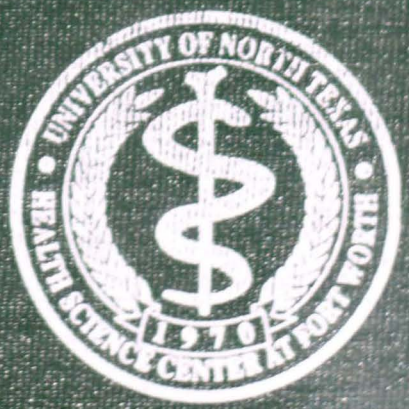
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Background: Complementary and Alternative Medicine (CAM) is an important health care trend that is drawing increasing attention from medical schools. An educational program, the Integrated Clinical Experience (ICE), was instituted at the Texas College of Osteopathic Medicine to address CAM for second year medical students.

Methods: A thirty-five question survey developed to measure the students' knowledge of and attitudes about CAM was given at the beginning and end of the ICE week.

Results: Students had significantly more knowledge about CAM prevalence following the ICE week. Students perceived greater efficacy and relevance in education for certain CAM modalities and felt more likely to incorporate CAM into their clinical practice and use CAM for self care.

MEDICAL STUDENTS' KNOWLEDGE OF AND ATTITUDES ABOUT COMPLEMENTARY AND ALTERNATIVE MEDICINE BEFORE AND AFTER AN INTEGRATED CLINICAL EXPERIENCE LEARNING MODULE

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THESIS

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CHAPTER 1

BACKGROUND

Complementary and alternative medicine (CAM) is a consumer driven trend in American healthcare that has come under increasing attention from the medical mainstream. In a groundbreaking study in 1993 and follow up study in 1997, Eisenberg et al showed that Americans made an estimated 425 million visits in 1990 and 627 million visits in 1997 to CAM therapists annually which exceeds the number of visits to primary care providers.[1-2] Another study by RC Kessler et al published in the *Annals of Internal Medicine* in August of 2001 examined long term trends in the usage of CAM therapies. The study found that the popularity of CAM represents a trend that began at least a half century ago, and the demand for CAM therapies is very likely to continue to increase.[3]

Within the medical community, there has been much disagreement over the term CAM. Medical providers practicing health care outside of traditional university based training are referred to as alternative or complementary. The term alternative referring to medicine practiced in the place of conventional medicine and complementary medicine being "non-standard" care provided along side conventional care. Conventional

medicine is traditionally defined as the medicine taught by medical schools awarding MD (Medical Doctor) and DO (Doctor of Osteopathy) degrees even though many of these schools now offer introductory courses on CAM. Conventional medicine can also be defined as the medicine practiced by physicians graduating from these schools and other related allied health professions including physician assistants, physical therapists, psychologists, and nurses. However, many conventional doctors have incorporated practices outside of their traditional training which are considered "alternative" or "complementary." A study by Verhoef and Sutherland in Canada showed that 20% of General practitioners had done training in CAM modalities with acupuncture and hypnosis being the most common.[4] Some physicians who have acquired CAM training have pioneered the use of the term "integrative medicine" instead of CAM to emphasize the blending of conventional and alternative medicine.

The National Institute of Health (NIH) has established a National Center for Complementary and Alternative Medicine (NCCAM) which is dedicated to scientifically researching CAM practices. NCCAM has expanded on the prevailing definition of CAM by categorizing CAM into 5 different domains. The first domain is the *alternative health systems* which are based on an entire unique philosophy of health and disease. Many alternative health systems are the historical product of a unique culture's approach to health and healing such as Traditional Chinese Medicine and Ayurveda (the indigenous healthcare system of India). Western examples of alternative healthcare systems include Homeopathy and Naturopathy. The second domain is *mind body interventions* which is the application of therapeutic techniques for controlling cognitive processes producing

effects on the entire body. Mind body medicine is the CAM domain with the greatest historical support within mainstream medicine and some therapies such as patients support groups and cognitive behavioral therapies are no longer considered alternative. Other examples of mind body medicine include biofeedback, hypnosis, prayer, and meditation. The third domain is *biologically based therapies* which consist of herbal medicine, vitamins, minerals, food, and other dietary supplements. The fourth domain is the *body-based therapies* which emphasize the importance of the relationship between body structure and function. Many of these therapies attempt to optimize skeletal alignment or balance muscular tone to impact systemic health. Examples include chiropractic, therapeutic massage, and yoga. Osteopathy, while generally considered conventional medicine, is a CAM therapy with regards to the component of musculoskeletal manipulation. The fifth domain is the *energetic medicine* domain which is broken down into the bioenergetic model and electromagnetic model. The bioenergetic model focuses on subtle energies present within and around the body that can be manipulated by skilled sensing practitioners. Examples include Reiki, Therapeutic Touch, and Qi Gong. Electromagnetic therapies use both magnets and electric currents to influence the body's health. [5]

Holistic medicine is another term that is often associated with CAM and CAM providers. Holistic medicine can be defined as medicine that addresses all aspects of a patient such as mind, body, and spirit or even the patient's personal relationships and physical environment. While holistic medicine is not by definition CAM, many of the types of therapies in CAM practice are applied to a single patient in a holistic manner.

Many practitioners believe that diverse manifestations of disease often belie an interconnected underlying pathological process. Alternative practitioners have criticized mainstream medical doctors for being reductionists in their approach to patient care. They site the proliferation of medical specialists with narrow focus as evidence that mainstream medicine has forgotten that the whole is greater than the sum of the parts.

