type and sex. There were statistically significant differences in knowledge by school (GSN versus SOM). There were no statistically significant differences in professional use of CAM therapies by provider type or gender. Year in school was not correlated to professional use of CAM. Age, knowledge, and attitudes were positively correlated to professional use of CAM. A linear regression was

performed and found that knowledge, attitudes, provider type, and personal use of CAM predicted 19.8% of the variance in professional use of CAM.

CHAPTER 5: Discussion

This quantitative, correlational, descriptive study utilized a cross-sectional survey to investigate military providers' and student providers' knowledge, attitudes, and use of CAM therapies for the management of LBP through the lens of the Diffusion of Innovation theory. Specifically, this study aimed to: (a) describe knowledge, attitudes, and use of CAM therapies by providers and student providers who care for service members with LBP, and (b) examine relationships between knowledge, attitudes, and use of CAM therapies.

A total of 7 APRNs, 20 physicians, 36 GSN students, and 59 SOM students completed the survey. Overall, findings show that: (a) knowledge was high for some CAM therapies (b) knowledge was low for other CAM therapies, (c) overall attitudes towards CAM therapies were positive, (d) most providers and student providers surveyed used at least one CAM therapy for the management of LBP, (e) use was high for certain CAM therapies, and (f) there were statistically significant differences in knowledge and attitudes among APRNs, physicians, GSN students, and SOM students. Although overall attitudes towards CAM therapies were positive and participants in this study agreed that CAM can be integrated into clinical practice, low knowledge for many CAM therapies likely limited higher adoption rates for most CAM therapies. These findings highlight the role of knowledge and attitudes in predicting the use of an innovation and emphasize the need to increase knowledge about CAM and support positive attitudes to facilitate the adoption of CAM for the management of LBP.

INTERPRETATION OF THE FINDINGS

As the second most common reason service members seek medical care, low back pain presents a significant problem for the military. Treatment options are limited for service members and many service members have turned towards CAM therapies for help in managing pain. Findings from this study suggest that providers and student providers have not fully adopted many of the available CAM therapies into clinical practice for the management of LBP and are not having conversations with patients about their CAM use. This limits patient access to safe and effective CAM therapies within the MTF and places patients at risk for engaging in CAM therapies which may not be compatible with medications they are taking or compatible with military requirements.

Among APRNs and GSN students, nearly 70% of those surveyed “always” or “often” asked their patients about their use of herbal medicines, while less than half “always” or “often” asked their patients about their use of other CAM therapies. Among physicians and SOM students, less than half of those surveyed “always” or “often” asked their patients about their use of herbal medicines or other CAM therapies. Establishing patient trust starts with engaging with patients in a non-judgmental manner. Providers are encouraged to inquire about CAM use to ensure that patient needs are being met. If providers ignore CAM use because of personal knowledge, attitudes, or use of CAM, the patient is ultimately not receiving all of the information that they need to make informed decisions about their care. Adoption of CAM through the Diffusion of Innovation lens, whether through referrals, providing services, or inquiring about the patient’s CAM use, begins with the provider.

Nearly 75% of those surveyed used at least one CAM therapy in a clinical setting for the management of LBP. However, less than 10% reported using the majority of the CAM therapies in the survey to include herbal/botanical therapies, non-herbal supplements, homeopathy, aromatherapy, naturopathy, spiritual healing/prayer therapy, imagery techniques, music therapy, biofeedback, and dance therapy. The most commonly used CAM therapies included acupuncture (to include battlefield acupuncture), massage, yoga, and chiropractic care, which are consistent with the most frequently used CAM therapies in the MTF as reported by Herman (2017).

According to the Diffusion of Innovation theory, knowledge is the first stage that an innovation passes through in order to be adopted or rejected by a social system. All (100%) of APRNs, 83% of GSN students, 60% of recent graduate physicians, and 58.6% of SOM students reported that they learned about CAM therapies in class. However, there were differences in (a) self-reported knowledge across specific CAM therapies among recent graduate/current students in the GSN and recent graduate physicians/current students in the SOM, (b) knowledge between the rank O3 and O4, and (c) overall self-reported knowledge was low among all groups of participants.

