

———— NUTRITION AND DIETETICS EDUCATION ————

# Culinary Medicine

## An Evaluation to Assess the Knowledge, Attitudes, Behaviors, and Confidence of First-Year Medical Students in a Culinary Medicine Teaching Kitchen

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This pilot study evaluated the feasibility, efficacy, and efficiency of a culinary medicine course for medical students at the University of South Carolina School of Medicine Greenville. The “Cooking With a Chef” survey was administered pre- and postculinary medicine training to assess cooking knowledge, attitudes, behaviors, confidence, and self-efficacy. Five medical students participated in 10 project modules. Students demonstrated significant improvements ( $P < .05$ ) in all assessment measures. Student feedback revealed increased awareness of nutrition-based care as a result of culinary medicine training. Implementing culinary medicine in medical curricula may improve nutrition education and counseling skills of health care providers. **Key words:** *cooking confidence, culinary medicine, culinary nutrition, teaching kitchen*

**N**EARLY 70% of all deaths worldwide are caused by chronic diseases such as

diabetes, cardiovascular disease, cancer, and chronic respiratory disease.<sup>1</sup> Increased rates of chronic disease are primarily attributed to 4 risk factors including unhealthy diets, physical inactivity, overconsumption of alcohol, and tobacco use.<sup>1</sup> However, it is nationally recognized that US medical school curricula does not teach physicians lifestyle medicine-related knowledge and skills,<sup>2</sup> and particularly nutrition competencies, which have been demonstrated as one of the most significant factors related to prevention of chronic diseases.<sup>3</sup> Some innovative medical schools and primary care residency programs are attempting to integrate nutrition knowledge, skills, application, and competencies into their curriculum<sup>4</sup>; however, there is limited information in the literature regarding buy-in and personal implementation by

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medical students who may be participating in these programs in addition to their core training.

To assess the buy-in and impact of adequate nutrition education in medical school curricula, the University of South Carolina School of Medicine Greenville (USCSOMG) piloted a culinary medicine course with 5 medical students in the summer between their first and second years. The purpose of this pilot study was to evaluate the feasibility, efficacy, and efficiency of a culinary medicine course for rising second-year medical students at the USCSOMG. The pilot study focused on effectiveness of the course in relation to student knowledge, attitudes, skills, behaviors, cooking confidence, and self-efficacy pertaining to culinary medicine. Specific aims of this study included assessing cooking knowledge, attitudes, behaviors, confidence, and self-efficacy pre- and postculinary medicine training to determine student buy-in and personal implementation in conjunction with overall course impact.

## METHODS AND MATERIALS

### Participants

Five medical students (4 male and 1 female) participated in 10 project modules over 6 weeks during the summer before their second year of medical school. All of the student participants were also part of the USCSOMG Lifestyle Medicine Distinction Track.<sup>5</sup> The USCSOMG held interviews to select which students would be eligible for this culinary medicine pilot study course. The Lifestyle Medicine Distinction Track director at the USCSOMG, a certified diplomat of the American College of Lifestyle Medicine (DipACLM), attended each of the summer pilot study modules and led the lecture and nutrition portions of each module.

### Research design

A mixed-methods research design focused on qualitative and quantitative results. A concurrent embedded design was used to allow for both qualitative and quantitative

data collection across multiple instruments. This mixed-methods research approach allowed for inference of further findings rather than using qualitative and quantitative data independently.<sup>6,7</sup>

### Formative evaluation

Formative evaluation processes were used to assess the progress of this pilot study course. Surveys, questionnaires, observations, and an exit focus group were used throughout this study to effectively collect data for the formative evaluation of this course.

