

A CULINARY MEDICINE COURSE IMPROVES NUTRITION AND DIETARY
COMPETENCIES OF MEDICAL AND PHYSICIAN ASSISTANT STUDENTS

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ABSTRACT

Purpose/Hypothesis: Nutrition plays a vital role in disease prevention and health promotion; however, few health professions curriculums provide adequate nutrition education. The Culinary Medicine program (CM) was developed at Tulane University Goldring Center for Culinary Medicine in 2012 to train health professions students about nutrition and healthy eating practices. Students also participate in a 10-year longitudinal study (Cooking for Health Optimization with Patients, CHOP) to assess learning outcomes. The purpose of this study was to evaluate both retrospective pre and post Culinary Medicine course CHOP data for 2016 – 2018 plus pre and post Culinary Medicine course Mediterranean Diet Score data for the spring 2019 cohort of health professions students.

Methods/Design: The CM curriculum was first offered in Fort Worth, TX in 2014 and taught by faculty from UNTHSC, TCOM, Texas Christian University (TCU) and Moncrief Cancer Institute. During 2016-2018, students participating in the CM course were assessed pre and post course using the 4-part CHOP survey including demographics, attitudes, dietary habits, and degree of proficiency in competencies related to nutrition/dietary knowledge and application. Additionally, medical and physician assistant students completed the Mediterranean Diet Score sheet both pre and post CM course for the spring 2019 session to determine personal dietary changes during the 6-week period. Study procedures were approved by TCU IRB, and informed consent was obtained. Data were analyzed to meet study objectives (SPSS, $p < 0.05$).

Outcome Measures: Assess outcomes of a Culinary Medicine course for improving nutrition and dietary competencies plus personal eating practices of health professions students.

Participants: 2016 – 2018 included a cohort of 77 first and second year medical and 13 physician assistant students (57/female; 33/male) from the University of North Texas Health Science Center and Texas College of Osteopathic Medicine. 2019 participants included 26 first and second year medical and 4 physician assistant students (18/female; 12/male) from the University of North Texas Health Science Center and Texas College of Osteopathic Medicine.

Results: 2016 – 2018 Results showed that students who participated in the Culinary Medicine course reported greater proficiency in their ability to inform patients about nutrition/dietary competencies: (1) health effects of the Mediterranean, Dash, and low fat diets; (2) weight loss strategies, portion control, food label facts and serving sizes; (3) dietary practices for type 2 diabetes, celiac disease, and food allergies; (4) role of dietary cholesterol/saturated fats in blood lipids; (5) recognizing warning signs/symptoms for eating disorders; and (6) role of fiber and omega-3 fatty acids in disease prevention and heart health ($p \leq 0.05$). Post course Mediterranean Diet Scores showed that students who participated in the Spring 2019 course reported significant increases in overall diet score. There were significant increases in individual questions answered “yes” in all but one question. Vegetables, fruits, whole grains, and legumes all showed significant increases in the percent of students who chose “yes”. Nuts, fats, and fish categories also showed significant increases. The category that showed no change was meat, and the category that showed the most change was red wine. Total scores also shifted from a 0-8 range to a 4-9 range. In the pre-course scoring, 5% of students scored in the 0-3 category and in the post-course scoring, no students scored within this category. In the post- course scoring students increased from below 5% to over 12% scoring in the 6-7 range. There was also a significant increase in students scoring within the 8-9 range ($p \leq 0.05$).

Conclusions: Study results underline the value of dietetics educators providing innovative learning opportunities that integrate nutrition into training for health professions students.

INTRODUCTION

Nutrition plays a key role in a person's overall health and well-being. In fact, the top two causes of death, heart disease and cancer, can directly correlate with a person's nutrition status (1). Proper nutrition can significantly lower inflammation and disease risk, either preventatively or as a component of recovery.

Nutrition education is something that many Americans lack, even after being diagnosed with a nutrition related disease. Unfortunately, it is not only those with the diseases that lack proper nutrition education, but also the physicians caring for them. America's healthcare system focuses on acute healthcare as opposed to stressing the preventative measures that keep people out of the hospital and healthy in the first place. With a necessary shift to preventative medicine potentially on the horizon, it would seem that medical schools would place a large focus on nutrition related courses. Unfortunately, most nutrition training seems to still come from basic science courses (2). Medical students should be learning more about the direct relation of nutrition throughout life stages, what happens during shock and trauma that is affected by nutrition, and what role nutritional maintenance plays in overall health and how to incorporate this into treating and teaching their patients (3).

In a study of 239 medical schools, 22 were found to provide nutrition education through a nutrition course, 82 were found to provide nutrition training on an integrated spectrum, and the rest spanned through chemistry, biology, physiology and clinical practices. This can be seen in Figure 1. Figure 2 shows the hours that are spent on nutrition within each course. Within these courses, it was found that nutrition courses provide the most hours of nutrition training with the most being 13.8 hours. This is significantly lower than the recommended 23-25 hours (4).