Low levels of general knowledge about CAM therapies are reported throughout the literature (Bahall & Legall, 2017; Loh et al., 2013; Neri et al., 2016; Wahner-Roedler et al., 2014). However, this study also found that self-reported knowledge about specific therapies such as acupuncture (to include battlefield acupuncture), yoga, and meditation was higher than knowledge about other therapies to include herbal/botanical therapies, chiropractic care, homeopathy, aromatherapy, biofeedback, music therapy, or dance therapy. This finding provides some insight into the overall low adoption rates of CAM,

but higher rates for specific CAM therapies. Here, the relationship between knowledge about specific therapies was related to adoption (use) of specific therapies.

These findings of low knowledge may be related to limited classroom instruction about CAM. Accrediting organizations for the advanced nursing programs or medical schools have not established curriculum standards for instruction on CAM. Students from the GSN and SOM have numerous opportunities at USU to engage in CAM therapies, thereby increasing their awareness-knowledge, and personal experience of specific CAM therapies. Students receive regular emails with articles about wellness and information on CAM services which are available to students and staff through the university. Students also have access to the wellness center at Walter Reed National Military Medical Center and a wellness group at USU, which offers courses that include breathing techniques, stress therapy, yoga, touch therapy, and more. These extracurricular classes are promoted to decrease stress and improve resiliency for students. In addition, students in the GSN have a one credit hour course on integrative medicine methodologies focused on auricular acupuncture along with 2-3 other CAM therapies. SOM students do not have a specific course on CAM therapies. CAM instruction during classes outside of the integrative medicine methodologies course is dependent upon faculty integrating information intermittently into other classes. Exposure to CAM therapies is also varied in clinical rotations as students may have different preceptors with different backgrounds and different practice philosophies providing the learning experience.

Exposure to CAM therapies may explain the difference in knowledge by providers with rank O3 and O4. While initially it may appear that the difference represents differences between providers in the GSN versus the SOM, the rank of O3

crosses both the GSN and recent graduate physicians from the SOM. Higher rank may be associated with increased knowledge as these providers have had more time in the military and thereby have more healthcare experience and exposure to CAM.

These findings about provider knowledge of CAM suggest that some providers in this study may not be ready to disseminate information to patients about the potential benefits or risks associated with many available CAM therapies or seek credentialing privileges to increase access (use/adoption) to many CAM therapies for their patients. Efforts to increase CAM adoption within the military health system need to begin with increasing provider knowledge about specific CAM therapies. Exposure to a variety of CAM therapies through curriculum changes in the classroom and patients in the clinical setting could lead to a better understanding of the CAM therapies (especially those in which participants reported no to low knowledge on specifically) to cultivate knowledge and encourage the formation of positive or negative attitudes towards CAM therapies. Changes in curriculum to increase knowledge through awareness, exposure, and understanding of CAM therapies as outlined in the Diffusion of Innovation theory may assist with increasing overall knowledge about specific therapies. This knowledge can then be used to form attitudes towards the therapy. Thereby positioning the student to make an informed decision about the adoption of specific CAM therapies. Given the limited time in class, it may be helpful for advanced nursing and medical educators to explore methods to increase knowledge among CAM therapies over time rather than a single class or course. Combined classes with advanced nursing and medical students on CAM and the integration of CAM across classes. These types of changes in curriculum

may increase knowledge across all student groups as well as bridge the gap in knowledge between APRNs/GSN students and physicians/SOM students.

It is encouraging that most surveyed providers were interested in learning more about CAM. Healthcare providers are most likely to adopt therapies into their treatment plans when they have developed awareness-knowledge (familiarity) and positive attitudes with an innovation. As knowledge and awareness increase, provider confidence increases, which thereby increases the provider's ability to discuss the risks and benefits of a specific therapy with patients and feel competent in providing a service if credentialed.

