CULINARY MEDICINE AND A MULTISITE LONGITUDINAL STUDY: COOKING FOR HEALTH OPTIMIZATION WITH PATIENTS (CHOP)

by

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with

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Submitted in partial fulfillment of the requirements for Departmental Honors in the Department of Nutritional Sciences

Texas Christian University

Fort Worth, TX

May 2nd, 2016
CULINARY MEDICINE AND A MULTISITE LONGITUDINAL
STUDY: COOKING FOR HEALTH OPTIMIZATION
WITH PATIENTS (CHOP)

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ABSTRACT

Background: The Culinary Medicine program was developed in 2014 by Tulane University and the Goldring Center for Culinary Medicine to train medical professionals about nutrition and healthy eating practices. Currently, 22 medical schools and institutions nationwide provide this program and also participate in a 10-year longitudinal study (Cooking for Health Optimization with Patients, CHOP) to assess training outcomes.

Project/Program: The Culinary Medicine (CM) curriculum was first piloted in Fort Worth, TX in 2014 and coordinated by dietetics and medical faculty from the University of North Texas Health Sciences (UNTHSC) and Texas College of Osteopathic Medicine (TCOM), Texas Christian University (TCU) and Moncrief Cancer Institute. During 2014-2015 academic school years, 66 health professions students participated in the course. Students were assessed following course participation by completing a 4-part survey including information on demographics, attitudes, dietary habits, and degree of proficiency in professional competencies related to clinical nutrition knowledge. Student responses were compared with 2,138 CM and non-CM students from seven partner institutions.

Results: Comparative multisite CHOP analysis during 2014-2015 show that a total of 97 UNTHSC/TCOM students completed the survey, both CM and non-CM participants. Compared to non-CM participants nationwide, post course results showed that UNTHSC/TCOM students were totally proficient in understanding the following evidence-based competencies, such as the health effects of the Mediterranean, Dash, and low fat diets; dietary patterns for type 2 diabetes, celiac disease, and food allergies; weight loss strategies; recognizing warning signs/symptoms of eating disorders; and the role of fiber and omega-3 fatty acids in disease prevention and heart health.
Conclusion: Nutrition plays a vital role in disease prevention and health promotion. However, few medical or health professions curriculums provide adequate practical integration of the effects of nutrition and eating practices on chronic disease management and quality of life.

CM enhanced Dietetics students’ education in several ways. It gave students the opportunity to enhance teaching skills in educating medical professionals about life-long benefits of sound nutrition practices for patient care, interact in an interprofessional program to build better communication skills with other health professions, and demonstrate the value of dietitian’s knowledge and expertise as part of the medical team.

Keywords: Nutrition education, culinary, Culinary Medicine
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Acknowledgements

This research could not have been completed without the dedication and hard work of our professors and additional health professionals in the field. These individuals contributed knowledge, time, and expertise to the Culinary Medicine program and the CHOP research study to make it what it is today. These individuals include:

Dr. Lyn Dart
Dr. Anne VanBeber
Dr. Stevenson
Dr. D’Agostino
Professor Smith-Barbaro
Dr. Farmer
K. Argenbright
K. Aspegren
Dr. Monlezun
L. Sarris
T. Harlan
List of Abbreviations

1. Culinary Medicine – CM
2. University of North Texas Health and Science Center – UNTHSC
3. Texas College of Osteopathic Medicine – TCOM
4. Dietary Approaches to Stop Hypertension- DASH
CHAPTER I
INTRODUCTION

The responsibilities of medical doctors are numerous and the knowledge that must be grasped through extensive higher education by these professionals is broad. The need for competent health care professionals has become vital as the epidemic of chronic disease states becomes increasingly problematic in the worldwide population. Sadly, obesity is present in approximately 36% of the U.S. adult population and another 30%-40% of adults are classified as being overweight\(^1\). Substantial research confirms that the spike in the percentage of obese and overweight individuals in the worldwide population is accredited to lifestyle factors, including diet and activity\(^2\). Preventative healthcare has now come to the forefront of the medical field as providers search for an effective solution to the obesity crisis and seemingly uncontrollable rising chronic disease state of this country\(^3\). Integrative healthcare models have noted nutrition education as an effective part of the treatment plan for clients and patients who are dealing with issues related to chronic disease and obesity. Unfortunately, only 14% of medical doctors feel that they have adequate nutrition knowledge to effectively counsel patients\(^2\). Many of these doctors reported feeling a lack of confidence in what to say to patients and to whom they should refer their patients to for valid nutritional advice\(^4\). The recognition of the knowledge deficit observed between nutrition and health care professionals has the potential to bridge gaps within the medical field that could ultimately assist in the fight against the epidemic of chronic disease state.