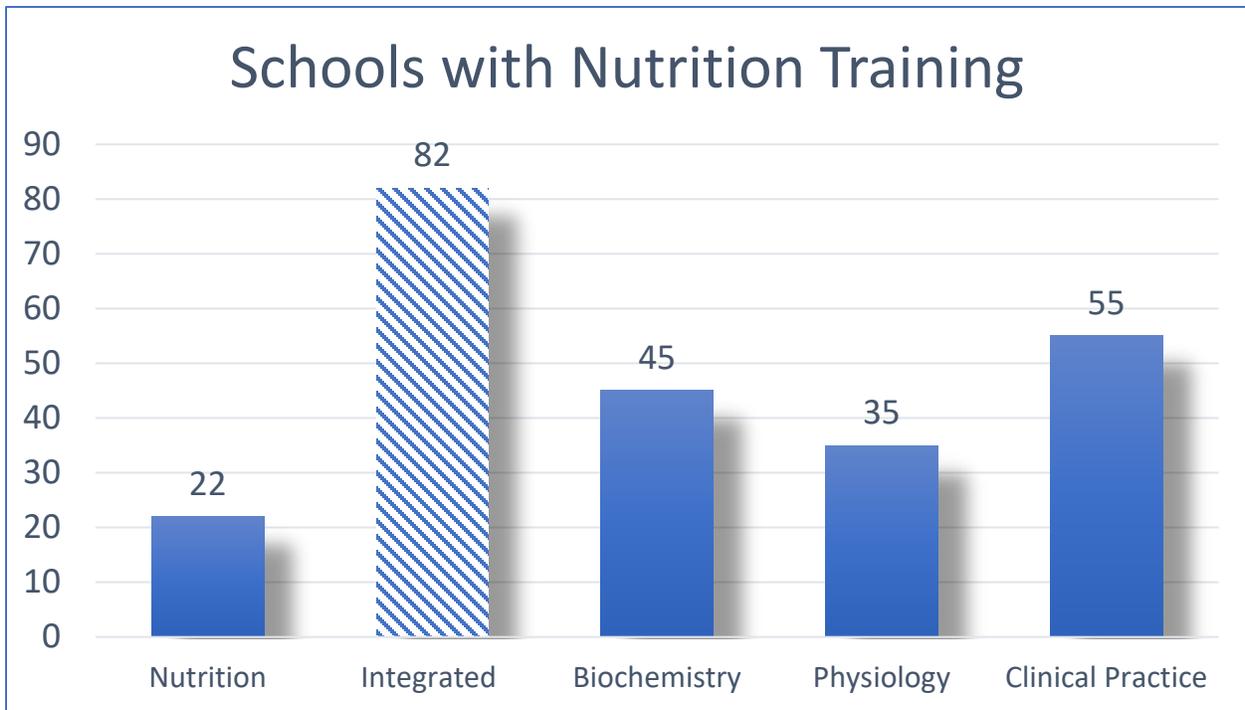


Figure 1. Schools with Nutrition Training

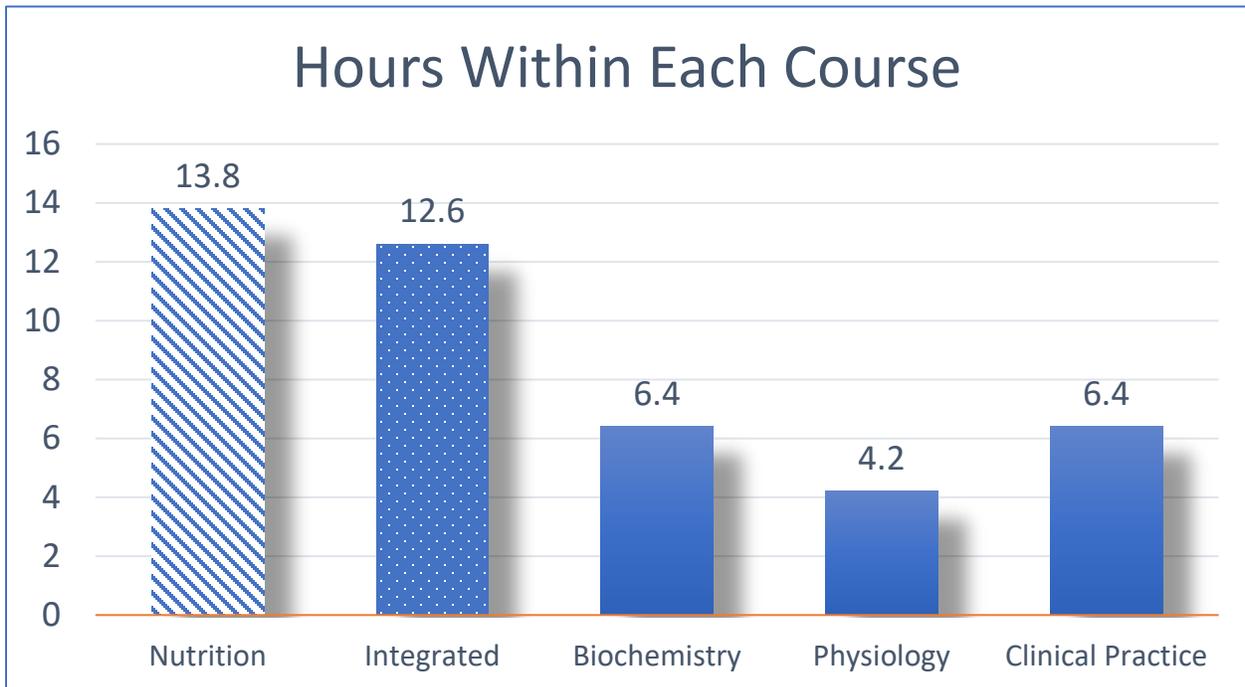


Figure 2. Hours Within Each Course

The Goldring Center for Culinary Medicine at Tulane University recognized this and became the first dedicated teaching kitchen for a medical school. It was created in partnership with Johnson and Wales University in 2012. This was one of the first centers in the United States whose purpose was to integrate nutrition and dietary intervention into the medical school curriculum. This course is available to first- and second-year medical students at Tulane University. It provides, hands on training for medical students as well as continuing education for those involved in healthcare and foodservice industries. There are over twenty units within the course that address health issues such as obesity, diabetes, heart disease, and high blood pressure. The diseases/conditions that these units are formatted around are those that can be prevented or addressed heavily with nutrition therapy and proper cooking/eating habits. Students learn about these diseases through the perspective of nutrition and eating behaviors and learn to apply these to their patient population. Within the course there is an opportunity to integrate medical nutrition therapy with hands on culinary experience and application of any previously gained nutrition knowledge. Research indicates hands-on cooking classes also improve personal health behaviors. This allows the students to have credible experience when talking with patients about their options. There are currently over fifty medical schools, residencies and nursing programs that use parts of these courses in their curriculum. A couple of these schools include, Texas College of Osteopathic Medicine (TCOM) and the University of North Texas Health Science Center (UNTHSC).

Schools that participate in the culinary medicine program also participate in the Cooking for Health Optimization with Patients (CHOP) study. This is a ten-year longitudinal study that assesses the training outcomes of the course. It is a fifty-nine-question four-part panel that is given to students before and after the course is taken. Data points include demographics, dietary habits, attitudes and degree of competency in a particular area.

At Texas Christian University (TCU), the Culinary Medicine course is an interprofessional course adapted from the Goldring Center for Culinary Medicine. The course is six weeks long and divided into six separate sessions. This class was piloted in 2014 and teaches health professions students (mainly medical and physician assistant) from UNTHSC and TCOM, in Fort, Worth, Tx. It teaches these students about food, how to cook, what to eat, and how they can use this information to help patients improve their health with diet and nutrition. These classes are coordinated by dietetics and medical faculty from UNTHSC, TCOM, TCU, and Moncreif Cancer Institute. Dietetics students from TCU help teach culinary and meal preparation skills as well as how to connect these sciences with the kitchen. The medical/physician assistant students receive pre class assignments prior to attending the class each week, when they get to class they go to the kitchen for