Medical schools across the country have all been increasing the course content concerning CAM in their respective curricula. A 1998 *Journal of the American Medical Association* study showed that 75 medical schools had either a stand-alone course or included CAM topics as part of a required course.[6] A 2000-2001 Liaison Committee on Medical Education (LCME) Annual Medical School Questionnaire showed 91 schools teaching CAM as part of a required course, 64 schools offering a separate elective course, and 32 schools teaching CAM as part of an elective course.[7] Osteopathic schools have also been including CAM in their curricula. The 2000-2001 Annual Osteopathic Medical School Questionnaire showed that a course in "alternative" medicine (not including required courses in Osteopathic Manipulative Medicine) was offered in 13 of the 19 Osteopathic schools in the United States. The American Osteopathic Association Board of Trustees adopted in February of 2002 a policy that calls for the inclusion of CAM in osteopathic education at the undergraduate, graduate and CME levels.

In 2002, the University of North Texas Health Science Center – Texas College of Osteopathic Medicine addressed the topic of CAM with the development of the CAM Integrated Clinical Experience week for the second year medical students. The overall design of the course consisted of a mixture of class room lecture, reading assignments,

research article review, and small group demonstration and discussion. The overview materials were given early in the week in lecture format and were followed by self study allowing for time to explore more specific interests. Emphasis was placed on a critical evidence based assessment of CAM during self study time to allow for informed discussion during the small group interactive sessions with CAM providers. The small group interactive sessions provided a time for practical clinical demonstrations of CAM therapies with providers who used these modalities with their own patients.

There were seven objectives for the ICE week which were listed in the course syllabus: 1) Describe the prevalence and economic impact of CAM therapies in the United States. 2) Discuss the NIH definition and categorization of CAM therapies. 3) Search and evaluate information on CAM therapies in the literature and on the internet. 4) Describe the concept of "holistic" evaluation of patients and apply this approach to cases. 5) Describe the potential safety issues of CAM therapy. 6) Observe at least one "mind-body" therapy (biofeedback, meditation, guided imagery). 7) Discuss the integration of one non-Western medical system with conventional medicine (Traditional Chinese Medicine, acupuncture, and Ayurveda)

The week began with an overview of CAM and evidence based medicine with three lecture hours for the entire class. The first lecture focused on specific knowledge about CAM prevalence in the United States medical system and the trends in CAM education. The lecture also offered a formal definition of CAM and an explanation of the NIH and NCCAM's classification of CAM domains. The second lecture discussed holistic medicine as a practical application of CAM. Several case studies were given

with discussions on how different CAM modalities can be used to address different aspects of the patient's health problem. The third lecture hour covered how to find and critically analyze medical literature. Students were reminded how to use various search engines to obtain research articles concerning different CAM topics. Basic information about how to examine the validity of research, the types of research studies, and the levels of evidence was also given during this lecture.

Students were then assigned homework for the next three days. All the students were required to pick a CAM topic, perform a literature search, read a selected article, and submit a one page summary of the article. All of the students were additionally required to read two articles: David Eisenberg, "Trends in alternative medicine in the U.S., 1990-1997: results of a national follow up," *Journal of the American Medical Association*, 1998 November 11, 280(18): 1569-1575, and A. Doyle, "Alternative Medicine and Medical Malpractice – Emerging Issues," *Journal of Legal Medicine*, 22: 533-552. Eisenberg's article provided a review of many of the basic facts covered in the first lecture hour about CAM prevalence in the United States.

The students were split into 9 groups of 10-11 people for interactive sessions with a CAM provider. Each student attended three one hour interactive sessions covering three different CAM domains: an alternative health system, a biologically based therapy approach, and a mind-body intervention. Because the students are in an osteopathic medical school, all of them have received training in a body-based therapy, Osteopathic Manipulative Treatment. The energetic medicine domain was touched upon in some of the small groups. Students were given reading assignments specific to the small group

session that they attended. Each small group was assigned a case study of a patient with a particular problem and an article covering the CAM modality that the practitioner used. This allowed the students to think about the clinical approach the practitioner would be using and formulate questions to be discussed.

The mind-body approaches which were covered were guided imagery, biofeedback, and meditation. Since each student was assigned to one mind body session, all the students had the opportunity to personally experience a mind body intervention. The guided imagery and meditation sessions first discussed the principles of mind-body medicine and then the practitioner allowed the students to experience the modality themselves. The biofeedback session provided an opportunity for the students to practice several types of simple biofeedback such as using the mind to alter heart rate, temperature, and muscle tone.

The alternative health systems which were addressed in the small group interactions were traditional Chinese medicine and ayurveda (the traditional medicine of India). The practitioners who came to present were either physicians who had incorporated these healing systems into their conventional practice or were practicing under the supervision of a physician in an integrated medical clinic. In the presentation about traditional Chinese medicine, students were given an actual demonstration of acupuncture in addition to the discussion of a hypothetical case.

The remaining small group sessions were with physicians describing holistic evaluation and treatment of patients using biologically based treatments. Clinical case studies of headache, musculoskeletal pain, and gastrointestinal problems were used to

give examples of holistic treatment approaches which could include dietary changes, vitamin supplements, herbs, exercises, and lifestyle modifications. The final piece of the ICE week was a concluding session with the entire class to allow time for questions and answers and discussions about what had been learned and experienced during the week.