Current research conducted across various universities worldwide has concluded that there is an overall lack of nutrition education offered or required in medical school curriculums\(^2\). In fact, it was noted that medical students report a large gap between the knowledge needed to pass the medical examination boards and the knowledge that is necessary to serve patients well\(^5\).
Studies have concluded that medical students are not receiving the nutrition education or culinary education that they desire in order to feel adequately prepared when faced with the task of counseling clients or speaking on topics of nutrition with patients. In a study completed across nine different universities in Canada, it was reported that students were not confident in their ability to discuss the role of nutrition in terms of preventative medicine or nutrient requirements across the life cycle with their patients. Medical students at these seven universities reported an awareness of the nutrition related gaps in their education and showed concern for their future as professionals with these gaps present. In a similar study completed at Harvard Medical School with second year medical students, it was reported that medical students overall felt that the traditional curriculum provided by the university lacked topics of importance including physical activity, nutrition counseling, and behavior-change strategies. This study concluded that students felt as though these areas were of great importance and deserved more of an emphasis than what was given in the traditional curriculum provided at Harvard Medical School. Students vocalized a willingness to take extra voluntary classes that emphasized topics of nutrition and healthy lifestyle choices because they found these skills and areas of health and wellness increasingly important within the scope of modern medicine. Data continues to show that with the traditional nutrition education methods present in medical schools today, our future leaders in medicine are leaving the academic setting feeling underprepared. Most importantly, medical students are lacking the skills that are needed to properly counsel and provide the necessary resources for patients seeking nutritional help. Studies have consistently pointed to this conclusion emphasizing there is a missing link in nutritional education in today’s medical students’ curriculum.

In response to the detrimental gap in nutrition education of future medical professionals, Tulane University and Johnson & Wales University partnered together to form The Goldring Center for Culinary Medicine in New Orleans, Louisiana in 2012. These prestigious universities
came together to launch the initial CM program with the goal of both improving the nutrition education of medical professionals and to better the nutritional status and life expectancy of those in the community. To achieve this, medical school students were educated in depth about nutrition and the role it plays in preventative medicine. The medical students that took part in the Culinary Medicine course also participated in the hands-on culinary classes, giving these students experience and confidence in the kitchen when cooking and tasting the foods themselves. Due to this unique hands-on experience, the participants were better equipped to provide their future patients recommendations and tips on how to make healthy foods taste good. Overall, the result of this program was a group of future medical professionals that appreciated how valuable food could be when used as a form of preventative medicine. The ideas and concepts taught and discussed throughout Culinary Medicine provided the participants with the ability to incorporate nutrition skills and knowledge into their future practices in order to educate their patients and to improve patients’ lives overall.

The major focus of this research is to outline the retrospective data collected in regards to the Culinary Medicine curriculum from both the Goldring Center for Culinary Medicine and a collaborative program executed by Texas Christian University (TCU) and University of North Texas Health and Science Center (UNTHSC). The medical students’ initial nutrition knowledge and habits will be assessed through the use of a prospective observational cohort study. The goal of this research is to identify the link between culinary and nutrition education courses and medical students’ knowledge of competencies. Additionally, the perceived benefit upon completion of the Culinary Medicine course compared to those students who did not take part in nutrition education curriculums will be observed. The desired outcome would report a positive correlation between a medical student's class attendance and completion of the Culinary Medicine course to their competency in managing and counseling patients and clients in regards to nutrition related
conditions and concerns. By the completion of the course, students will understand the perceived benefits of referring patients that are in need of formal nutrition counseling to nutrition experts. Lastly, Culinary Medicine will increase medical students’ knowledge of nutrition while also furthering the students’ personal health and improving the long-term nutritional status of the community by reducing chronic disease rates.

CHAPTER II
LITERATURE REVIEW

Although medical students delve into an incredibly varied and dense curricula regarding health, nutrition as a preventive science is often only lightly touched on or missed completely. The lack of nutrition education within the curriculum is due to a variety of reasons, such as time, cost, and priority of knowledge in medical schools across America. However, as rates of heart disease, diabetes, and other diet-related chronic diseases continue to climb, nutrition has become an integral aspect of the healthcare field. With that being said, medical doctors are being looked to by society to help spur patients on to better life choices, and providers often do not feel as confident as they should to give diet and exercise advice. While dietitians are the experts in the field of nutrition, medical doctors are often at the forefront of a patient’s primary care. This makes medical doctors a
vital communicator regarding the importance of nutrition on quality of life and preventing disease. Without a push in the right direction in the form of dietary advice, patients have less of a chance of making necessary life changes in the form of healthy eating. There are several solutions to this deficit of time, including additional education, voluntary attendance of supplementary classes, conferences, and seminars for medical students. These are small changes that could be made in medical schools that could, in turn, provide future medical professionals with knowledge and skills that could prevent the growth and spread of chronic disease in the United States.

As mentioned above, preventing the further rise of chronic disease and illnesses is a top priority for medical professionals right now. Unfortunately, it’s a large challenge, as not all physicians are equally trained in all areas. In fact, it was found that “younger care physicians, ages 20-39, were more likely to have had some obesity training than those aged 40-49 or those 50+”9. Because obesity is a chronic disease that is impacting people all over the county, it is of the upmost importance that all medical professionals, especially primary care doctors, have adequate knowledge in order to best serve their patients.

The National Academy of Sciences recommends a minimum of 25 hours of nutrition education for a medical school curriculum10. Interestingly, only 28 of 105 programs in 2008 met this guideline (27%), as opposed to the 2004 number of 40 of 106 schools (38%)10. Perhaps this decrease has also lead to most medical students being discontented with their medical nutrition education.