hands on cooking and integration of medical nutrition therapy with cooking, then they plate and present for an opportunity to teach back what they learned, finally a staff member will lead a discussion that delves deeper into the anatomical and physiological application of the information. Students are taught how to prepare more nutritious dishes and modify recipes of commonly consumed foods to meet health needs of certain individuals. building, healthy substitutions, and sodium reduction are all components of these lessons. This collaboration has been a successful interprofessional learning opportunity that underlines the value of health professions educators emphasizing the continuity between food, health, and medicine that integrate nutrition into lifestyle and medical training.

The Mediterranean Diet is a large component of many of the recipes used in this course. The Mediterranean Diet is a plant-based heart healthy diet that focuses on fruits, vegetables, grains, nuts/seeds, and heart healthy fats (5). Although animal products such as meat and dairy are consumed, there is not as much of an emphasis on them. This diet has been ranked by systematic reviews as the top diet that can aide in preventing heart disease (6).

The Mediterranean Diet Score shows how closely someone's eating habits correlate with the Mediterranean Diet, the higher the score the more it parallels (7). There are nine categories within the Mediterranean Diet Score survey. These categories include whether or not a person frequently eats fruits, vegetables, whole grains, seafood, olive oils, nuts/seeds, rarely eats red meats, and occasionally drinks red wine. If they mark "yes", they get a point and the more points, the closer your diet parallels the Mediterranean Diet.

The purpose of this research was to (1) determine 2016-2018 outcomes of CHOP competencies among health professions students following the 6-week culinary medicine training as well as to (2) assess Mediterranean Diet Scores among health professions students following a 2019 culinary medicine course.

METHODS

2016 – 2018 CHOP Survey

A cohort of 77 medical and 13 physician assistant students (57/female; 33/male) from UNTHSC and TCOM were assessed both pre and post CM course participation in the spring of 2016, 2017 and 2018. The assessment was taken via the Cooking for Health Optimization with Patients (CHOP) survey. During 2016-2018, students who participated in the CM course were assessed using the 4-part CHOP survey to find trends in health metrics and behaviors, including demographics, attitudes, dietary habits, and degree of proficiency in competencies related to nutrition knowledge. Students taking the CHOP surveys were sent a link before and after completing the six-week course.

2019 Mediterranean Diet Score

A cohort of 30 students from the TCU culinary medicine program who also attend UNTHSC and TCOM were assessed pre and post CM in the spring of 2019 to analyze trends in the Mediterranean

Diet Scores. The Mediterranean Diet Scores were analyzed to find trends in personal health practices before and after completion of the CM course. Participants rated their score before and after the six-week course, with the intention that they raised their score by at least one point.