Despite low participant knowledge scores for many CAM therapies, this study found that participants had overall high (positive) attitudes towards CAM therapies. This finding is well supported in the literature (Aveni et al., 2016; Bahall & Legall, 2017; Geisler et al., 2015; Joos et al., 2011; Linde et al., 2015; Neri et al., 2016). Examining use and knowledge within the context of specific therapies rather than CAM as a whole may help to explain the discrepancy between low knowledge and high (positive) attitudes because knowledge and use for certain therapies was high, while knowledge and use for many other therapies was low. Although personal use was not correlated with professional use, knowledge, or attitudes, it should be noted that personal use was highest for meditation, relaxation therapies, massage, and acupuncture. These findings suggest that if knowledge about less-popular CAM therapies were increased, knowledge and attitudes towards less-popular therapies may also increase and thereby the adoption (use) of CAM therapies as a group could increase.

Most participants in this study believed that CAM could be integrated into clinical practice. These attitudes can be supported while providing more education on specific CAM therapies. As such, it would be important for educators to highlight the differences between and benefits of mainstream medicine and CAM. CAM is intended to serve as an adjunct to mainstream medicine rather than a replacement. Integrative medicine is a combination of conventional medicine along with CAM therapies. Educators could focus on CAM as a complementary therapy. CAM is intended to be viewed through a pluralistic view of medicine which encourages cooperation, research, and open communication to ensure that providers are prepared to support or disagree with patients when necessary. A pluralistic model allows providers to evaluate the risks and benefits of CAM therapies within the context of available scientific evidence.

Findings from this study suggest that despite positive attitudes towards CAM, the adoption (use) of many CAM therapies is low, because knowledge is low for specific CAM therapies. The source for low knowledge may be related to limited research to support some CAM therapies for the management of low back pain or a lack of instruction in classes. Pain is a biopsychosocial experience. As such, many mind-body therapies such as aromatherapy, meditation, biofeedback, and relaxation techniques may be beneficial in relieving pain (Lakhan, Sheafer, & Tepper, 2016; Lee, Crawford, Hickey, & Active Self-Care Therapies for Pain Working, 2014; Sielski, Rief, & Glombiewski, 2017). Although research in this area is new, findings from this study suggest that low knowledge about the benefits of therapies outside of physical manipulation of the body is likely one cause of low professional use of some CAM therapies. As providers increase

knowledge about these therapies, they can engage in conversations with patients about the risks and benefits of different CAM therapies.

Building knowledge in the form of evidence through research and building knowledge through additional education and training is important. The Diffusion of Innovation theory explains the adoption process by examining knowledge, attitudes, and use. Findings from this study encourage educators to collaborate within the GSN and SOM on ways to integrate more CAM education into the curriculum and increase networking among the students. If CAM is to be adopted for use across the military health system, knowledge must first be increased across all provider groups. This ensures that providers are able to make informed decision about adopting CAM into their clinical practice for the management of LBP. Increasing access to non-opioid treatment options improves the service member's ability to be fit for duty, exercise, and deploy if needed.

APPLICATION OF FINDINGS TO THE DIFFUSION OF INNOVATION THEORY

This study was designed to examine the constructs of knowledge, attitudes, and use according to the Diffusion of Innovation theory among military providers and student providers. Findings from this study suggest there are certain CAM therapies which have begun to be diffused into clinical practice, such as acupuncture (including battlefield acupuncture), while other therapies have not begun to diffuse despite evidence which suggests that the mind-body benefits of some therapies, such as music therapy and biofeedback, may help reduce pain due to the psychological factors associated with the pain experience (Guétin et al., 2005; Sielski et al., 2017). This study found that, despite low knowledge and professional use of specific CAM therapies, overall attitudes were high and positively correlated with use. This demonstrates that this study may not have

fully captured participants' knowledge as defined by other concepts in the diffusion of innovation theory (experience, social norms, perceived attributes of the innovation, characteristics of the decision-making unit) for specific CAM therapies, which ultimately influenced the participants overall attitudes towards CAM.