Along with the perceived dietary knowledge of the medical students, the study focuses on the Harvard Medical School’s nutrition course, which had previously been a dedicated course but had recently become integrated into the curriculum. The dedicated course, formerly called the Preventive Medicine and Nutrition (PMN) course, consisted of 28 contact hours over a 14-week period. The dedicated curriculum resulted in students feeling more satisfied with their medical
nutrition education than their counterparts. The integrated curriculum that took the place of PMN is composed of three 3-hour long lectures dubbed Introduction to Clinical Nutrition (ICN). Both the PNM and the integrated curriculum contained similar themes of discussion, such as micronutrients, obesity, and dietary assessment and counseling.

The resulting satisfaction scores from the students of the two differing curricula really play into the thought that knowledge is transferred more readily when a student is expecting to learn a certain topic. While there was no difference in the knowledge scores from one program to the next, a significant number of students from the ICN portion felt unsatisfied with the quantity and quality of nutrition education provided to them.

An article titled “Nutrition Education in an Era of Global Obesity and Diabetes: Thinking Outside the Box” parallels the mindset of nutrition as an integral aspect of essential healthy life skills. After summarizing the daunting state that the world is coming to in regards to diseases such as obesity, diabetes, and heart disease, the author has an interesting thought: “Is there evidence, albeit circumstantial, that cooking may impact weight and health?” This message is exactly what the “Healthy Kitchens, Healthy Lives – Caring for Our Patients and Ourselves” (HKHL) medical education program focuses on. An annual conference that is headed by the Harvard School of Public Health, the Culinary Institute of America, and the Samueli Institute takes cooking demonstrations, academic lectures, and hands-on cooking lessons to teach physicians how to practice healthful behavior in their own lives. When it comes to hands on learning “practicing a healthful behavior oneself was the most consistent and powerful predictor of physicians counseling patients about these same behaviors”.

Such thinking calls for a change in curricula for medical schools. It is important to note that 71% of entering medical students find nutrition clinically important, but that upon graduation fewer than half hold to this belief. And in practice, only 14% of physicians feel they had sufficient
nutrition counseling training\(^1\). However, when the maintenance of health is insisted upon and held as the norm as opposed to addressing only pathogenic states of disease, the thought process behind attitudes towards mindful eating could take a turn for the betterment of health as well.

Students graduating medical school programs across the country are subject to deficiencies in nutritional knowledge. In fact, one study found that “incoming residents to a pediatric residency program appeared to be deficient in basic nutrition knowledge”\(^{11}\). When the medical professionals that are treating children, an irreplaceable component of society as a whole, do not have basic nutrition skills, it is unreasonable to expect the outcome to be very positive. Nutrition is valuable to a healthy lifestyle, and patients have to be well educated on proper nutrition practices in order to succeed.

Unfortunately, curriculums in medical schools continue to lack the necessary nutrition education that medical students need in order to feel confident and comfortable counseling and assisting their patients and clients with nutrition related concerns. It is reported that less than 50% of the primary care physicians feel comfortable enough to provide their patients with up to date information and guidance on lifestyle behaviors like physical activity and a healthy diet\(^6\). This is a major cause for concern due to the steep increase in the number of diseases and medical conditions caused by poor lifestyle choices. According to the World Health Organization, by the year 2020 a predicted two-thirds of all diseases worldwide will be caused primarily by poor lifestyle choices and health practices\(^6\). This swift and alarming increase could begin to decline if physicians felt as though they were competent in nutritional knowledge and other lifestyle related fields to provide proper counseling and support to their clients and patients.

Furthermore, a study conducted at medical schools in inner-city New York on first year medical students concluded that after taking a course in nutrition the medical students level of knowledge and skills related to nutritional counseling greatly increased as well as their skills and
behaviors in regards to personal health and nutrition. The students were provided with an anonymous pre-class and post-class survey while taking a 2-hour 2 weeklong nutrition crash course. The survey was designed to assess their competencies in nutrition counseling confidence, ability to assess diet, and overall nutritional knowledge. A total of 121 students completed both the pre- and post-survey and the results were recorded. Overall, the researchers found significant change in the students’ abilities to conduct dietary assessments as well as overall counseling confidence. These results assisted in concluding that nutritional education in medical schools provides students with additional confidence and peace of mind when counseling and speaking with clients and patients. The students also reportedly had further positive lifestyle modifications and attitudes towards their personal nutrition after completion of the nutrition course. This curriculum is beneficial to the future practitioner as well as the current student in terms of bettering his or her own lifestyle.

In a study conducted on first year medical students at Erciyes University, it was shown that medical students often partake in hazardous health behaviors in regards to physical activity, sleep, and overall nutrition. The study was completed on 130 students and concluded that more than one-third of the students did not consume cooked vegetables while one-quarter of the students reported not eating fruits or salad. The study also recorded that males ate fewer fruits and vegetables than females. This study assists in showing the importance of educating medical students on healthy lifestyle practices for both the patient and themselves. Providing students with a curriculum on maintaining a healthy lifestyle not only fosters an exchange in knowledge from the practitioner to the patient but also promotes a healthy lifestyle and allows students to take a step back and think about their health in all the chaos of medical school.