Data Analysis

Study procedures were approved by Tulane and TCU IRB, and participant informed consent was obtained. Data was analyzed to meet study objectives for the following variables:

- CHOP Survey: demographics, dietary habits, attitudes, degree of proficiency in professional competencies.
- Mediterranean Diet Score: amount of serving sizes of specific food categories per day/week based on Mediterranean dietary principles.

Data points were compared using frequencies, correlations, conditional multivariate logistic regression and longitudinal panel analyses (SPSS, $p \leq 0.05$).

RESULTS

2016 – 2018 CHOP Survey

Post course 2016 – 2018 CHOP results showed that students who participated in the CM course reported greater proficiency in their ability to inform patients on these following nutrition competencies: (1) health effects of the Mediterranean, Dash, and low fat diets; (2) serving sizes; (3) recognizing warning signs/symptoms for eating disorders; (4) role of dietary cholesterol/saturated fats in blood lipids; (5) dietary patterns for type 2 diabetes; and (6) role of fiber and omega-3 fatty acids in disease prevention and heart health ($P \leq 0.05$).

CHOP Results 2017-2018

The results of the CHOP Study analysis are shown in Table 1. In 2017, confidence inability to inform patients on the health effects of the Mediterranean Diet went from 32% in the pre-test to

90% in the post test, in 2018 the results were similar with ability increasing from 30% to 90%. Confidence in ability to inform patients on health effects of the Dash diet in 2017 increased from 23% to 78% and in 2018 increased from 27% to 87%. In 2017 confidence in ability to inform patients on health effects of low-fat diets increased from 32% to 64% and in 2018 from 22% to 87%. In 2017, confidence in ability to educate patients on serving size from MyPlate guidelines increased from 23% to 87% and in 2018 increased from 50% to 86%. In 2017, confidence in ability to recognize warning signs/symptoms of eating disorders increased from 42% to 87%, and in 2018 increased from 64% to 86%. In 2017, confidence in ability to educate patients on role of dietary cholesterol and saturated fats in blood lipids increased from 50% to 87%, and in 2018 from 45% to 78%. In 2017, confidence in ability to educate patients on recommended dietary patterns for Type II Diabetes increased from 31% to 71% and in 2018 from 41% to 86%. In 2017 confidence in ability to educate patients on the role of omega-3 and omega-6 fatty acids in heart health and their food examples increased from 15% to 94% and in 2018 increased from 32% to 64%. In 2017 confidence in ability to educate patients on fiber and disease prevention and sources increased from 39% to 87% and in 2018 increased from 46% to 93%.

Table 1. Chop Results 2016-2018

Competency Ability	2017 Pre-Study	2017 Post-Study		2018 Pre-Study	2018 Post-Study
Mediterranean Diet	32%	90%		30%	90%
Dash Diet	23%	78%		27%	87%
Low-Fat Diet	32%	64%		22%	87%
MyPlate Guidelines	23%	87%		50%	86%
Warning Signs/Symptoms of Eating Disorders	42%	87%		64%	86%
Role of Dietary Cholesterol and Saturated Fats on Blood lipids	50%	87%		45%	78%
Dietary Pattern Recommendations for Type II Diabetes	31%	71%		41%	86%
Role of Omega 3's and Omega 6's in Heart Health	15%	94%		32%	64%
Fiber and Disease Prevention	39%	87%		46%	93%

2019 Mediterranean Diet Score

Post course Mediterranean Diet Scores showed that students who participated in the Spring 2019 course reported significant increases in overall diet score (see Table 2, Figure 3 and 4). There were significant increases in individual questions answered “yes” in all but one question. Vegetables, fruits, whole grains, and legumes all showed very significant increases in the percent of students who chose “yes”. Nuts, fats, and fish categories also showed significant increases. The category that saw no change was meat, and the category that saw the most significant change was red wine.

Table 2. Mediterranean Diet Score 2019

Mediterranean Diet Score	2019 Pre-Course	2019 Post-Course
I eat two or more cups of vegetables a day	23.1%	37.9%
I eat two or more pieces of fruit a day	23.1%	51.7%
I eat two or more whole grains a day	19.2%	44.8%
I drink ½ to 1 drink a day for women, 1 to 2 for men (but no more)	26.9%	89.7%
I eat fish two or more times a week	69.2%	79.3%
I eat two or more servings a week of legumes/beans	30.8%	51.7%
I eat a handful of nuts most days	30.8%	58.6%
I eat lots of olive oil and few other fats	11.5%	17.2%
I eat two servings or fewer a week of red or processed meat	34.6%	34.5%