The next step in examining the diffusion of the innovation (CAM) and supporting the increasing adoption of CAM in the military health system is to increase provider knowledge for therapies, which participants rated as low, and allow time to pass in which the innovation can continue to diffuse through various members of the social system through communication channels. Given that most students report that they have had classes on CAM therapies, knowledge could be cultivated in less traditional educational ways in the classroom such as through hands-on experience. In addition, perceived characteristics of specific CAM therapies and barriers to safely adopting CAM therapies into practice need to be examined. The use of focus groups in which participants can talk together could help to further understand the diffusion process from within social dynamics of the military health system.

It should be noted that the diffusion process occurs over time. Results from this study do not provide insight into the complete adoption or rejection of CAM by the participants. The final decision of the adoption or rejection of CAM into clinical practice may take several years and the Diffusion of Innovation theory does not provide guidance on how long the diffusion process can take. For now, participants in this study should be supported to ensure that the adoption of CAM occurs in a safe and effective way for the management of LBP.

CLINICAL AND MILITARY IMPLICATIONS

Renewed attention to CAM from this study may spark provider interest in providing CAM services to patients as they begin seeking knowledge and forming attitudes about CAM therapies. Low back pain is a significant problem for the military. Service members are using CAM therapies. As such, providers need to be ready to have discussions with their patients about CAM use and provide access to a variety of credentialed CAM practitioners according to the CAM service desired by the patient. Increased knowledge is expected to increase awareness and understanding of the risks and benefits to increase provider confidence to talk with patients about CAM therapies without judging the patients about their desire to use CAM therapies.

To help patients safely approach the use of CAM therapies, providers can begin asking patients about their use of CAM. This may facilitate the patient-provider relationship, build patient trust, and encourage the provider to learn more about CAM in order to be able to help the patient in the future. Providers are encouraged to remain non-judgmental about the patient's decision to use CAM and provide patients with the best information that they have from the evidence available.

Policy makers may examine ways to minimize administrative barriers to adopting CAM and facilitate ways to credential providers when a service is not initially provided at a facility. Increased funding to support provider education and training on specific CAM therapies would be helpful. Working outside of individual MTFs and working across the MHS may facilitate these processes and increase patient access to CAM therapies. The use of telemedicine may give patients access to some CAM therapies which do not require touch such as biofeedback, yoga, or relaxation therapy that may be

available at other facilities. Leaders and policy makers may increase funding for continuing education on CAM therapies to allow providers the opportunity to increase their knowledge and awareness of CAM therapies. And lastly, policy makers may examine ways to increase access to CAM outside of the MTF via insurance reimbursement and collaborations with universities throughout the nation.

Adopting CAM as a safe and effective alternative to opioids is important for service members with LBP. Service members are using CAM therapies and looking for treatment options that will not interfere with their military duties. Providers have an obligation to learn about CAM therapies in order to be able to hold discussions with patients about the risks and benefits, despite their decision to provide CAM services or refer patients to CAM practitioners.

NURSING IMPLICATIONS

The American Association of Colleges of Nursing (2008) wrote that “knowledge acquisition related to wellness, health promotion, illness, disease management is core to nursing practice” (p. 30). Advanced practice nurses are “characterized by the use of a holistic perspective... [and] advanced practice thinking, judgment, and skillful performance” (American Association of Colleges of Nursing, 2006, p. 18). As such, patients depend on advanced nurses to be knowledgeable about CAM therapies. Nurses represent one of the largest portions of healthcare providers (American Association of Colleges of Nursing, 2019). Advanced practice nurses are primed to be subject matter experts and play a large role in patient care, education, and advocacy.

Fear of losing their job may prompt service members to seek CAM therapies early in the management of LBP. Service members may turn to and benefit from CAM

therapies for a variety of reasons, including its holistic approach to health and its focus on self-care. Despite the fact that many CAM therapies are deemed relatively safe, there are risks associated with some CAM therapies, such as the combination of certain herbal therapies with medications. Aside from some providers choosing to provide CAM therapies directly to their patients, all providers need to be ready to support these patients and provide information to ensure that patients are safe and aware of the risks and benefits of CAM. Nurses are in a prime position to advocate for safe CAM use for patients with LBP, educate patients about CAM and integrative medicine, and conduct future research studies to investigate the safety and efficacy of CAM therapies.