For years, the basis of medical practice has focused on retrospective treatment, and there are still many programs that focus on this effort today. Recently however, there has been a movement
toward a preventative focus of healthcare, a theory that is aimed at helping a patient prior to being diagnosed with a chronic disease or a faced with a dire situation. Nutrition is a crucial element within preventative medicine. Unfortunately, the education has not caught up with the societal need. In a study focused on primary care residents and their knowledge, attitudes, and professional norms regarding obesity and nutrition and physical activity counseling, it was found that “[their] knowledge of nutrition assessment and management strategies has room for improvement”\textsuperscript{7}. Specifically, a total of 219 residents participated in the survey, with the mean score being a “50.8 on a 0 to 100 scale”\textsuperscript{7}. It is obvious that with scores of only 50%, the majority of these residents were in no condition to effectively counsel their patients on weight loss, physical activity, and dietary recommendations and therefore were unable to provide them with complete medical care. When it comes to preventing the rise of chronic diseases and treating patients as well as possible, nutritional knowledge and adequate means of nutritional counseling are skills that are crucial for any health professional to have.

As the needs of patients change, the education and experiences given to medical school students should be altered as well to provide the best treatment possible for patients. Students are a crucial part of the future and are an especially valuable component of the future of healthcare. With this being the case, medical students should be appropriately trained in all possible aspects, including the idea of preventative healthcare. This includes nutritional theories and counseling techniques concerning obesity, decreased physical activity patterns, and the components of a healthy diet. However, this study makes it quite apparent that this is not the case for all medical school students or residents.

In a study that tested incoming pediatrics residents, it was found that “the incoming interns averaged answering 52% of the questions correctly”\textsuperscript{11}. The questions asked in the survey revolved around basic nutritional knowledge and theories related to children under the age of 18 years old.
With only about half of the questions answered correctly, it can accurately be stated that the “incoming residents to a pediatric residency program appear to be deficient in basic nutritional knowledge”¹¹. As nutritional knowledge is invaluable when it comes to chronic disease prevention, these results clearly highlight a large problem. Simply stated, “with the ever increasing burden of obesity and its associated co-morbidities on society, it is imperative that medical education focuses on preparing physicians to appropriately counsel all populations on proper nutrition”¹¹. It is extremely important that all physicians and other current health care professionals be well versed in good dietary habits and lifestyle changes, but the incoming classes of doctors and physicians must also possess this same knowledge for any lasting impact or change on the nutritional status of the United States to be made.

Medical schools nationwide are beginning to see the immense value that nutritional education can have on students and are beginning to add additional voluntary courses in nutritional science. Along with Tulane University and the University of North Texas, medical schools including Harvard Medical School have created a unique learning experience for students to gain vital insight on nutrition and proper diet practices⁶. These courses are led by students as well as professors and allow for conversation about topics in nutrition and lifestyle choices. As the courses are completed each year, the students are asked to provide feedback on the relevance of the voluntary course. Without fail, the response is consistently positive and in full support of the unique curriculum that emphasizes how crucial an education in nutrition is to creating a well-rounded medical professional. Closing the gap between nutrition and medical school curriculum may seem like a daunting task, but it has repeatedly been shown that it is a vital gap to fill for both the patient and the practitioner.
CHAPTER III

METHODS

Study Design:

This study was a prospective observational cohort study design. There were two sections of the Culinary Medicine Course given: one in the fall semester of 2014 and one in the spring semester of 2015. During each section, participants completed a 6-week nutrition education course, with one class per week. Each class lasted approximately 3 hours. Participants completed the course at the Moncrief Cancer Institute in Fort Worth, TX. Participants completed a pre-test and post-test at the beginning and end of the school year to evaluate the difference, if any, in specified nutrition competency level upon finishing the course. The results for the pre-test and post-test surveys were collected in this longitudinal study and their responses were recorded and analyzed. The data was collected off of the academic portal website, CourseSites (BlackBoard, USA), and participants results were assessed through Chi Squared with an emphasis on survey answers that were recorded as “strongly agree”.

Participants:
A total of 66 health professions students participated in the Culinary Medicine in 2014-2015. The health professions studies were classified as Physician Assistant (PA) students, pharmaceutical students, or TCOM students. Students were admitted to the course based on a voluntary lottery system, and were required to be a current medical student at UNTHSC to enter. The majority of participants were female, although both sexes were equally eligible to participate. Students that did not complete the entire course, as well as those that did not take both the pre- and the post-course survey were not included in the overall study results. Tulane University and Texas Christian University Institutional Research Board approved the study procedures, and informed consent was obtained upon participation by all participants.

**Protocol:**

**Pre-Test Survey**

The pre-test survey was administered online before the Culinary Medicine course began. Students were given approximately thirty minutes to complete the survey. Competencies that were assessed included, knowledge of benefits of fiber in disease prevention, weight loss tactics and maintenance, the Mediterranean Diet, DASH diet, eating disorders management, importance of hydration, and weight loss in Type II diabetes management, and other nutrition related proficiencies (Appendix E).