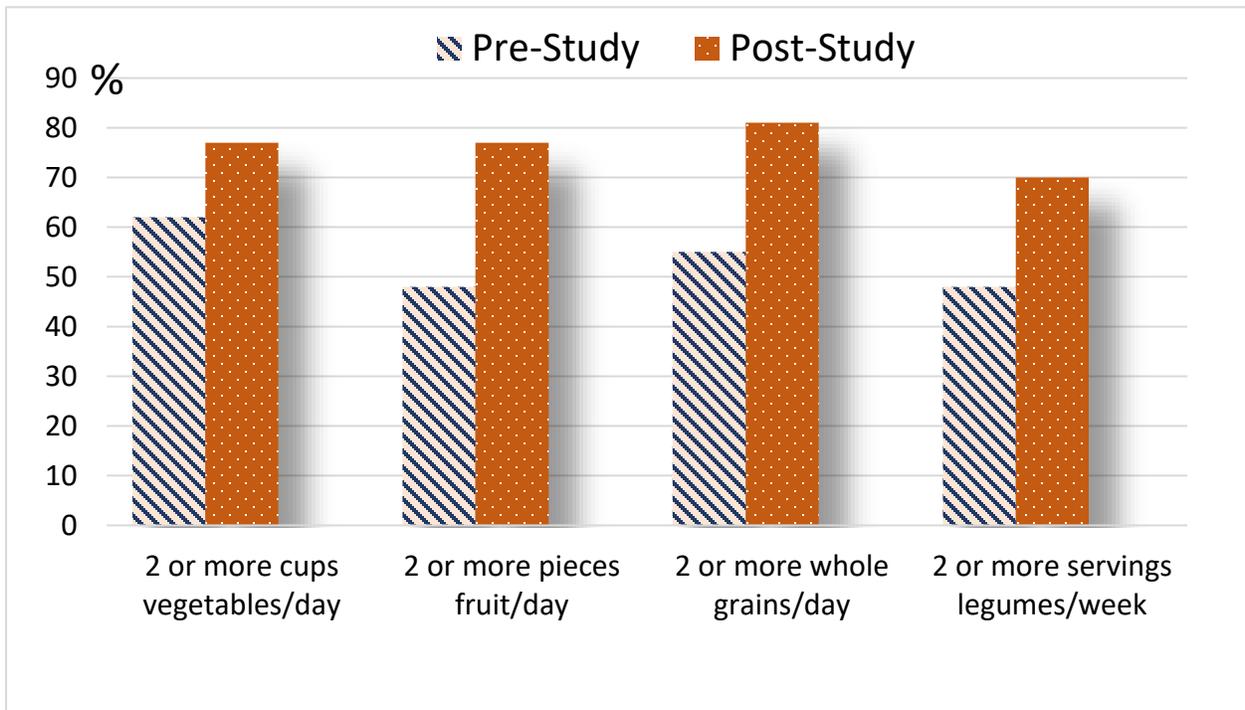


Figure 3. Mediterranean Diet Pre vs Post

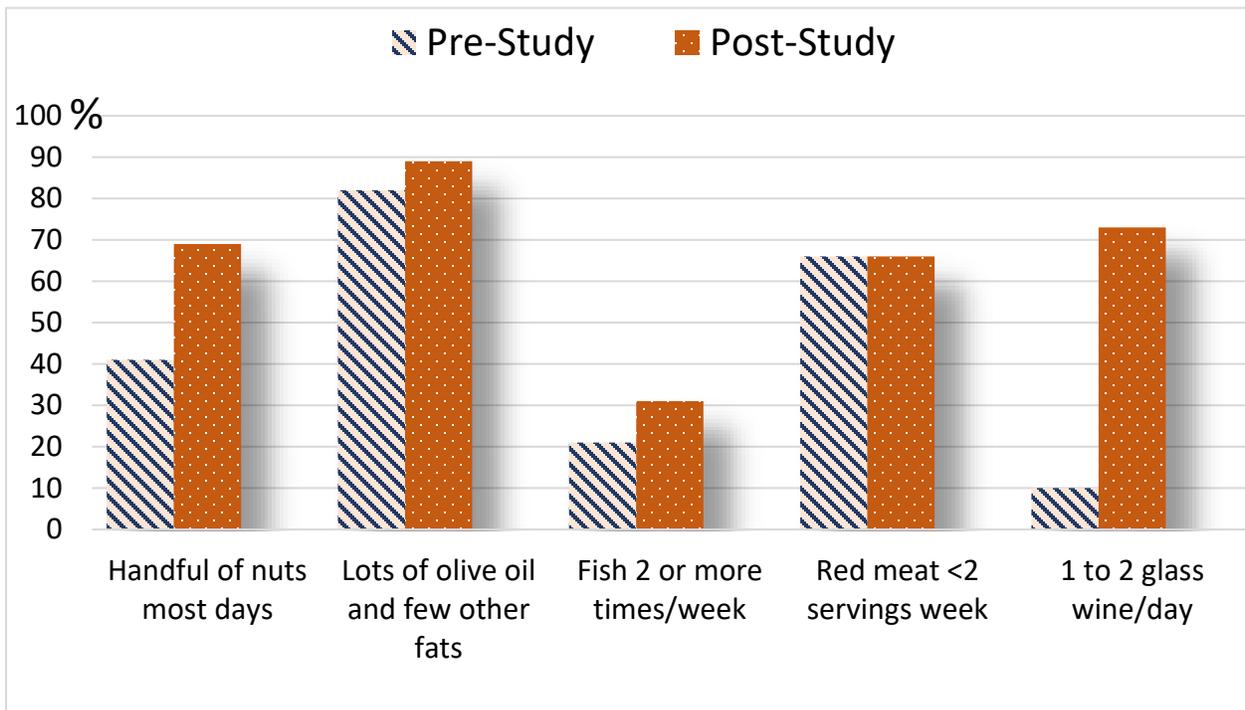


Figure 4. Mediterranean Diet Pre vs Post

Total scores also shifted from a 0-8 range to a 4-9 range (see Figure 5). In the pre-course survey, 5% of students scored in the 0-3 category and in the post-course survey, no students scored within

this category. In the post- course survey students increased from below 5% to over 12% scoring in the 6-7 range. There was also a significant increase in students scoring within the 8-9 range.