FUTURE RESEARCH

This study fills a gap in the literature to explain CAM knowledge, attitudes, and use among military providers who care for service members with LBP. At some point, students from USU will be making clinical decisions for service members with LBP. Understanding their knowledge and attitudes towards CAM serves as a step forward to adopting CAM across the MHS.

Future research is needed to focus on ways to increase knowledge about CAM therapies, identifying barriers to the use of specific CAM therapies, and understanding the perceived characteristics of specific CAM therapies. This research would help to identify which CAM therapies, which are safe and effective, are perceived as compatible for service members and which CAM therapies can be adopted because of their compatibility at stateside facilities and abroad in deployed locations. Understanding the barriers to adopting CAM, in addition to provider knowledge and attitudes, would facilitate the adoption of CAM therapies if practical. Future studies with qualitative or

mixed method designs may add depth and further understanding of quantitative findings to further understand how low knowledge and positive attitudes are correlated to use. Ethnography and phenomenology qualitative studies would help to better understand the role of the culture and social norms on the formation of knowledge and attitudes with military providers.

Longitudinal studies are needed to examine implementation of CAM over time by providers who have recently graduated from advanced nursing and medical schools. This would be helpful to understand where CAM is positioned in the MHS and how changes in knowledge and attitudes over time influence adoption or rejection of specific CAM therapies. Lastly, future studies should consider larger samples and providers with more experience as well as different disciplines to include physical therapy, pharmacy, orthopedics, among others as CAM is not specific to just APRNs and physicians because ultimately CAM adoption or rejection will occur at the system level of the MHS.

STRENGTHS

This study has several strengths. First, this study utilized a reliable and valid tool to measure knowledge, attitudes, and use in a unique sample of military providers and student providers. The quantitative data obtained from this study may be used to examine trends in knowledge, attitudes, and use of CAM therapies across all providers in the Military Health System.

Second, this study was strengthened by examining specific therapies in which providers and student providers self-reported knowledge. Examining specific therapies rather than self-perceived general knowledge on CAM allowed the findings to isolate

specific CAM therapies which need further examination and assisted in explaining the findings of positive attitudes in light of low knowledge.

Third, this study was strengthened by examining differences in knowledge, attitudes, and use among advanced practice nursing and medical providers as well as differences across cohorts (years in school). The information gained from this study will provide information to advanced nursing and medical educators as well as policy leaders about differences between the groups, which may inform educators about ways to improve curriculum about CAM, leaders and policy maker to write policies and guidelines, and the MHS to form interdisciplinary working groups aimed at increasing CAM adoption in the MHS.

Lastly, this study provides insight into the future practice decisions that recent graduates will be make. Findings from this study suggest that recent graduates may not routinely inquire about patient CAM use and may not have the information needed to talk to patients about CAM. Findings from this study may be used to inform policies about inquiring about CAM use, continuing education opportunities. These findings may also be used to guide curriculum content on CAM therapies for current students based on what has been learned from recent graduates.

LIMITATIONS

There are a few limitations in this study. First, the response rate was low (14.1%). This study was conducted during the COVID-19 nationwide shut down, limiting direct access to participants. Participants with less interest in CAM may not have been interested in participating via an email invitation without being able to directly discuss what the study entailed with the Principal Investigator or without seeing reminder posters

throughout the university. This may have resulted in a sample bias in which persons with an interest in CAM completed the survey after receiving an email about a CAM research study versus individuals with less interest in CAM not opening or reading the email. It is unknown if all participants who were recruited received email invitations given their off-site work locations and changes in Permanent Change of Station orders during a time of mandatory social distancing. The small sample size limits the generalizability of the findings. However, the low response rate and potential for sampling bias does not minimize the findings of this study. Given the wide range of responses in this study, findings are expected to reflect the participants' genuine perspectives.

Second, this study utilized self-reported data in which participants had the option to skip questions. This resulted in the exclusion of some participant responses from the cumulative analysis because the participant did not answer one or more individual questions within the section. It is not known why participants chose to answer certain questions and other questions were missed. This study was designed to maximize the participant's autonomy to answer questions based upon what they felt comfortable answering.