**Six-Week Culinary Medicine Program**

Following the pre-test survey, participants began the Culinary Medicine course. Participants arrived at the Moncrief Cancer Institute in Fort Worth, TX at 5 pm for the first class. Participants were randomly assigned into teams of 3 with TCOM, PA, or pharmaceutical students, and then each group of three was paired with one dietetics student educator. At the beginning of each class, participants were introduced to that week's particular health topic and each group of participants was assigned a different recipe to create that was relevant to the health topic. Next, participants
gathered the necessary supplies and ingredients for their recipe and began to cook, with the help of their dietetics student teacher. Upon completion of the recipe, participants platted up their dish in the recommended serving size and gave a presentation to the rest of the class that highlighted the concepts they learned while cooking that week. These presentations involved comments entailing why each dish was considered a healthy choice, what food substitutions had been made, and the nutrition facts for one serving of the dish. After all participants completed their presentations, participants were allowed to take a plate and sample each recipe that was prepared that week, sit with their team of three and their dietetic educator, and begin to eat. While the participants were eating, Dr. D’Agostino from the UNTHSC presented a lecture focused on medical nutrition therapy and the physiological and biological components of the topics addressed in class that week, and went over the answers to case study assignments participants were to complete prior to the start of class. Dr. D’Agostino answered any questions regarding medical nutrition therapy and nutrition biology that any of the participants would have following the lecture and review of case study materials. Participants listened attentively, took notes, and reviewed the case study answers each week while Dr. D’Agostino presented. Upon completion of the lecture, participants assisted in cleaning up their table (with help from dietetics student teacher) and left the Moncrief Cancer Institute at approximately 8 pm.

*Post-Test Survey*

After one year participants completed their post-test survey. The same exact procedures occurred at the post-test survey as the pre-test survey. A 9-month time frame had elapsed (Appendix E).

*Statistical Analyses*

The SPSS was used for all data. Descriptive statistics were calculated for percentages for female, age over 24 years, race, prior nutrition education, special diet, clinical years upperclassmen
(3rd or 4th year), and primary care. The answers on the pre- and post-test surveys were then compared against 488 other health professions students that had not completed the Culinary Medicine course. All values are recorded as either a percentage of the whole or as a p-value to indicate significance. The indicated variances between students who completed the Culinary Medicine curriculum versus those that had not participated in the curriculum were obtained using Fisher’s exact test, 1-sided Fisher’s exact test, and conditional (fixed effects) logistic regression.

**CHAPTER IV**

**RESULTS AND DISCUSSION**

**Results:**

Upon completion of the post test survey, it was found that there were several significant competencies that showed significant levels of improvement (p<.05). The specific competencies related to understanding basic dietary principles and recommended practices included knowledge of a low fat diet and its relationship to optimal health, understanding of the Mediterranean diet, knowledge and use of the glycemic diet, understanding of the DASH diet, food allergies, and optimal strategies for weight loss in obese and/or overweight patients. (Appendix A). The specific competencies that showed significant levels of improvement in understanding the role of dietary nutrients in disease management included: fiber in disease prevention, eating disorders, knowledge of recommended fatty acids, water and hydration, and the impact of weight loss on people with type two diabetes (Appendix B). These outcomes all directly correlate to the competencies that were taught in the CM class.

**Discussion:**
The aim of this study was to analyze TCOM medical students performance pre and post completion of the culinary medicine program and assess the perceived benefits and education students received through the CM class. We found that students that participated and completed the CM class reported increased confidence in their ability to counsel and speak to patients about various topics including but not limited to weight management, disordered eating, the Mediterranean diet, the DASH diet, omega 3 and omega 6 fatty acids, hydration, use of fiber in disease prevention, and common allergens. These findings indicate that the culinary medicine program is effective in providing medical students the necessary education and experience that is required to properly counsel and refer patients with nutrition-related concerns. This study supports the idea that nutrition education should be emphasized and incorporated into the curriculum at medical schools. We found that the confidence and overall nutritional knowledge of TCOM students at UNTHSC was greatly impacted by the culinary medicine course. These results were observed through comparison of pre- and post-tested TCOM students who participated in the culinary medicine course and surveys completed by students who did not participate in the culinary medicine course. Significant increases in overall confidence and attitude towards nutrition counseling were noted and were consistent with previously administered research on medical students at Harvard Medical School in a similar nutrition education program. Both courses showed increases in the students’ perceived feelings towards nutrition and nutrition education with their patients. When compared to a study completed in 2011 regarding the attitudes of medical school students upon completion of an integrated nutrition curriculum compared to a dedicated nutrition curriculum, our results displayed that a dedicated nutrition curriculum such as Culinary was much more beneficial in educating students on nutrition-related concepts. The comparative study results reported that the model of nutrition education they received in traditional curriculums did not affect
medical school students significantly. Our results reflect almost the exact opposite, most likely due to the unique hands on set up of the course. The elective TCOM students directly benefitted from dedicated nutrition curriculum and reported increased proficiency in both disease prevention/treatment and knowledge of recommended dietary pattern competencies.

TCOM students are health professionals, meaning that they comprehend the value of health through their prior education and prior scholastic experiences. Once these students were provided with hands on nutrition education and culinary experience, they were able to grasp the importance of nutrition and the lasting impact proper nutrition education can have on a person’s health, quality of life, and lifespan. Through assessment of the results it was shown that the TCOM students became more proficient in nutritional competencies, developed an attitude that recognized routine nutrition counseling as a crucial component to a patient’s health status and valued the work of nutrition professionals and dietitians as the nutrition experts. The results that were assessed utilized detailed questions pertaining to several nutrition related competencies that were discussed throughout the six-week course.

This study’s credibility is negatively affected by its relatively small sample size. The class was based on a lottery system and not all students that had the desire to participate in Culinary Medicine were able to do so due to logistics and the resources available to the program. The lottery system also added a convenience bias to the study by only assessing students that were willing to sign up and be apart of a non-required course. Additionally, the class met once a week for several hours at a time. If the learning had been spaced out over a few days each week, the results that were reported may have differed from increased exposure to nutrition related topics.