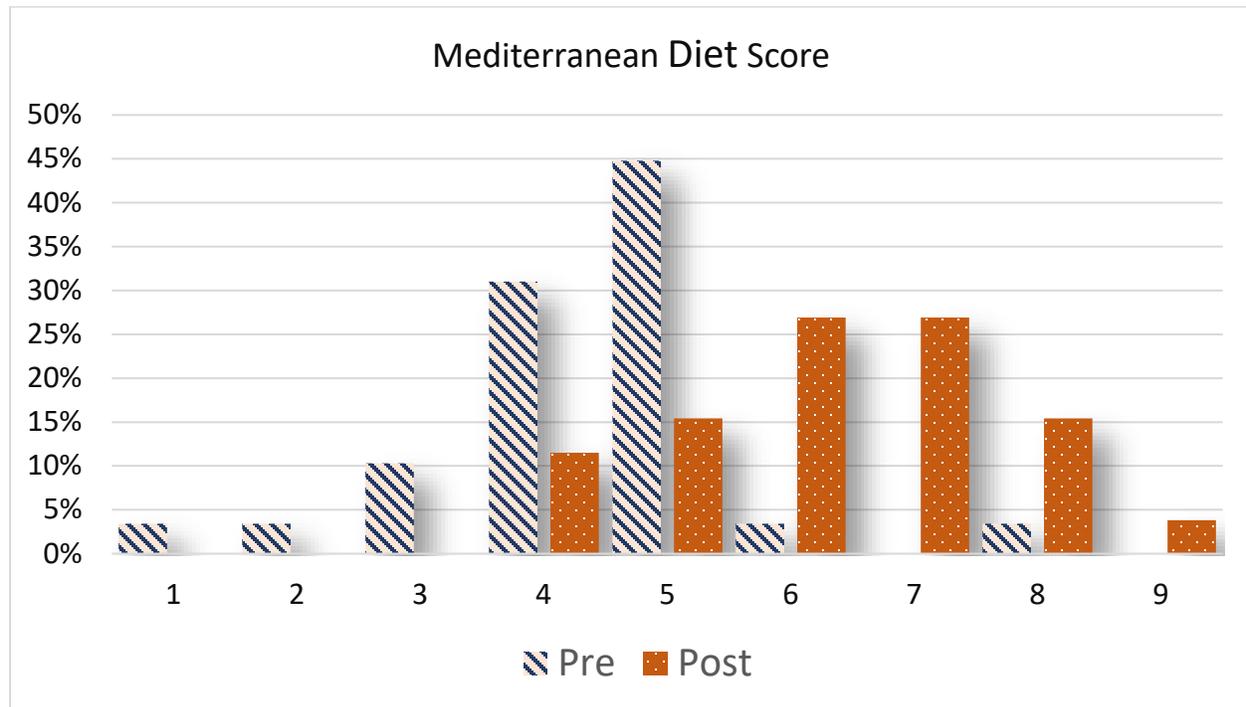


Figure 5. Total Mediterranean Diet Scores

DISCUSSION AND CONCLUSIONS

The results of the CHOP surveys show us that participating students are improving their ability to communicate important nutrition knowledge with their patients. The results of the Mediterranean Diet Scores show that the culinary medicine courses are also helping students improve their own health practices. These courses are providing usable nutrition/dietetic knowledge and skills for these future physicians and physician assistants. Having these skills provides them with the ability to use these skills in their practice when helping patients prevent or treat diseases. In return, rates of these diseases (heart disease, cancer, and kidney disease) may show a decrease in incidence. Using food as medicine and as a source of primary preventative care can also aid in decreasing acute health care costs in the United States. Lastly, this also gives health professions students an opportunity to learn to interact productively with other health professions and emphasizes the role of the registered dietitian in health care teams. Additionally, all of the benefits seen as a

result of providing these Culinary Medicine courses can help improve life expectancy and quality of life for many people.

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APPENDICES.

APPENDIX A - CHOP Survey

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..

	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Nutritional counseling should be included in any routine appointment, just like diagnosis and treatment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Specific advice about how to make dietary changes could help patients improve their eating habits.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physicians can have an effect on a patient's dietary behavior if they take the time to discuss the problem.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 2 of 4: Dietary Habits

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

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

Part 3 of 4: Competencies

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

	Not at all confident	Somewhat confident	Neither not at all confident, or totally confident	Mostly confident	Totally confident
Mediterranean Diet and its health effects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DASH diet and its health effects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetarian diet and its health effects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Very low fat diet and its health effects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High protein/high fat diet (e.g. Atkins) and its health effects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Examples of a serving size from the 2011 “My Plate” guidelines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Definition of moderate alcohol consumption and its health effects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognizing warning signs and symptoms of patients with eating disorders.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Role of dietary cholesterol and saturated fat in blood lipids.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recommended dietary patterns for type 2 diabetes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Significance of modest weight loss for type 2 diabetes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Weight loss strategies in overweight or obese patients.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Role of Omega-3 and -6 fatty acids in heart health and their food examples.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.2 For me educating patients on the following topics independently off support from other medical professionals, I feel..

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

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?