Students' knowledge about CAM prevalence was predicted to significantly increase following the ICE week. Students' attitudes were also predicted to change as seen with greater perception of relevance for CAM in future clinical practice, an increased desire for CAM education with more topics covered, and alterations in views of CAM efficacy. Regarding knowledge, the course was designed to increase students' awareness of the remarkable prevalence of CAM in America in the lectures and reading assignments. Knowledge and experience gained would result in changing students' attitudes. Awareness of CAM prevalence would make students feel that CAM is more relevant for their medical futures. By focusing on an evidence based approach, students were predicted to have a change in their perception of the evidence base and efficacy of CAM therapies. Many students would form opinions about CAM topics that they previously had no knowledge about. Other students would alter both positive and negative misconceptions about CAM after examining scientific research. With greater knowledge and perceived knowledge of efficacy, students were expected to have a significantly increased interest in CAM education.

A survey of the literature supported the hypothesis that students' knowledge of and attitudes about CAM would change following an educational intervention. The literature demonstrates that medical students have a significant interest in CAM and have

a desire to learn more about it. Several studies demonstrate a correlation between the amount of knowledge students perceive they have and their attitude about education, future referral and intended use, and perception of efficacy for CAM therapies. This suggests that a learning module that increases students' knowledge would increase their desire for further education, perception of CAM efficacy and perception of importance. A fairly strong link is demonstrated between knowledge of specific CAM therapies and perception of efficacy and relevance. There are a few studies measuring medical student attitudes about CAM, and many studies show a correlation between greater knowledge and a more positive attitude toward CAM education, efficacy, and intention for use.

An Australian study of medical student attitudes included a comparison of 5th year medical students who had received an introductory lecture on CAM (n=130) to those who had not (n=33). The authors found that the lectured group felt they knew more about CAM, thought CAM education was more necessary, thought that CAM therapies were more useful, and had greater intention to refer patients to CAM providers. This study also reported that 51% of students underestimated the public's use of CAM, 34% estimated it correctly, and 15% overestimated it. These results were not specified in terms of the students who had taken the introductory lecture or not. This study also demonstrates that the therapies that the students knew the most about were the ones that they viewed as most useful. The percentage of students who understood the basic principles of meditation (70%), massage (70%), and acupuncture (65%) correlated with the percentage of students who perceived utility in meditation (81%), massage (85%), and acupuncture (83%). The therapies with low understanding, reflexology (15%) and

homeopathy (23%), were also the ones with the lowest rating for utility - reflexology (15%) and homeopathy (18%). [8]

Other evidence that supports the hypothesis comes from comparing results of different studies. Most frequently, when students have a greater perception of knowledge of CAM, they believe CAM education is more necessary, perceive greater efficacy for CAM, and have a higher intention to refer to or use CAM therapies. A comparison between a study by Jessica Baugniet et al of Canadian medical students and a study by Ronald Chez et al of American medical students highlights how increased perception of knowledge changes attitudes. When asked if they understood the basic principles, students in Chez's study claimed to know more than Baugniet's group (76% vs. 39.3% for massage, 74% vs. 32.8% for herbal medicine, 67% vs. 37% for chiropractic, 59% vs. 23% for hypnosis, 47% vs. 18% for acupuncture). Students in the study by Chez also viewed each CAM therapy as more "useful" or "very useful" than the students in Baugniet's study. Individual therapies that students knew the most about were perceived to be the most useful in each study. In Baugniet's study, the two modalities that the group knew the most about were also the therapies that were considered most useful (massage was considered useful by 45.9% and chiropractic by 44.2%). In the study by Chez, the therapies that the students knew the most about were also perceived as most useful. For meditation 74% of students felt they understood the basic principle and 90% considered it useful, for herbal medicine 74% knew basic principles and 73% considered it useful, and for massage 76% knew the basic principles and 87% considered it useful. These same students considered themselves more likely to refer patients or encourage

patient use of massage (67%) and meditation (77%) which were two modalities that scored high for perceived knowledge and usefulness. [9, 10]

Another study that supports the hypothesis that more knowledge of CAM results in a more positive attitude about CAM's effectiveness and greater likelihood for referral or use is by David Taylor Reilly on 86 general practitioner trainees attending a conference in Scotland. The doctors claimed to know the most about hypnosis (74 knowing at least "something of"), acupuncture (68), homeopathy (51), and osteopathy (40). These therapies were the same ones that the doctors were most likely to perceive to be useful, desire to train further in, and refer their patients to. For acupuncture, 76 respondents found it "useful," 19 either were using it or wished to train in it, and 6 had made referrals for their patients. For hypnosis, 74 found it useful, 60 were either using it or wished to train in it, and 12 had made referrals for their patients. For homeopathy, 45 considered it useful, 10 either used it or wished to train in it, and 9 had made referrals for their patients. For osteopathy, 39 considered it useful, 21 either used it or wished to train in it, and 10 had made referrals for their patients. [11]

Two studies were done comparing students' and doctors' attitudes toward CAM, one of which supports the hypothesis and the other contradicts it. M.Y. Hasan surveyed 158 general practitioners and 113 medical students in the United Arab Emirates. The students had all attended a 12-hour program on CAM during the first year of medical school. The students had more experience and familiarity with CAM therapies than the doctors. Students had experience from personal use (73%) and from use of CAM by family and friends (76%). Students had significantly higher knowledge of CAM use by

friends and family than physicians for osteopathy (50.4% versus 8.2%), spiritual healing (66.4% versus 20.3%), and herbal medicine (76.1% to 36.7%). More students considered osteopathy and spiritual healing more effective than general practitioners did. More students felt that it was important for a general practitioner to know about osteopathy (40.7%) and spiritual healing (50.4%) than the general practitioners themselves (5.1% for osteopathy and 29.1% for spiritual healing). Students reported a greater likelihood than the GPs of referring patients for herbal medicine (87.6% versus 31.6%), acupuncture (63.7% versus 16.5%), spiritual therapy (52.2% versus 8.9%), and osteopathy/chiropractic (51.3% versus 2.5%). This study supports the hypothesis and demonstrates that the students who had knowledge of greater CAM prevalence in the society felt that CAM was more effective, more important to know about, and more important in their future career.[12]