By conducting this study, additional evidence to support the importance of educating medical students on nutrition and nutrition’s impact on preventative health care was identified. This study may provide evidence to promote additional medical schools to adopt CHOP, or provide their
students with the opportunity to learn and become more familiar with the impact nutritional practices has on quality of patient care. Further studies pertaining to nutrition education in other medical schools and nutrition education to pre-medical students at the undergraduate level may be completed following this study. By studying the medical students and their perceived value of nutrition and nutrition education, valuable insight into the health practices of these professionals for their patients as well as in their personal lives was recorded. It also provided evidence into how these professionals will practice either with the Culinary Medicine program or without exposure to this material.

**Conclusion:**

The participants in this study showed great improvement in their knowledge of the nutritional competencies that were taught in the Culinary Medicine course. Specifically, participants showed improvements in the competencies of understanding the role of fiber in disease prevention, weight loss practices, weight loss practices with Type 2 Diabetes, the Mediterranean Diet, DASH diet, hydration, the importance of exercise, eating disorders, omega-3 and omega-6 fatty acids and their role in the diet, use of glycemic index, and food allergies and intolerances (Appendix A and B). This means that they are not only better equipped to improve their personal nutrition and dietary habits, but also better prepared to counsel their future patients on preventative medicine techniques. By improving the participants’ knowledge, skill level, and familiarity of these preventative medicine nutrition techniques, these future medical professionals will be able to care for their patients in a much more impactful, and possibly life-saving, way.

**Suggestions for Further Research:**

Further research could be utilized in the areas of other nutritional competencies, such as knowledge of basic renal and cardiac diet terms and usage. If doctors and dietitians were on the
same page about the largest points--such as what food groups are recommended and how to space them out, etc., then patients could spend less time trying to figure out which medical professional is correct. For example, if a patient has been recently diagnosed with Type 2 Diabetes and the primary care physician instructs the patient to never eat sugar again, the patient will most likely be upset and a bit confused. Hopefully, when the patient visits a dietitian, this issue would be cleared up, but a lot of stress and worry could be prevented if both health professionals had the same general views on nutrition for the more common disease states, such as diabetes, heart disease, kidney failure, and the more common types of cancer.

Further research could also be utilized throughout a longer span of time. Specifically, the participants used in this study could be further surveyed in 5-10 years about their status in the competencies that showed improvement during this study. The goal of this would be to see if participants actually retained the learned information, and were realistically able to pass it on to their patients. Further research could also be done through changing the time of when participants took both the pre-test and post-test. Although this study showed that participants improved in the specified competencies throughout the school year, it is not possible to know for sure that all of the recorded improvement happened strictly because of the CM course. For further studies, it would be beneficial to have participants take a pre-test survey during the first CM class and a post-test survey during the last CM class. This way, the results would only show improvements of the knowledge of participants directly from the CM class, not from any other classes they took during the school year.
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<table>
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<th>Post Elective TCOM Students Totally Proficient In: Disease Management</th>
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APPENDIX B

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</tr>
<tr>
<td>Optimal strategy for weight loss in overweight or obese patients</td>
<td>0.023</td>
</tr>
</tbody>
</table>
APPENDIX C

Texas Christian University
Fort Worth, Texas

CONSENT TO PARTICIPATE IN RESEARCH

Title of Research:
The title of the research is Culinary Medicine.

Funding Agency/Sponsor:
The funding sponsor is Tulane University.

Study Investigators:
The study investigators are Nicole Bell, Natalie Sisk, Erica Schiesler.

What is the purpose of the research?
The purpose of the research is to prove or disprove the effectiveness of the Culinary Medicine program upon the students and participants.

How many people will participate in this study?
A minimum of 150 participants will participate in this study.

What is my involvement for participating in this study?
The involvement of the participant in this study is to give their input on their individual learning experiences regarding the Culinary Medicine program.

How long am I expected to be in this study for and how much of my time is required?
After completing the Culinary Medicine program (6 weeks) the participant will complete the evaluation form (approximately 20-25 minutes) online. The information in this form will be used for the extent of the research period.

What are the risks of participating in this study and how will they be minimized?
This study is very low risk. However, there is the possibility of psychological detriment. The participant analyzing their experience in a negative way, leading to undesirable emotions, could cause this.

What are the benefits for participating in this study?
The benefits of participating this study are that future Culinary Medicine courses will be improved so that incoming students can develop an even deeper understanding and appreciation of nutritional sciences.

Will I be compensated for participating in this study?
There will be no compensation for participating in this study.

What is an alternate procedure(s) that I can choose instead of participating in this study?
No, only participants that take part in the Culinary Medicine course can take part in the survey. The written survey is the only way to participate in this research study after taking the culinary medicine course.

How will my confidentiality be protected?

All participants will have their confidentiality protected per federal regulations. Completed surveys will be stored in a secure location that is only accessible by study investigators and the research class preceptor. Names and other personal information will not be distributed to any outside parties.

Is my participation voluntary?
Yes, participation is completely voluntary for this study.

Can I stop taking part in this research?
Yes, at any time you can stop taking part in this research. Simply contact a study investigator to begin the withdrawal process.
What are the procedures for withdrawal?
If withdrawal is desired, simply contact one of the study investigators for assistance with the withdrawal process.