	1st year	2nd year	3rd year	4th year
MD (Medical Doctor)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nursing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PA (Physician Assistant)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
OT (Occupational Therapist)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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.

	No	Yes
Elective or culinary medicine class	<input type="radio"/>	<input type="radio"/>
Community service (at least 4 hours)	<input type="radio"/>	<input type="radio"/>
3rd or 4th year medical student seminars	<input type="radio"/>	<input type="radio"/>
Medical student rotation at Johnson and Wales	<input type="radio"/>	<input type="radio"/>
Additional community service (5-10 hours)	<input type="radio"/>	<input type="radio"/>
Additional community service (more than 10 hours)	<input type="radio"/>	<input type="radio"/>

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.

APPENDIX B - Mediterranean Diet Score



RATE YOUR MED DIET SCORE

Scientific studies show that people who follow the Med Diet enjoy better health than those who don't. Find out your Med Diet Score today, by giving yourself one point for each yes below, and zero for each no.

I eat....		If Yes, score 1	If No, score 0
Vegetables	Two or more cups of vegetables a day		
Fruit	Two or more pieces of fruit a day		
Whole grains	2 or more whole grains a day		
Wine	½ to 1 drink a day for women, 1 to 2 for men (but no more)		
Fish	Fish 2 or more times a week		
Legumes / beans	2 or more servings a week		
Nuts / Seeds	A handful of nuts most days		
Fat	Lots of olive oil and few other fats		
Red or Processed Meat	2 servings or fewer a week		
Your Total Med Diet Score			

If your score is...

- 8-9 Long life! Your eating habits follow the Med Diet very closely.
- 6-7 You're doing well. What would help you to add another point or two?
- 4-5 A good start, but you can do better, if you value your health.
- 0-3 Time to turn your life around.



MED DIET FUN FACTS QUIZ

1. Do you have to be Italian or Spanish or Greek to eat the Mediterranean Diet?
2. If you're following the Med Diet, would you cook vegetables in butter or in olive oil?
3. What's tabbouleh?
4. Which of the following makes a great Med-style dip?
 - a. Sour cream with chives
 - b. Hummus
 - c. Nacho cheese sauce
5. True or False: French fries are an important part of the Med Diet, since they come from France, which borders the Mediterranean.
6. If I don't drink wine, can I still benefit from the Med Diet?
7. Name five countries whose traditional foods are associated with the Med Diet.
8. What would a typical Med Diet meal look like?
 - a. Pasta with tomato sauce, peppers, onions, mushrooms and shrimp
 - b. 12-ounce steak, baked potato with sour cream, creamed corn
 - c. Vegetable soup with beans, and a chunk of crusty whole grain bread
 - d. Grilled fish with broccoli and brown rice

Answers

1. No! Anyone, in any country, can enjoy the Med Diet, even though it's based on foods traditionally popular in countries surrounding the Mediterranean Sea.
2. Olive oil. It makes up most of the fat in the Mediterranean Diet, which is low in solid fats like butter.
3. It's a cold grain-and-vegetable salad made from bulgur (a quick-cooking whole wheat) and chopped vegetables, with olive oil and lemon.
4. b. Hummus, made from chickpeas, olive oil, and spices, is healthy and delicious, and your best Med choice.
5. False! Fried foods are rarely eaten in the Med Diet (and lots of French foods – like cream sauces) aren't in keeping with the Med Diet.
6. Scientific studies show that small amounts of alcohol contribute to the health benefits of the Mediterranean Diet. But it's okay to skip that part, if you don't drink!
7. You score if you named any five of the following: In Europe: Spain, France, Monaco, Malta, Italy, Slovenia, Croatia, Bosnia-Herzegovina, Montenegro, Albania, Greece, Turkey and Cyprus; In Asia: Turkey, Syria, Lebanon, Israel and Egypt; In Africa: Egypt, Libya, Tunisia, Algeria and Morocco.
8. a, c, and d are all correct. Lots of different and delicious foods can be combined to make healthy Med Diet meals, including many of your existing favorite foods.

APPENDIX C - Presentation

Honors Presentation: A Culinary Medicine Module Improves Nutrition and Dietary Competencies in Medical and Physician Assistant Students

A Culinary Medicine Course Improves Nutrition and Dietary Competencies of Medical and Physician Assistant Students



Haley Tullios & Angela Adams

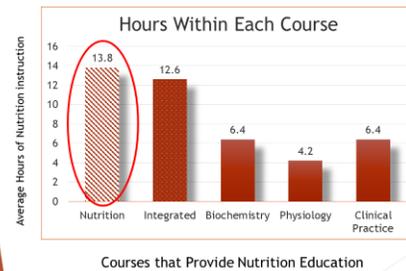
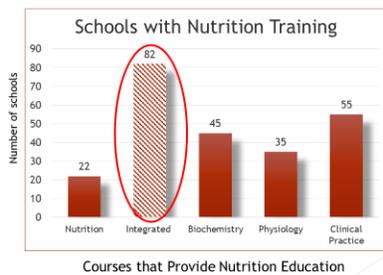
Advisors
Lyn Dart, PhD, RD, LD
Anne VanBeber, PhD, RD, LD
Donna Schonerstedt

John V. Roach Honors College
Texas Christian University
Fort Worth, TX

Nutrition Related Chronic Disease



- Heart Disease, Hypertension, Diabetes, Cancer, Kidney Disease prevalent in the United States.
- All can be treated and/or prevented with proper nutrition.
- Many physicians providing care have minimal nutrition education.