The study by Michael Perkin of medical students, general practitioners and hospital doctors in London England is the only study that partially contradicts the hypothesis. He found that medical students had the least amount of knowledge of CAM therapies, but were the most enthusiastic about CAM and CAM education. Medical students scored lower on self reported knowledge of acupuncture, chiropractic, homeopathy, naturopathy, and osteopathy, but had higher scores on interest (6.0 on a 1 to 10 scale) than hospital doctors (4.3 interest score) and general practitioners (5.5 interest score). More medical students felt that CAM should be taught as a topic course in medical school (84%) than general practitioners (75%) and hospital doctors (60%). However, with the exception of homeopathy, the CAM therapies that the doctors knew

the most about were the same therapies that they had referred patients to. For acupuncture, 94% of hospital doctors and 95% of general practitioners knew the basic principles, and 58% of hospital doctors and 66% of general practitioners had suggested referrals for acupuncture. For osteopathy, 83% of hospital doctors and 84% of general practitioners knew the basic principles of osteopathy, and 52% of hospital doctors and 78% of general practitioners had suggested referrals for osteopathy. For homeopathy, 90% of hospital doctors and 91% of general practitioners knew the basic principles, but only 17% of hospital doctors and 43% of general practitioners had suggested referrals for homeopathy. [13]

CHAPTER 2

METHODS

In order to measure the changes predicted in the hypothesis, a 4 page survey was designed to determine knowledge and attitudes of the students. The survey has 4 sections: knowledge, attitudes concerning relevance, attitudes about education, and perceptions of efficacy, safety, and evidence base. An initial draft of the survey was shared with members of the faculty involved in the ICE week course design and other graduate students in School of Biomedical Sciences. Input was given concerning balance of positive and negative statements, length of the survey, wording of questions, and layout of the answer choices. Although the survey has not been validated, there was general agreement among the developers that the survey would demonstrate students' knowledge and attitudes about CAM. The survey is included in the appendix.

Other studies examining students' knowledge of CAM have focused on perceived self-knowledge rather than direct testing of knowledge. This study deviates from other studies in the literature by asking more factual questions about CAM prevalence rather than perceived self-knowledge of CAM. Questions included information about the number of visits to CAM providers, the economic impact of CAM, the direction of the

CAM trend, the percentage of physicians making referrals to CAM providers, the non disclosure rate of patients using CAM, and the number of medical schools teaching CAM courses. Questions on the relevance of CAM focused on whether students felt they would refer to CAM providers, consider providing CAM therapies, use CAM therapies themselves, and whether they needed to discuss CAM with patients. Attitudes about CAM education included their general view on CAM in medical school and various reasons for or against their views. This study compared perceptions of efficacy, evidence base, and need for education for a large variety of specific CAM therapies, some of which were covered in small group sessions and others that were not. By comparing pre versus post survey answers, the results of the survey captured the effect of small group sessions on specific CAM modalities had on the students' attitude.

The research plan was submitted to the IRB for approval. The IRB was informed that the students would be assigned a random number which they would enter themselves on both surveys. The surveys would be matched by the random numbers to ensure that the pre and post ICE week survey could be paired for the students returning both surveys. Following IRB approval, students were informed both in writing and in verbal explanation that participation in the research study was completely voluntary, completely anonymous, and would have no bearing on grades for the course. The survey was administered immediately prior to the initial lecture at the beginning of the ICE week and then again at the end of the final session on the last day. From a class of 120 students, a total of 106 students returned the pre-ICE week surveys, but only 81 students returned the post ICE week survey. A total of 76 students returned both a pre and post ICE week

survey. The results were entered into a computer database and analyzed using SPSS software. Paired samples T-tests were performed on the results of the surveys from students who had returned both surveys and completed answers on relevant questions.

CHAPTER 3

RESULTS

Following the Integrated Clinical Experience, the medical students had significantly greater knowledge of the prevalence of CAM in the United States. In the questions measuring this knowledge, students initially underestimated number of visits to CAM providers, the economic impact of CAM, the duration of the CAM trend, the nondisclosure rate of patients using CAM, the rate of physician referrals to CAM providers, and the number of medical schools teaching courses in CAM. The surveys following the intervention showed that the students gained greater understanding of the prevalence of CAM in America. This greater understanding is demonstrated by the increase in percentages of correct scores of the knowledge questions following the ICE week as (See Table 1)

Table 1- Changes in correct responses to questions about knowledge of CAM prevalence before and after CAM ICE week.

Knowledge Questions Concerning CAM prevalence	% Correct Pre-ICE	% Correct post-ICE	% Change in correct responses	p-value
Number of visits to CAM providers compared to PCPs annually	0	43.42	43.42	<.001
Total expenditures for CAM services in 1997	5.26	28.95	23.68	<.001
Long term trend of CAM of CAM usage	65.79	77.63	11.84	.038
Percentage of patients not disclosing CAM usage to their physician	31.58	40.79	9.21	.146
Percentage of primary care physicians who made a referral to CAM provider	10.53	31.58	21.05	.001
Number of medical schools including CAM in curriculum	1.32	18.46	17.11	.001

N=76

From all the surveys returned, students initially underestimated the prevalence of CAM as seen in several measures in the survey. In the initial survey, 95.3% of students underestimated the number of visits to CAM providers compared to visits to primary care physicians (PCPs) and only 39.5% underestimated the visits following the ICE week. For the estimation of total expenditures for CAM services, 86.9% underestimated the total initially, and 53% continued to underestimate expenditures following the ICE week. This same underestimation concerning CAM was also seen in perception of CAM education. Students felt CAM education was important, but not addressed well in medical education. The pre-intervention survey demonstrated that 98.1% of students underestimated the number of medical schools covering CAM in the curriculum.