Will I be given a copy of the consent document to keep?
Yes, you will be given a copy of the consent form to keep per federal guidelines.

Who should I contact if I have questions regarding the study?
For further questions please contact Nicole Bell at (760)-519-9838, Erica Schiesler at (832)-794-4294 or Natalie Sisk at (972) 821-7217.

Who should I contact if I have concerns regarding my rights as a study participant?
Dr. Dan Southard, Chair, TCU Institutional Review Board, Phone 817 257-6869.
Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104.
Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.
APPENDIX D
Cooking for Health Optimization with Patients (CHOP)-Medical Professionals Track

Investigators: Dominique J. Monlezun, Ph.D.(c), M.P.H. (Principal Investigator) and Timothy S. Harlan, M.D (Co-Investigator), The Goldring Center for Culinary Medicine at Tulane University School of Medicine, on behalf of the CHOP Co-investigators.

Description: This is the world’s first and largest known comparative effectiveness trial assessing hands-on cooking and nutrition education compared to traditional clinical education for current and future medical professionals and patients. This prospective observational cohort study will enroll 10,000 subjects across its professional, community, employee, and randomized controlled trial tracks.

Data safety: Your participation in this study is anonymous through a dummy ID you create. Your responses and email are only viewable to the study team for purposes of the study and are kept on password protected-Tulane University computers and secure servers in locked offices to contact you for prize drawing and correctly record your survey responses during your medical schooling years. Data analysis occurs ONLY with de-identified responses using your dummy ID so we protect your identity. Only the first fully completed survey from each student per semester (fall or spring) will be considered for the drawing. By clicking on the online survey link, you agreed to participate in this study. At any point you are free to stop participating by simply closing your browser window with the survey. You can contact the Study PI for any questions (dmonlezu@tulane.edu).

There are four parts that together take about 10 minutes: (1) attitude towards nutrition counseling (~1 minute), (2) dietary habits (~2 minutes), (3) competencies in patient education (~5 minutes), (4) demographics (~2 minutes). Thank you in advance for participating!

Sincerely,
CHOP Co-Investigators

CODE: To ensure anonymity, please use the following 6-letter/digit code: First 2 letters of your mother’s first name, then the month you were born (2 digits), and the first 2 letters of the town where you were born. For example if your mother’s name is Judy, you are born in August and you are from Altoona, the code would be JU08AL.
### Part 1 of 4: Attitudes

**Q1 In general, I believe that..**

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional counseling should be included in any routine appointment, just like diagnosis and treatment.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Specific advice about how to make dietary changes could help patients improve their eating habits.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Physicians can have an effect on a patient’s dietary behavior if they take the time to discuss the problem.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
## Part 2 of 4: Dietary Habits

Q2 On average over the last 6 months, how often did you consume..

<table>
<thead>
<tr>
<th>Item</th>
<th>Never</th>
<th>1-2 times per week</th>
<th>3-5 times per week</th>
<th>1 time daily</th>
<th>2 or more times daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables (e.g. carrots, spinach, tomatoes, but NOT potatoes or french fries)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Legumes (e.g. beans, split peas, peanuts, or lentils)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Fruits (e.g. oranges, apples, bananas)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Nuts or nut butters (e.g. peanuts, almonds, cashews)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Cheese or fermented diary (e.g. yogurt)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Red and processed meat (e.g. hamburgers, steak, hotdogs)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Non-fried fish or seafood (e.g. canned, baked, grilled)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Whole grains (e.g. whole wheat bread or pasta, oats, brown rice, corn tortilla)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Monosaturated fats (e.g. avocado, olive or canola oils)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>1 alcohol serving (e.g. 1 can of 12 oz beer = 1 glass of wine = 1 shot of spirits)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Baked products (e.g. muffins, doughnuts, pastries)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Calorie-containing beverages (e.g. coke/soda, non-black coffee drinks, energy drinks)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
<tr>
<td>Saturated fats (e.g. butter, 2% or whole milk, margarine)</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
<td>⬜</td>
</tr>
</tbody>
</table>
Part 3 of 4: Competencies

Q3.1 For me educating patients independently of support from other medical professionals on the following topics, I feel..

<table>
<thead>
<tr>
<th>Topic</th>
<th>Not at all confident</th>
<th>Somewhat confident</th>
<th>Neither not at all confident, or totally confident</th>
<th>Mostly confident</th>
<th>Totally confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediterranean Diet and its health effects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DASH diet and its health effects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetarian diet and its health effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low fat diet and its health effects</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>High protein/high fat diet (e.g. Atkins) and its health effects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examples of a serving size from the 2011 “My Plate” guidelines.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Definition of moderate alcohol consumption and its health effects.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognizing warning signs and symptoms of patients with eating disorders.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role of dietary cholesterol and saturated fat in blood lipids.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended dietary patterns for type 2 diabetes.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Significance of modest weight loss for type 2 diabetes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight loss strategies in overweight or obese patients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role of Omega-3 and -6 fatty acids in heart health and their food examples.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q3.2 For me educating patients on the following topics independently of support from other medical professionals, I feel:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Not at all confident</th>
<th>Somewhat confident</th>
<th>Neither not at all confident, or totally confident</th>
<th>Mostly confident</th>
<th>Totally confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of dietary fat types (e.g. saturated vs. other) and their food examples.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifying antioxidant-rich grocery produce.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calories per gram of protein, carbohydrate and fat, and their basic metabolic roles.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role of hydration in health, and fluid needs based on activity and age.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Celiac disease and management strategies for patient’s diet and lifestyle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food allergies and management strategies for patient’s diet and lifestyle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The role of glycemic index and load in dietary management.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiber in disease prevention, and example ingredients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessing the total calories, saturated fat, and sodium using the food label.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteoporosis and prevention and treatment strategies for patient’s diet and lifestyle.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculation of body mass index (BMI) and waist-to-hip ratio based on gender.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall benefits of aerobic exercise on health and well-being.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part 4 of 4: Demographics