### Summer pilot study description and format

This culinary medicine pilot study was approved by the Institutional Review Board in the Office of Research Compliance at the USCSOMG. The culinary medicine course contained a lecture, laboratory, meal, and discussion section. This course was held twice per week at the Culinary Institute of the Carolinas Greenville Technical College (GTC) Berea Campus.<sup>8</sup> The Health Meets Food courseware used for the program was supplied by the Culinary Medicine Specialist Board.<sup>9</sup> Each module was composed of goals, medical nutrition learning objectives, culinary nutrition learning objectives, expectations of students prior to class, and a 3- to 4-hour in-class component.<sup>10-13</sup> Expectations of students prior to class included completion of a video lecture covering the medical and culinary objectives, review of journal articles, and completion of an assessment quiz for each respective module. The in-class component of each module consisted of a brief review session, an individual or group completion of a case study related to the respective module topic, recipe production in the kitchen, tasting and discussion of the recipes prepared, and kitchen cleanup. Each course module was administered in the aforementioned order.

The instructing chef led the laboratory section of each module. Each student was assigned 1, 2, or 3 recipes (depending on difficulty and time constraints) prior to each class session. For each module, some students were grouped in pairs of 2, and other

students worked individually. The students were allotted approximately 10 minutes to get all ingredients in place (“mise en place”) before starting to cook. After all ingredients and cookware were in place, the chef hosted a demonstration session for each module. The demonstration session lasted approximately 25 minutes. During the demonstration session, the chef quickly discussed the day’s recipes and expounded on specific cooking techniques and knife skills that pertained to the module’s recipes.

After the chef demonstration session, all students returned to their stations to work on their respective module recipes. The students were allotted approximately 1 hour to complete their recipes for each module. While the students prepared recipes, a laboratory assistant and 2 volunteer assistants helped the students to ensure they had all of the supplies and ingredients needed. This greatly helped the students finish their recipes in a more timely manner and adhere to the schedule.

Once all food dishes were complete and on the serving line, students, instructors, and laboratory assistants gathered to plate, display, and discuss the nutritional aspects and ease of preparation of each dish. The nutrition discussion of each module took approximately 25 minutes. The lifestyle medicine distinction track director from the USCSOMG led this portion of each module. The director inquired about each food dish, and the student who made that particular dish reported the nutrition facts supplied in their recipe sheet. Each student discussed the portion size of each dish they prepared.

After the nutrition discussion was complete, all students, instructors, and assistants gathered for a “family meal” to sample the dishes. Everyone sat together and ate for approximately 30 minutes. During the 30-minute “family meal” portion of each module, students, instructors, and assistants discussed the specific recipes made, likes and dislikes of each dish, and how various recipes may pertain to patients.

Students finished the module with a 30-minute cleanup. This section of the course consisted of washing dishes, sanitizing the

**Table 1.** Pilot Study Module Topics<sup>a</sup>

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| <ol style="list-style-type: none"> <li>1. Orientation, Safety, and Sanitation</li> <li>2. Introduction to Culinary Medicine</li> <li>3. Weight Management &amp; Portion Control</li> <li>4. Fats</li> <li>5. Food Allergy and Intolerance</li> <li>6. Protein &amp; Vegetarian Diet</li> <li>7. Sodium, Potassium and Renal Homeostasis</li> <li>8. Carbohydrates and Diabetes Mellitus</li> <li>9. The Pediatric Diet: A Family Approach to Healthy Children</li> <li>10. Student Project Module</li> </ol> |
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<sup>a</sup>Ten module topics from the *Health Meets Food* curriculum were completed during the pilot study course.<sup>10</sup> Used with permission.

countertops, storing or disposing of leftover food, sweeping, mopping, and cleaning anything in the kitchen that may have been used during the laboratory portion of the module that day. Each student and the 2 volunteer assistants worked as a team to clean the kitchen and ensure each module was finished in a timely manner (Table 1).

## Assessment tools

### *Cooking With a Chef survey*

The Cooking With a Chef (CWC) survey is an assessment tool that has been validated through previous research studies,<sup>14,15</sup> and it has been edited and updated multiple times to further improve its use as an assessment tool.<sup>16,17</sup> The CWC survey consists of 8 sections including 1 index, 6 scales, and 1 knowledge test (Table 2).