A strong majority of students returning both surveys agreed that medical students should be taught about CAM in medical school both before and after the ICE week. Using a 1-5 Likert scale (1- strongly disagree, 2 – disagree, 3 – neutral, 4 – agree and 5- strongly agree), students had a mean pre-ICE week score of 4.05 and post ICE week score of 4.07 for the statement "I believe that medical students should be taught about complementary and alternative medicine in medical school." While this score did not change significantly (p=.906) following the ICE week, two reasons that people felt CAM education was important did change significantly. There was a significant increase in students wanting CAM education because they would consider referring to a CAM provider (pre-ICE week mean 3.84, post ICE week mean of 4.08, p=.015) and because they would consider incorporating CAM into their own practice (pre-ICE week mean 3.67, post ICE week mean 3.96, p=.005). (See table 2)

Table 2 – Mean agreement scores pre and post ICE week for reasons why CAM should or should not be taught about in medical school, N=76

Reasons for wanting or not wanting CAM To be taught about in medical school	Mean Pre ICE week	Mean Post ICE week	P value
Patients will ask for advice concerning CAM therapies and I will need to tell them what does work and why	4.12	4.16	0.728
Patients will ask for advice concerning CAM therapies and I will need to tell them what does not work and why	4.01	4.13	0.332
Safety concerns – danger of adverse interactions with standard therapies	3.95	4.11	0.251
Safety concerns – danger of adverse reactions to CAM therapies	3.82	4.00	0.203
I would consider referral to CAM practitioner	3.84	4.08	0.015
I would consider incorporating CAM therapy into my own practice	3.67	3.96	0.004
I want to be aware of cutting edge medicine where new therapies are being developed	3.99	4.01	0.825
I have no interest in CAM	2.00	2.00	1.000
CAM is not evidence based	2.63	2.61	0.929
There is not enough time to teach CAM since there are other more important topics	2.52	2.58	0.669
Teaching CAM in medical school will give it false credibility	2.24	2.25	0.910
CAM is not tested on Board Examinations	2.86	2.95	0.467

Mean is based on a 1-5 Likert scale: 1- strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, and 5 – strongly agree

While students also rated other reasons for including or not including CAM into medical school curriculum, these other reasons did not significantly change following the ICE week. Most of the positive reasons for wanting CAM education in medical school were endorsed by the students in both the pre and post surveys. Students agreed that CAM education was important for advising patients, safety precautions, being aware of new therapies, for referring patients to CAM providers, and for incorporating CAM into their own practice. Reservations about inclusion of CAM education in medical school were mainly due to the perception that CAM is not tested on board examinations (mean pre-ICE week survey 2.86 and post ICE week 2.95, p=0.467), that there is not enough time (mean pre-ICE week survey 2.52 and post ICE week survey 2.58, p=0.669) and that there was no evidence for CAM (mean pre-ICE week mean 2.63 and post ICE week mean of 2.61, p=0.929). As for the other reasons that students would not want CAM education, "no interest in CAM" was the statement with the lowest mean (2) for both pre and post survey score. None of the negative reasons changed significantly.

As for the topics that students felt should be covered, significantly more people in the post ICE week survey felt that guided imagery and Ayurveda should be included in a course about CAM. Of the students returning both surveys, 14 % of students in the pre-ICE week survey felt Ayurveda should be covered and 25% in the post ICE week survey felt it should be covered (p=.020). For guided imagery, only 9% of students felt it should be covered initially versus 28% at the end of ICE week (p=.002). Both of these therapies had relatively low interest in the initial survey, but were both covered in the small group interactive sessions. At the end of ICE week, significantly fewer people were interested

in including prayer (36.8 % in pre ICE week and 26.3% post ICE week, p=.045) and applied kinesiology (26.3% in pre-ICE week and 15.8% post ICE week, p=.020). Neither of these therapies was specifically addressed during the course.

The therapies that had the greatest student interest did not change significantly in their assessment from pre to post ICE week. Osteopathic Manipulative Treatment was chosen for inclusion in CAM education by the highest margins of both surveys (88% in the first survey and 95% in the second with p=.058). Herbal medicine (75% pre and 72.% post, p=.640) and nutrition (78% in each) were the next most popular choices. Of the other CAM therapies that were addressed in the small groups, biofeedback showed non-significantly increased interest (46% in pre and 54% in post with p=.223), but Traditional Chinese medicine (21% and 23%, p=.810) and acupuncture (55% in both) showed stable interest.

In the questions designed to measure the students' perceptions of CAM's relevance in medicine, students felt significantly more likely to both provide CAM services and use CAM for self care in the future following the ICE week. Using the same 1-5 Likert scale as earlier sections (1 meaning strongly disagree and 5 strongly agree), the mean pre ICE week score was 3.59 for the statement "I would consider providing CAM therapy to my patients." This score increased to 3.84 after the ICE week (p=.019) Student mean scores for the statement "I would consider using CAM therapy personally for self care" increased from 3.74 pre-ICE week to 3.97 post ICE week (p=.033) Of all pre-ICE week surveys returned, 50.9% of students reported that they had never used CAM for self care.