Third, self-reported data is susceptible to response bias in which participants provide answers based on social desirability. This survey did not assess the participants' objective knowledge and attitudes about CAM therapies, but rather the study examined the participant's subjective self-reported knowledge and attitudes. Objective and self-reported subjective knowledge and attitudes may differ. Findings from this study are strengthened by the consistencies with previous research. Although the data collected in this study was self-reported, it does not minimize the value in the participant's responses

which suggest that providers and student providers want more information about CAM and have a preference to use certain CAM therapies. Future studies may measure both objective and subjective knowledge.

A final limitation to this study was the type of providers included in the analysis. There was a lack of current providers with more than one year of practice and the study did not differentiate between providers who are credentialed to provide a CAM therapy, providers who refer patients for CAM therapies, or providers who are learning to provide CAM therapies. However, this study does offer a glimpse into patient access to CAM therapies in the MTF via direct care or referrals from providers who are ordering treatments for service members with LBP. This principal investigator recognizes that recent graduates may not be fully representative of current providers and may not have the well-established decision-making skills based on clinical experience as fully autonomous providers because clinical rotations occur under the supervision of another provider. However, their responses in this survey are still expected to reflect decision-making about CAM in the clinical setting. Participant responses are reflective of the learning and knowledge that may have formed as a result of communication with experienced preceptors in clinical rotations that are directly in the MTF. This is important for clinicians, educators, policy makers, and military leaders to know. Finally, results from this study provide insight into the immediate practice patterns that may be seen by new graduates.

Despite these limitations, the findings from this study offer significant value and knowledge to the field of provider decision-making, knowledge, attitudes, and use of CAM therapies. Findings from this study serve as a starting point to understand military

providers knowledge, attitudes, and professional use of CAM therapies which may be used to inform clinical practice, policy, and future research.

CONCLUSION

Low back pain is a significant problem for the military. Many CAM therapies present a safe and effective alternative to opioids, but their adoption in the Military Health System relies on access to CAM through providers. This study examined provider and student provider knowledge, attitudes, and use of CAM therapies for the management of LBP using the constructs of the Diffusion of Innovation theory. This study found that: (a) knowledge was high for a some CAM therapies (b) knowledge was low for other CAM therapies, (c) overall attitudes towards CAM therapies were positive, (d) most providers and student providers surveyed used at least one CAM therapy for the management of LBP, (e) use was high for certain CAM therapies, and (f) there were statistically significant differences in knowledge and attitudes among APRNs, physicians, GSN students, and SOM students. Higher rates of use for some therapies and minimal use of other therapies highlight the need for additional strategies to increase adoption of CAM for the management of low back pain. Findings on the adoption (use) of CAM therapies at the provider level in this study are likely the result of high knowledge for specific CAM therapies and overall positive attitudes. Efforts to increase the use of CAM therapies may be facilitated by increasing knowledge for CAM therapies in which providers lack knowledge and supporting positive provider attitudes towards CAM.

From the lens of the Diffusion of Innovation, adoption of an innovation as a social system occurs over time. While use may be high today for specific therapies, confirmation or rejection of CAM as a group of therapies is determined over time.

Therefore, efforts to increase CAM adoption should be implemented over time.

Increasing provider knowledge during and after higher education is important. Policy changes to increase education and access to CAM therapies are needed. Policy makers are encouraged to consider additional funding for continuing education and ensure that facilities have supplies and staff available to increase access to a variety of CAM therapies. Providers would benefit from discussions about experience, risks, and benefits of CAM therapies in staff meetings and staff huddles to increase awareness-knowledge and establish the personal and group perceived attributes of CAM as an innovation.

Nurses are well-positioned to advocate for the use of CAM therapies for the management of LBP. Nursing has traditionally been viewed as more holistic than the medical model, as such medical students and nursing students could benefit from their differences through interdisciplinary learning about the risks and benefits of CAM.