### *Culinary medicine curriculum delivery observation checklist*

The observation checklist was developed to measure the level of student engagement throughout each section of each module as well as measure the overall adherence to the time scheduled for each portion of each module. A scale ranging from 1 to 5 was used to measure the answer to each question of the observation checklist for each of the 10 modules in the summer pilot study course. Notes were also taken in conjunction with the observation checklist to further expound

**Table 2.** Cooking With a Chef Survey Section Topics<sup>a</sup>

Availability and Accessibility of Fruits and Vegetables (AAFV) Cooking Attitudes (CA) Cooking Behaviors (CB) Self-efficacy of Produce Consumption (SEPC) Cooking Self-efficacy (SEC) Self-efficacy for Using Basic Cooking Techniques (SSECT) Self-efficacy for Fruits, Vegetables, and Seasonings (SEFVS) Knowledge of Cooking Terms and Techniques
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<sup>a</sup>Used for evaluation and assessment of cooking attitudes, behaviors, confidence, and self-efficacy of students' pre- and postculinary medicine pilot study course.

on time adherence and student engagement (Table 3).

***Culinary Medicine Curriculum Delivery Participant Feedback Questionnaire***

The Culinary Medicine Curriculum Delivery Participant Feedback Questionnaire was used to collect additional feedback from the

**Table 3.** Culinary Medicine Curriculum Delivery Observation Checklist Questions<sup>a</sup>

1. Are the students engaged in this module's lecture section? 2. Are the students engaged in this module's laboratory section? 3. Do the students seem to enjoy eating the food they cooked in laboratory? 4. Are the students engaged in this module's discussion section? 6. Is there enough time allotted for this module's lecture section? 7. Is there enough time allotted for this module's laboratory section? 8. Is there enough time allotted for this module's discussion section? 9. Is there enough time allotted for this module's clean-up section? 10. Is there an excess amount of food leftover at the end of this module?
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<sup>a</sup>Used to evaluate and assess overall student engagement and adherence to the planned course schedule.

**Table 4.** Culinary Medicine Curriculum Delivery Participant Feedback Questionnaire<sup>a</sup>

1. There was enough time allotted to each module. 2. The sequence of module presentation was organized and clearly explained. 3. The course location was convenient in relation to your commute. 4. All members of this course worked well together. 6. I would recommend this course to a fellow peer. 7. This course provided a greater understanding of culinary medicine. 8. This course positively influenced my personal dietary habits. 9. I am pleased with the overall quality of this course. 10. I am pleased with the overall content of this course.
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<sup>a</sup>Used to evaluate and assess participant satisfaction in the delivery of the culinary medicine course.

participants involved in the culinary medicine summer pilot study course. Each participant completed the questionnaire within 4 days of the last culinary medicine module of the summer course (Table 4).

***Culinary medicine curriculum focus group to follow feedback questionnaire***

The culinary medicine curriculum exit focus group consisted of 8 questions. This focus group was administered to gain more feedback from the 5 medical students who participated in this summer pilot study course. The exit focus group took place at the USCSOMG campus the day after the culinary medicine course had been completed. All 5 medical students were present for the focus group. One student left the room 5 to 10 minutes prior to the closing of the focus group.