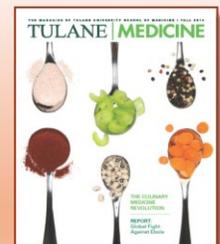
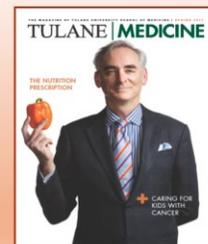


Bridging the Gap

Integrate MNT

Hands on culinary experience

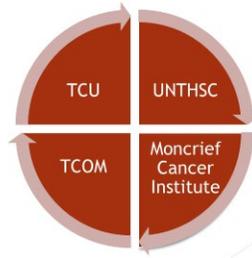
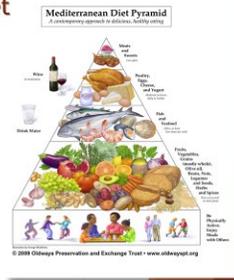
Apply nutrition knowledge



The Mediterranean Diet

Plant Based - Heart Healthy

1. Fruits, Vegetables, Grains
2. Legumes
3. Healthy fats
4. Occasional fish
5. Limit red meats
6. Use of herbs/spices
7. Red wine in moderation



Structure of Course

What does it look like?

- ▶ Pre-class assignments, content review
- ▶ Culinary hands-on training
- ▶ Plating and presentation
- ▶ Discussion including case study application of nutrition principles

Culinary Medicine Modules

- ▶ Introduction to Culinary Medicine
- ▶ Fats in the diet
- ▶ Sodium reduction and flavor building
- ▶ Carbohydrates in the diet
- ▶ Dietary patterns and cancer risks
- ▶ Anti-inflammation Diet

Cooking for Health Optimization with Patients (CHOP)

- ▶ 10-Year longitudinal study to assess Culinary Medicine training outcomes
- ▶ 39 medical schools and institutions nationwide currently provide this program and participate in the study



Research Purpose

1. Determine 2016-2018 outcomes of *CHOP* competencies among health professions students following Culinary Medicine training.
2. Assess *Mediterranean Diet Scores* among health professions students following 2019 Culinary Medicine course.

Methods & Procedures

- ▢ *CHOP* Survey - 2016 - 2018
 - 90 health professions students
 - 60 question online survey pre/post course: demographics, dietary habits, attitudes, and degree of proficiency accomplishing professional competencies
- ▢ *Mediterranean Diet Score* - 2019
 - 30 health professions students
 - 9 question survey pre/post course

If your score is.....

- ▶ **8--9** Long life! Your eating habits follow the Med Diet very closely.
- ▶ **6--7** You're doing well. What would help you to add another point or two?
- ▶ **4--5** A good start, but you can do better, if you value your health.
- ▶ **0--3** Time to turn your life around.



Data Analyses

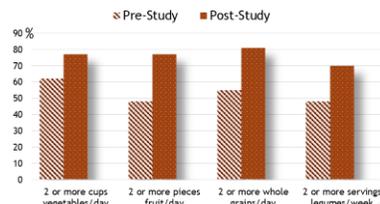
- ▶ CHOP Survey: demographics, dietary habits, attitudes, degree of proficiency in professional competencies (DACs)
- ▶ Mediterranean Diet Score: amount of serving sizes of specific food categories per day/week based on Mediterranean dietary principles
- ▶ Data points compared using frequencies, correlations, conditional multivariate logistic regression and longitudinal panel analyses (SPSS, $p < 0.05$)

Results: CHOP 2016-2018 ($p < 0.05$)

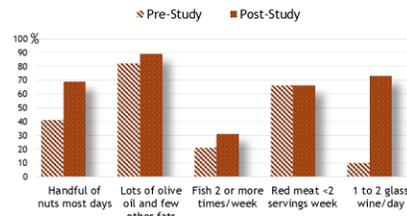
Greater proficiency in knowledge about:

- Health effects of different diets
- Weight loss strategies, portion control, food labels, serving sizes
- Dietary practices for chronic diseases
- Role of dietary cholesterol/saturated fats in blood lipids
- Recognizing warning signs/symptoms for eating disorders
- Fiber, sodium, omega-3 fatty acids in disease prevention

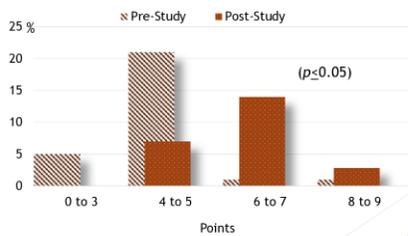
Mediterranean Diet Score



Mediterranean Diet Score



Mediterranean Diet Score



Benefits

- ▶ Providing usable nutrition/dietetics/culinary knowledge and skills for future physicians/physician assistants
- ▶ Emphasizing RD/RDN role as valued health professional and educator
- ▶ Reinforcing collaboration and interprofessional education, practice, and research in the community
- ▶ Aid in decreasing acute healthcare costs

Saving lives

- ▶ Future doctors will have ability to use food as medicine
- ▶ Heart disease, diabetes, hypertension, cancer, and kidney disease rates drop
- ▶ Life expectancy and quality of life increase



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