Future research that includes longitudinal and qualitative designs is needed to further understand provider views towards CAM therapies. Specifically, examining the role of social norms in adopting CAM in the MHS would help to understand the diffusion of CAM through the social lens and the influence of social norms on the formation of attitudes as well as adoption. Examining barriers to the adoption of CAM in the MHS would assist policy makers in writing policy based on provider needs. Identifying perceived characteristics of CAM therapies will help to understand what providers know about CAM therapies and how the characteristics of a specific therapy influence their decision to adopt the therapy. This would also inform providers about which therapies would be most compatible with the combat environment. Lastly, investing in ways to increase knowledge about CAM is needed. Understanding how to increase knowledge

outside of traditional classrooms would support life-long learning and encourage learning over time.

Opportunities to increase access to CAM and improve LBP without the use of opioids exist in the MHS. Results from this study highlight the importance of cultivating knowledge about CAM therapies and supporting positive attitudes to increase the use of CAM. Final adoption of many CAM therapies for the management of LBP within the MHS should be done in a safe and effective manner, but this cannot take place until providers have gained the knowledge to understand the perceived characteristics of specific CAM therapies and have the knowledge to critically evaluate the risks and benefits of CAM to make a decision to adopt or reject the innovation as a group.

Providers who choose not to adopt CAM therapies will still need knowledge about CAM to be able to have informed discussions with patients about the risks and benefits of CAM. Hopefully over time, increased knowledge and support for positive attitudes will increase access to safe and effective CAM therapies at the provider level for the management of LBP. Until then, (a) providers are encouraged to learn more about CAM therapies, talk with colleagues about CAM, and coordinate patient care with colleagues from multiple disciplines to meet the needs of service members with LBP, (b) educators are encouraged to explore creative ways to increase education about CAM over time through simulation (SIM) labs and other courses and integrate courses outside of their respective disciplines, and (c) policy makers are encouraged to increase funding for educational opportunities, ensure that policies exist to credential providers across facilities to provide CAM services, provide funding for clinics to increase supplies for CAM, and support policies on telemedicine for CAM across the MHS.

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Appendix A

Part 1. Demographics

Gender

☐ Male ☐ Female ☐ Do not wish to disclose

Age

☐ continuous ordinal variable open ended response
☐ Do not wish to disclose

Military Grade

☐ 01 ☐ 02 ☐ 03 ☐ 04 ☐ 05 ☐ 06 ☐ 07 ☐ 08

I identify my race/ethnicity as... Note you may check more than one selection.

☐ White
☐ Black or African American
☐ American Indian or Alaska Native
☐ Hispanic, Latino, or of Spanish origin
☐ Asian
☐ Native Hawaiian or Other Pacific Islander
☐ Other
☐ Do not wish to disclose

Type of Provider

☐ Nurse Practitioner
☐ Physician Assistant
☐ Physician
☐ Psychologist
☐ Physical therapist
☐ Student

Specialty

☐ Family Practice
☐ Internal Medicine
☐ Orthopedics
☐ Physical Medicine and Rehab
☐ Neurology
☐ Pain Clinic
☐ Occupational health
☐ Emergency Department
☐ Graduate School of Nursing
☐ School of Medicine
☐ Other

Years of practice

☐ continuous ordinal variable open ended response

Year in school

- ☐ 1
☐ 2
☐ 3
☐ 4
☐ 2020 Graduate

Years of service

☐ continuous ordinal variable open ended response

How many deployments have you had?

- ☐ 0
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5 or more

Part 2. Knowledge/Attitudes/Use of CAM therapies

Section 1. Knowledge of CAM

1. Please rate your perceived level of knowledge of the following therapies

CAM therapy	Level of Knowledge			
	None	Very little	Some	A lot
Herbal/botanical therapies				
Non-herbal supplements				
Homeopathy				
Aromatherapy				
Acupuncture (to include auricular and battlefield acupuncture)				
Naturopathy				
Relaxation techniques				

Spiritual healing/prayer therapy				
Imagery techniques				
Music therapy				
Yoga				
Biofeedback				
Meditation				
Dance therapy				
Osteopathy				
Chiropractic care				
Massage therapy				

2. Where have you learned about CAM therapies? Please check all that apply

☐ Publications ☐ Conferences ☐ Staff meetings ☐ Colleagues ☐ Friends ☐ Family ☐ Class ☐ Other

3. Are you interested in learning more about CAM therapies?

☐ Yes ☐ No

Section 2. Personal/Professional use of CAM

1. Please indicate which of the following therapies **you personally use** (you can choose more than one box). If you do not use any of the therapies, please answer none.