The focus group was administered by a student researcher and a Clemson University faculty member and research advisor took notes throughout the duration of the focus group. The focus group was audio recorded to aid in

the transcription and evaluation of the questions asked and the students' responses. The exit focus group was 45 minutes long from start to finish. (Table 5)

### Data collection

All data from the CWC survey and participant feedback questionnaire were collected by the USCSOMG via REDCap software.<sup>18,19</sup> As for the observation checklist, the student researcher collected all data for each module and inputted the data into an excel spreadsheet. Data from the exit focus group were collected by the student researcher and research advisor. The exit focus group was audio recorded to allow for reference back to

**Table 5.** Culinary Medicine Curriculum Focus Group Questions<sup>a</sup>

1. Have you recreated any of the culinary medicine curriculum recipes at home? What recipes have you recreated? Tell about the recreating process?
2. Share a recipe from the culinary medicine course you would want to recommend to others pursuing a Mediterranean diet. What is it about the recipe you want to share?
3. After this summer's culinary medicine course, how would you reduce the amount of salt listed in a recipe and maintain adequate flavor?
4. From this summer's culinary medicine course, were there any recipes you did not like? If so, please name one. What did you not like about it?
5. Do you have suggestions for the time allotted to each section of the modules? What suggestions do you have?
6. Do you have suggestions for the improvement of the case exercise (lecture) section of the course?
7. Do you have any suggestions for the improvement of the cooking (laboratory) section of the course?
8. Do you have any suggestions for the improvement of the nutrition review and meal section of the course?

<sup>a</sup>Used to evaluate and assess participant feedback after culinary medicine course.

the student responses for further qualitative description.

### Data analysis

To determine whether CWC survey questions shifted from the pre- to the postsurvey, a series of *t* tests were performed. Data were manipulated and captured using REDCap and Microsoft Excel Software systems.<sup>18-20</sup> Statistical calculations and *t* tests were performed with JMP Pro 13 software.<sup>21</sup> *P* values less than or equal to .05 were considered evidence of statistical significance. *P* values greater than .05 and less than .1 were considered evidence of weakly significant statistical shifts.

Review of the qualitative results involved critical evaluation of the observations listed for each module within the observation checklist, the responses to each question of the exit focus group, and the responses to each question of the participant feedback questionnaire. While evaluating these results, reviewers focused on common recurring themes and patterns throughout the observation checklist, exit focus group, and participant feedback questionnaire, as well as the results of the pre- and post-CWC surveys. Coding, clustering, and grouping techniques were then used to organize these patterns and themes into categories and subcategories. Inductive thematic analysis was used to code all qualitative data. Key terms for original codes emerged from the initial review program implementation guide, and the discussions with program developers. These terms/codes were used for original coding. This was followed by a clustering and grouping axial coding process to organize codes according to patterns and themes.

## RESULTS

### Cooking With a Chef survey pre- and postresults

Statistical analysis of the CWC surveys taken pre- and postculinary medicine course found significant shifts occurred in 17 questions, and weakly significant shifts occurred

in 18 questions. Weakly significant shifts were recognized for the sake of this study due to the number of participants (n = 5). Significant and weakly significant shifts occurred across all CWC survey sections, indicating that cooking attitudes, behaviors, confidence, and self-efficacy significantly improved from pre- to postcourse. The following CWC survey questions significantly shifted from the pre- to post-survey: questions 14, 22, 26, 28, 35, 36, 37, 39, 40, 41, 43, 46, 48, 50, 51, 54, and 55 (Table 6).

**Comparative analysis of the quantitative and qualitative data**

Data integration for a mixed-methods analysis occurred during interpretation of findings. This integration process allowed us to compare results across assessment tools and identified key themes based on results across all 4 assessment methods. These key themes included:

1. Cooking knowledge, attitude, and behavior

**Table 6.** Significant Shifts in the Cooking Attitude, Behaviors, and Self-efficacy of the CWC Survey

<i>Cooking Attitude Section</i>	For each item below, indicate the extent to which you agree or disagree with the statement about cooking (measured “strongly disagree” to “strongly agree”):
Question 14	Cooking is fun.
Question 22	Cooking is frustrating.
Question 26	I find cooking tiring.
<i>Cooking Behaviors Section</i>	During the past month how often did you do the following (measured “not at all” to “about everyday”)?
Question 28	Prepare meals using convenience items (such as bagged salad, prepared mashed potatoes, preshredded carrots, and deli rotisserie chicken).
<i>Cooking Self-efficacy Section</i>	Indicate the extent to which you feel confident about performing the particular activity (measured from “not at all confident” to “extremely confident”):
Question 35	Prepare dinner from items you currently have in your pantry and refrigerator.
Question 36	Use knife skills in the kitchen.
Question 37	Plan nutritious meals.
<i>Self-efficacy for Using Basic Cooking Techniques Section</i>	Indicate the extent to which you feel confident about performing the particular activity (measured from “not at all confident” to “extremely confident”):
Question 39	Boiling
Question 40	Simmering
Question 41	Steaming
Question 43	Sautéing
Question 46	Poaching
Question 48	Roasting
Question 50	Microwaving
Question 51	Reusing leftovers for another meal
<i>Self-efficacy for Fruits, Vegetables, and Seasonings Section</i>	Indicate the extent to which you currently feel confident about preparing the following foods (measured “not at all confident” to “extremely confident”):
Question 54	Fruit (eg, peaches and watermelon)
Question 55	Herbs and spices (eg, basil, thyme, and cayenne pepper)

Abbreviation: CWC, Cooking With a Chef.

2. Cooking confidence, and self-efficacy
3. The Mediterranean, plant-based diet
4. Timing and organization of the culinary medicine pilot study course

Each tool used for data collection (CWC survey, observation checklist, focus group, and feedback questionnaire) strongly contributed to the findings of these 4 co-occurring themes.

Cooking knowledge, attitude, and behavior was measured by all 4 data collection tools. The CWC survey results indicate an overall improvement in the participants' cooking knowledge, attitudes, and behaviors. However, throughout the culinary medicine course, participants did show a decreased enjoyment in cooking with an increased frustration related to cooking. The observation checklist demonstrates high levels of participant engagement throughout the course and increased participant knowledge as the course progressed. The focus group revealed participants' increased interest in cooking techniques, knife skills, recipes, food ingredients, and chef demonstrations—all of which pertain to the overall cooking knowledge, attitude, and behavior of the participants. In conjunction with all of these findings, the feedback questionnaire results suggest the following:

1. The participants were pleased with the overall content of this course.
2. The participants viewed this course as beneficial to their career.
3. The participants would recommend this course to a peer.
4. This course did provide a greater understanding of culinary medicine.
5. This course positively changed participants' personal dietary habits.

The CWC survey revealed significant improvements in cooking confidence and self-efficacy from precourse survey to post-course survey. When asked questions such as confidence in using knife skills, planning nutritious meals, and preparing foods using fruits or herbs and spices, participants' confidence and self-efficacy levels significantly increased from precourse to postcourse. The CWC sur-

vey results also showed significant levels of increased confidence and self-efficacy related to specific cooking techniques such as boiling, simmering, steaming, sautéing, poaching, roasting, microwaving, and reusing leftovers for another meal. The observation checklist results are consistent with the CWC findings related to cooking confidence and self-efficacy. The observation checklist results indicate the participants continued to improve adherence to the allotted time schedule, specifically in relation to the time they were given to prepare their recipes in the kitchen. Throughout the focus group, participants mentioned what they had learned and their willingness to take this knowledge to the next level and share their knowledge with friends, family, and peers, indicates their increased cooking confidence and self-efficacy. The feedback questionnaire also demonstrated increased cooking confidence and self-efficacy, as it relates to participants' willingness to recommend this course to a fellow peer, view the course as beneficial to their own career, and make personal dietary changes due to the influence of the culinary medicine course.

The Mediterranean diet, a plant-based diet, was another co-occurring theme throughout the entirety of this study. The CWC survey questions, pertaining to fruits, vegetables, spices, and herbs, revealed significant increases in confidence and self-efficacy in relation to using these food ingredients when cooking.