In other measures of CAM relevance, student perceptions did not change significantly following the ICE week. Regarding attitude toward CAM in future practice, a strong majority agreed that it was important to know about CAM use in their patients (3.92 in pre-ICE week and 4.00 in post ICE week, p=.426). Most students felt that they had a legal duty to inform their patients about CAM therapy options commonly available in the community, but there was a non-significant decrease in that opinion following the ICE week (3.72 pre-ICE week and 3.54 post ICE week, p=.099). This shift in opinion is likely the result of a reading assignment concerning medical law and CAM. Few students felt confident that they would be able to guide their patients to a reputable source of information on CAM before the ICE week (2.95 pre-ICE week). More students felt they could guide patients to a CAM information resource following the ICE week, but the change failed to attain statistical significance (3.24 post ICE week, p=.066).

Regarding perceptions of efficacy, students' opinions changed significantly for three CAM therapies: Ayurveda, Guided Imagery, and meditation. Student perceptions of individual modalities were converted to a 0-4 effectiveness scale with 0 meaning the therapy is ineffective, 1 the therapy might be effective, 2 unknown effectiveness, 3 might be effective, and 4 meaning it is effective. Fewer students answered the efficacy section than other sections of the survey. For all the therapies, few people indicated that they thought the therapies were ineffective, but many students either chose not to answer or indicated that they did not know about the efficacy. Meditation received a mean efficacy score of 2.73 in the pre ICE week survey and a 3.11 in the post ICE week survey (p=.015) from 56 people responding on both surveys. Guided imagery had an increase

from 2.45 to 2.88 (p=.008), and ayurveda had an increase from 2.35 to 2.74 (p=0.013) following the ICE week from 49 students responding to both surveys. These three CAM therapies were all included in the small group interactive sessions.

The perceptions of efficacy for the highest rated therapies did not change significantly following the ICE week. From the students responding to questions in both surveys, the therapies that were considered the most efficacious were OMT (pre 3.77 and post 3.69, p=.569), massage (pre 3.47 and post 3.39, p=.577), chiropractic (pre 3.34 and post 3.47, p=.473), prayer (pre 3.19 and post 3.30, p=.371), acupuncture (pre 3.16 and post 3.24, p=.533), and nutrition (pre 3.10 and post 3.31, p=.236) Other therapies which were included in the small groups interactive sessions showed non-significant increases in perception of efficacy such as traditional Chinese medicine (pre 2.70 and post 2.84, p=.367), and biofeedback (pre 3.02 and post 3.04, p=.878).

A section on the perception of evidence base of CAM therapies did not yield meaningful results. Most people left the section blank most likely due to a lack of knowledge concerning scientific evaluation of the various CAM therapies.

Finally, in regards to students' perception of the CAM ICE week itself, a significant increase occurred in students rating of the adequacy of CAM education in their own medical school experience. However, students remained generally unsatisfied with their educational exposure to CAM even at the end of the ICE week indicating that further education is still desired. On the 1-5 Likert scale, mean pre ICE week score for the statement "I feel that CAM has been adequately addressed in my medical education" received a 2.32 compared to a post ICE week mean of 2.70 (p=.010).

CHAPTER 4

CONCLUSIONS

This study showed that the CAM ICE week educational program significantly changed students' knowledge of and attitudes about CAM. Students showed significant changes in knowledge of CAM prevalence including the economic and educational impact utilization of CAM therapies has had in the United States. While students' high rating in favor of CAM education did not change during the study, students' attitudes about why CAM education was needed significantly changed. Most remarkably, students felt more strongly that CAM education was needed because they would consider referring patients to CAM providers and incorporating CAM therapies into their own practice. CAM therapies that the students most wanted to learn about; OMT, nutrition, herbal medicine, acupuncture and biofeedback; were also felt to be efficacious. However, none of these therapies produced significant changes in interest or efficacy ratings following educational exposure even though they were included in small group discussions (OMT was not included in small group discussions but is already part of the curriculum). The CAM therapies that were more unfamiliar, guided imagery and Ayurveda, showed both a significant increased interest in education and perception of efficacy after they were

included in small group discussions. This change in desire for education and perception of efficacy suggests that CAM education presented in a small group format by practitioners of a CAM modality significantly influenced students' attitudes about CAM. When presented with more information about a modality, students obtained an increased perception of efficacy and desire for more education. However, a significant change could only occur in the therapies that were relatively unfamiliar prior to the educational intervention.

Certainly, many of the therapies that were seen to be the most efficacious were also the therapies that students wanted to learn about. There were a few notable exceptions to this trend. Students rated other manual therapies such as massage and chiropractic as very effective, but did not think they needed to be included in the curriculum. An obvious explanation is that OMT is already extensively covered in the Osteopathic medical schools. Prayer was another modality that was seen as efficacious, but not rated highly for inclusion in the curriculum. A possible explanation is that the topic of prayer is controversial due to its relation to the very personal matter of religious faith. Many people might oppose teaching about prayer so that the school would not appear to be endorsing a particular faith. As many medical schools including UNTHSC are state supported, teaching about prayer might appear to violate the principal of separation of church and state.