Q4.1 Please select your current institution.
- Tulane University School of Medicine, New Orleans, LA
- University of Texas-Southwestern Medical School: Montcrief Cancer Institute, Dallas, TX
- Texas College of Osteopathic Medicine, Dallas, TX
- Texas Christian University, Dallas, TX
- University of Illinois-Chicago College of Medicine, Chicago, IL
- University of Colorado-Denver School of Medicine, Denver, CO
- Charles R. Drew/UCLA Medical Education Program, Los Angeles, CA
- Western University of Health Sciences, Lebanon, OR, or Pomona, CA
- University of Texas School of Medicine in San Antonio, San Antonio, TX
- Lake Erie College of Osteopathic Medicine: Arnot Ogden Medical Center, Erie, PA
- Robert Wood Johnson Medical School, New Brunswick, NJ
- Meharry Medical College, Nashville, TN
- University of Chicago Pritzker School of Medicine, Chicago, IL
- Michigan State University College of Human Medicine, East Lansing, MI
- Penn State Hershey College of Medicine, Hershey, PA
- Mercer University School of Medicine, Columbus, GA
- Mercer University School of Medicine, Macon, GA
- Mercer University School of Medicine, Savannah, GA
- West Virginia University School of Medicine, Morgantown, WV
- University of Alabama School of Medicine, Tuscaloosa, AL

Q4.2 Please select your survey year.
- Fall 2014
- Spring 2015
- Fall 2015
- Spring 2016
- Fall 2016
- Spring 2017
- Fall 2017
- Spring 2018
Q4.3 In what year of schooling are you for your respective track?

<table>
<thead>
<tr>
<th>Track</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD (Medical Doctor)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA (Physician Assistant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OT (Occupational Therapist)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q4.4 What is your age?
- Under 21
- 21-24
- 25-29
- 30-39
- 40 or over

Q4.5 Are you male or female?
- Male
- Female

Q4.6 With what race or ethnicity do you primarily identify?
- White
- African American
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or other Pacific Islander
- Other (please specify) ________________

Q4.7 Do you follow any specific dietary practices? (e.g. gluten-free, vegetarian, weight watchers, kosher, etc.)?
- No
- Yes

Q4.8 Did you have any nutrition training prior to your current schooling?
- No
- College major or minor
- Graduate classes (e.g. MPH, RD, etc.)
- Other (please specify) _____________________
Q4.9 For medical students, what is your intended specialty?
- Anesthesiology
- Dermatology
- Emergency Medicine
- Family Medicine
- General Surgery
- Internal Medicine
- Neurology
- Obstetrics and Gynecology
- Ophthalmology
- Orthopedic Surgery
- Pathology
- Psychiatry
- Radiology
- Biotech/ Pharmaceutical Research
- ENT
- Immunology
- Internal Medicine/ Pediatrics
- Neurosurgery or Cardiothoracic Surgery
- Otolaryngology
- Pediatrics
- Physical Medicine & Rehabilitation
- Reproductive Endocrinology (Fertility)
- Sports Medicine
- Undecided
- Urology
- Not applicable

Q4.10 Please select your involvement in Culinary Medicine opportunities.

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective or culinary medicine class</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>Community service (at least 4 hours)</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>3rd or 4th year medical student seminars</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>Medical student rotation at Johnson and Wales</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>Additional community service (5-10 hours)</td>
<td>❌</td>
<td>✓</td>
</tr>
<tr>
<td>Additional community service (more than 10 hours)</td>
<td>❌</td>
<td>✓</td>
</tr>
</tbody>
</table>
Q4.11 Are you satisfied with the quality and quantity of your nutrition education?
☑ No
☑ Yes

Q4.12 Do you have any recommendations or critiques for curriculum topics or opportunities?

Q4.13 If you participated in any Goldring Center for Culinary Medicine (GCCM) cooking classes, who was most influential in your choice to participate?
☑ Co-worker/classmate
☑ Child
☑ Extended family (i.e. aunt, cousin, etc.)
☑ Friend
☑ Grandparent
☑ Parent
☑ Neighbor
☑ Sibling (i.e. brother or sister)
☑ Medical professional (i.e. doctor, nurse, RD, etc.)

Q4.14 How often do you provide nutrition counseling to patients when you are allowed by your attending and clinical schedule? (i.e. suggesting to patients wheat instead of white pasta on 3rd/4th year medical school rotation in an outpatient clinic).
☑ Almost never (0 out of every 10 patients)
☑ Rarely (1-3 out of every 10 patients)
☑ Sometimes (4-6 out of every 10 patients)
☑ Often (7-8 out of every 10 patients)
☑ Almost every time (9-10 out of every 10 patients)

Please write your email address.