- ☐ Herbal/botanical therapies
- ☐ Non-herbal supplements
- ☐ Homeopathy
- ☐ Aromatherapy
- ☐ Acupuncture (Battlefield acupuncture)
- ☐ Naturopathy
- ☐ Relaxation techniques
- ☐ Spiritual healing/prayer therapy

- ☐ Imagery techniques
- ☐ Music therapy
- ☐ Yoga
- ☐ Biofeedback
- ☐ Meditation
- ☐ Dance therapy
- ☐ Osteopathy
- ☐ Chiropractic care
- ☐ Massage
- ☐ None

2. Please indicate which of the following therapies you **currently use/refer for your patients with back pain** (you can choose more than one box). If you do not use any of the therapies, please select none.

- ☐ Herbal/botanical therapies
- ☐ Non-herbal supplements
- ☐ Homeopathy
- ☐ Aromatherapy
- ☐ Acupuncture (Battlefield acupuncture)
- ☐ Naturopathy
- ☐ Relaxation techniques
- ☐ Spiritual healing/prayer therapy
- ☐ Imagery techniques
- ☐ Music therapy
- ☐ Yoga
- ☐ Biofeedback
- ☐ Meditation
- ☐ Dance therapy
- ☐ Osteopathy
- ☐ Chiropractic care
- ☐ Massage
- ☐ None
- ☐ Not applicable

3. Do you advise currently your patients to consult CAM practitioners?

- ☐ Yes ☐ No, please go to question 4 ☐ Not applicable, please go to question 4

If yes, what type (you can choose more than one box)

- ☐ Massage therapist ☐ Herbal/Naturopath ☐ Energy healing ☐ Chiropractor ☐ Homeopath
- ☐ Acupuncturist ☐ Hypnotherapist ☐ Faith healer ☐ Other _____

4. How often do you currently ask about the **use of herbal medicines** as part of your patient exam?
☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not applicable
5. How often do you currently ask about the use of CAM therapies **other than herbal medicines** as part of your patient exam?
☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not applicable

Section 3. Attitudes towards CAM therapies

Please rate your level of agreement or disagreement with the following statements

Attitudinal Statement	Level of Agreement				
	Strongly Agree	Agree	Neutral/I don't know	Disagree	Strongly Disagree
1. CAM is an important aspect of my own family's health care					
2. CAM boosts my immune system/resistance					
3. CAM promotes a holistic approach to health					
4. CAM gives me more control over my health/body					
5. Acupuncture (to include auricular and battlefield acupuncture)					
6. Evidence of effectiveness is important to my choice of CAM					
7. My personal experience of the					

effectiveness of CAM is more important than clinical evidence					
8. Patients should have the right to choose between conventional medicines and CAM therapies					
9. Patients are not adequately informed about CAM therapies in the hospital/clinic					
10. Surgical patients can be helped by using CAM therapies					
11. CAM needs to be tested for safety/side-effects					
12. Some forms of CAM therapies are as effective as conventional medicines					
13. CAM has fewer side-effects than conventional medicines					
14. CAM therapies are completely safe					
15. CAM therapies could be used as a complement to the treatments used in					

conventional health care					
16. I think people should not use CAM when taking western medicines					
17. CAM is a better preventive measure than conventional medicine					
18. The use of CAM therapies may delay the patients' decision to contact conventional health professionals					
CAM therapies may involve unknown risk factors for users' health					
18. CAM therapies are offered just for financial gain by quack health careers					
19. I think all health care professionals should accept that patients are using CAM					
20. Healthcare providers should be knowledgeable about CAM and be able to advise their patients on commonly used CAM					

21. I think that CAM can be integrated into our current clinical practice					
22. CAM outcomes are largely due to placebo effects					
23. Overall, how would you describe your attitude toward CAM therapies?					

Please write any further comments you would like to make.