Students also experienced a significant increase in the perception of relevancy of CAM. Students felt that that they were more likely to incorporate CAM into their practice and also to use it for self care. Originally, the increase in knowledge about CAM

prevalence was predicted to result in significant increase in perception of relevancy. However, other measures of perception of relevancy, such as the need to know patients' CAM usage and the need to discuss CAM with patients, did not change significantly. Instead the small group sessions that featured physicians who had themselves incorporated CAM modalities into a conventional medical practice appeared to serve as role models that influenced the students thinking about their future careers as physicians. From end of year curriculum comments, the students' responses were the most positive concerning the small group sessions. Students felt that interactions with role models that actually practice the CAM therapies they are talking about was more useful than hearing about it from people who do not use it or reading about it in the literature. The fact that the small group sessions also had time and space for the students to actually try some of the mind body techniques on themselves was likely influential on their intention to use CAM for self care.

Weaknesses of the study include the decrease in returned surveys following the ICE week. Students returning both surveys were more likely to be interested in CAM and had more positive reasons for wanting CAM education. In comparing the mean pre-ICE week scores of all students (N=106) returning surveys versus students returning both pre and post surveys (N=76) does reveal this bias in regard to questions on CAM education. For the statement "I believe that medical students should be taught about CAM in medical school," pre-ICE week mean score of all students was 3.88 and of the 76 students returning both surveys was 4.07. Negative statements concerning the rationale for their view on CAM education also received slightly higher scores from the

all students group versus the group returning both surveys. For example, the statement that there was "not enough time to teach CAM" (2.58 versus 2.53) and that "CAM is not tested on board examinations" (2.94 versus 2.86) received slightly higher scores from the "all students" group (meaning more students not returning the second survey agreed with the negative statements). However, the high relative response rate decreases the likelihood of bias.

Another weakness is the fact that the educational program was not the same for all students because of the small group interaction assignments. The students needed to be split into groups of 10-11, so each individual student only experienced 3 of the 9 possible small group sessions. A further problem occurred because another group of students missed the small group sessions because they were away for part of the week doing rural preceptorships. Naturally, some of the small group facilitators were better than others as could be seen from end of semester student course instructor evaluations. This problem suggests that perhaps there were a few instructors that had a large influence on students' attitudes, but other instructors did not. Furthermore, there were different reading assignments based on the small group assignment to further compound this discrepancy. An examination of the changes within each group might have added greater illumination to what aspect of the ICE week program affected student attitudes.

Other weaknesses concern the survey questions. The survey has not been validated and might not accurately measure the students' knowledge and attitudes. The questions regarding the efficacy and evidence base of the individual therapies were poorly worded which could have contributed to a decrease in student answers on this

section. The number of student answers could have also decreased because of the excessive length of the survey and short time to complete it. There were no questions to directly measure students' perceived knowledge about individual CAM modalities.

It is evident from the study that medical students want CAM education, and feel that CAM is relevant for their medical careers. Students were most interested in learning about OMT, herbal medicine, nutritional supplements and acupuncture which were also therapies perceived to be efficacious. Modalities which students were not as familiar with gained greater interest and perception of utility following education. Students feel that CAM is relevant because they want to incorporate it in their practice, make referrals for their patients, discuss it with their patients, and know if their patients are using it. Students want even more opportunities to learn the specifics of CAM therapy. The biggest question facing educators should be how to teach about CAM and not whether to do it. The experiential approach to learning (having students do meditation or guided imagery for example) and the small group interactive sessions with CAM providers were very successful in the experience at UNTHSC-TCOM. Future studies could be done to compare the impact on students' knowledge and attitudes about CAM from different teaching approaches

The limitation of time in the medical school curriculum points to the importance of further educational opportunities at all points in a physician's career such as residency, membership in professional CAM organizations, and attending CME courses. The goals of education in these other settings might vary from the goals of an undergraduate medical school course, but many of the same teaching methods could be employed.

Future studies should assess educational approaches on physicians' knowledge and attitudes in these other setting. Pervasive patient use of and desire for CAM in America necessitates the development of effective education to keep physicians informed about this important health care trend.

APPENDIX

1. In the United States, what do you believe is the prevalence of usage of complementary and alternative medicine (CAM) practitioners compared to the use of conventional primary care physician (PCP)?
   A. Total visits to CAM practitioners is substantially less than visits to PCPs
   B. Total visits to CAM practitioners is less than visits to PCPs
   C. Total visits to CAM practitioners is roughly equal to visits to PCPs
   D. Total visits to CAM practitioners is greater than visits to PCPs
   E. Total visits to CAM practitioners is substantially greater than visits to PCPs

2. In the United States, what do you believe were the estimated total expenditures for alternative medicine professional services in 1997?
   A. 0-$500 million
   B. $500 million - $1 billion
   C. $1 billion - $5 billion
   D. $5 billion - $15 billion
   E. $15 billion - $25 billion
   F. $25 billion - $35 billion

3. In 1997, how do you think *out of pocket* expenditures relating to CAM therapies compared to *out of pocket* expenditures for all US physician services?
   A. Out of pocket CAM therapy expenditures were less than out of pocket expenditure for all US physician services.
   B. Out of pocket CAM therapy expenditures were approximately equal to out of pocket expenditures for all US physician services
   C. Out of pocket CAM therapy expenditures were greater than out of pocket expenditures for all US physicians

4. What do you believe are the long-term trends in the usage of CAM in the US?
   A. Usage of CAM therapy is a recent trend (<20 years) and its use is declining
   B. Usage of CAM therapy is a recent trend (<20 years) and its use is remaining the same
   C. Usage of CAM therapy is a recent trend (<20 years) and its use is increasing
   D. Usage of CAM therapy is longer trend (>20 years) and its use is declining
   E. Usage of CAM therapy is a longer trend (>20 years) and its use is remaining the same
   F. Usage of CAM therapy is a longer trend (>20 years) and its use is increasing

5. Of the patients who use CAM and see a conventional doctor, which percentage does ***not*** disclose at least one type of CAM therapy to their doctor?
   A. 15-30%
   B. 30-45%
   C. 45-60%
   D. 60-75%
   E. 75-90%

6. What percentage of primary care physicians has made a referral to a CAM provider?
   A. greater than 50%
   B. less than 50%

7. According to the 2000-2001 Liaison Committee on Medical Education (the accrediting authority for allopathic medical schools) Annual Medical school questionnaire, how many medical schools had CAM curriculum as part of a required course?
   A. 0 - 20
   B. 20 - 40
   C. 40 - 60
   D. 60 - 80
   E. 80 - 100

The following are a list of statements about CAM. Please rate the degree to which these statements reflect your own belief based on the following scale

1-strongly disagree 2-disagree 3-neutral 4-agree 5-strongly agree

8. I believe that medical students should be taught about Complementary and Alternative Medicine (CAM) in medical school.
   1 2 3 4 5

9. Important reasons for your answer to question number 8 might include the following:
   A. Patients will ask for advice concerning CAM therapies and I will need to tell them what does not work and why. 1 2 3 4 5
   B. Patients will ask for advice concerning CAM therapies and I will need to tell them what does work and why. 1 2 3 4 5
   C. Of safety concerns – danger of adverse interactions with standard treatment 1 2 3 4 5
   D. Of safety concerns – danger of adverse reactions to CAM therapies 1 2 3 4 5
   E. I would consider a referral to a CAM practitioner. 1 2 3 4 5
   F. I would consider incorporating CAM therapy into my own practice 1 2 3 4 5
   G. I want to be aware of the cutting edge of medicine where new therapies are being developed 1 2 3 4 5
   H. I have no interest in CAM 1 2 3 4 5
   I. CAM is not evidence based 1 2 3 4 5
   J. There is not enough time to teach CAM since there are other more important topics 1 2 3 4 5
   K. Teaching CAM in medical school will give CAM false credibility 1 2 3 4 5
   L. CAM is not tested on Board examinations 1 2 3 4 5

10. I feel the topic of CAM has been adequately addressed in my medical education
    1 2 3 4 5

11. I think it is important to know about the usage of CAM therapies in the patients I am treating. 1 2 3 4 5

12. If a patient were to ask me where they could find reputable information on CAM, I would be able to guide them to a good source of information
    1 2 3 4 5

13. Physicians have a legal duty to inform patients of their treatment options. I believe physicians need to inform patients about CAM treatment options commonly available in the community.
    1 2 3 4 5

14. I would consider referring a patient to a CAM provider.
    1 2 3 4 5

15. I would consider providing CAM therapy to my patients.
    1 2 3 4 5

16. I would consider using CAM therapy personally for self care.
    1 2 3 4 5

17. Have you ever used CAM therapy personally for self care?
    A. Yes - If yes, what?_____
    B. No

18. Which areas of CAM do you feel that it is most important to have covered in the medical curriculum? (circle all that apply)

    A. Osteopathic Manipulative Treatment
    B. Chiropractic Medicine
    C. Massage therapy
    D. Acupuncture
    E. Other manual therapies like the Alexander technique and Rolfing
    F. Herbal medications
    G. Nutritional supplements
    H. Homeopathy
    I. Naturopathy
    J. Functional Medicine
    K. Traditional Chinese Medicine
    L. Ayurveda
    M. Traditional Medicine of the Americas (Native American medicine, curanderos)
    N. Meditation
    O. Guided Imagery
    P. Hypnosis
    Q. Biofeedback
    R. Self-help groups
    S. Prayer
    T. Applied Kinesiology
    U. Therapeutic Touch
    V. Reflexology
    W. Qi Gong
    X. Yoga

Of the following types of CAM therapies, what is your overall impression of their efficacy, safety, and evidence base? Mark all that apply

A. Is ineffective
B. Might be ineffective
C. Might be effective
D. Is effective
E. I don't know
F. Is dangerous
G. Is potentially dangerous
H. Is safe
I. Studies show it is ineffective
J. Studies show tendency toward ineffectiveness
K. Studies are inconclusive about effectiveness
L. Studies show tendency toward effectiveness
M. Studies show it is effective
N. I don't know of any studies

Manual Medicine	
19. Osteopathic Manipulative Treatment	A B C D E F G H I J K L M N
20. Chiropractic medicine	A B C D E F G H I J K L M N
21. Massage therapy	A B C D E F G H I J K L M N
22. Acupuncture	A B C D E F G H I J K L M N
Biological Medicine	
23. Herbal medications	A B C D E F G H I J K L M N
24. Nutritional supplements	A B C D E F G H I J K L M N
25. Homeopathy	A B C D E F G H I J K L M N
26. Naturopathy	A B C D E F G H I J K L M N
27. Functional Medicine	A B C D E F G H I J K L M N
Other healing Systems	
28. Traditional Chinese Medicine	A B C D E F G H I J K L M N
29. Ayurveda	A B C D E F G H I J K L M N
Mind Body Medicine	
30. Meditation	A B C D E F G H I J K L M N
31. Guided Imagery	A B C D E F G H I J K L M N
32. Hypnosis	A B C D E F G H I J K L M N
33. Biofeedback	A B C D E F G H I J K L M N
34. Self-help groups	A B C D E F G H I J K L M N
34. Prayer	A B C D E F G H I J K L M N
35. Energy medicine	A B C D E F G H I J K L M N

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