In conjunction with the prepared recipes, the students frequently discussed the specific food ingredients and the prepared dishes, as they were consuming the food during the meal section of each module. Students often brought up aspects of each dish they did and did not particularly care for, and how patients may respond to these foods as well. It was interesting to see the social component of the Mediterranean diet at play as well. The Mediterranean diet is largely based on social interactions with friends and family, and this social component was in full effect throughout the culinary medicine course. The focus

group, observation checklist, and feedback questionnaire all agree that the students were engaged with one another throughout each module. The students frequently mentioned they enjoyed working together and spending time with each other throughout the course of the study.

Analysis tools (the observation checklist, focus group, and feedback questionnaire) agree that a fourth co-occurring theme includes the overall timing and organization of this culinary medicine pilot study course. Due to the formative evaluation format of this study, it is to be expected that timing and organization greatly contribute to the overall findings. Though the CWC survey is not meant to measure aspects of timing and organization, all other analysis tools did measure and assess these components of the study. The observation checklist demonstrates if the schedule was or was not adhered to each day of class, as well as the schedule change that occurred after the fourth-class meeting throughout the duration of the course. The observation checklist also indicates that the students and educators improved in adhering to the schedule as course progressed. The focus group and the feedback questionnaire show that the students were satisfied with the overall timing and organization of the culinary medicine course. However, throughout the focus group, the students mentioned changes they would make to the course schedule and course components for overall improvement. The students suggested making changes to the chef demonstration section and the nutrition section of each module to gain more knowledge, streamline processes, and better adhere to time constraints.

## DISCUSSION

This evaluation of rising second-year medical students in a pilot culinary medicine teaching program sought to provide evidence of the program's impact on students' knowledge, attitudes, behaviors, and confidence related to culinary medicine. The assessment tools used

provided both qualitative and quantitative results, indicating this culinary medicine course was effective, feasible, and beneficial for the student participants. This study shows medical students may experience benefit and impact from a culinary medicine course, including improved self-efficacy related to cooking with food items in their pantry, cooking with fresh or frozen fruits, vegetables, spices and herbs, as well as using leftover foods from the refrigerator, and confidence with specific cooking techniques such as grilling, baking, sautéing, simmering, poaching, stewing, steaming, stir-frying, and roasting.

Limitations of this study include the small sample size of the participant group and the administration of a single focus group. The participant group was limited to 5 students, as this was a pilot feasibility program. The USC-SOMG founding dean and faculty aimed for this pilot study to include 5% of the first-year medical student class, which consisted of 100 students, to determine the feasibility of and interest in the program, which has now been expanded to 20 students starting in the 2020–2021 academic year. Due to the sample size, the statistical tests have reduced power and may possibly have missed pre-/postchanges in the responses of the participants. However, the supporting qualitative analysis and combination of graphical and analytical techniques used allowed for the detection of many possible changes in the participant responses. The overall objectives of this pilot study were met and the data can inform and support a larger scale follow-up study to confirm the impact of such a culinary medicine course.

To reduce the limitations of a single focus group, culinary medicine course educators and coordinators were asked not to attend the focus group to reduce the potential of bias in the participants' responses to the focus group questions. Only having one observing researcher complete the observation checklist for the duration of the pilot study presents another limitation to this study. Having additional observers complete the observation checklist to compare responses would have

made this assessment tool more powerful. There are also limitations associated with the participant feedback questionnaire. Though this feedback questionnaire was administered online and student responses were anonymous, student answers could have been influenced by bias. Since this was a small participant group, students could have been concerned about the potential of educators and researchers identifying their responses.

Strengths of this study include the quantitative and qualitative assessments that were used. The quantitative assessments, specifically the observation checklist, focus group, and participant feedback questionnaire, further informed the qualitative findings from the CWC survey. Additionally, the CWC survey had been validated and used in a number of other research studies, and a process evaluation expert was involved in the development of the focus group and participant feedback questions.<sup>14-17</sup> Furthermore, this study was strengthened by the facilities and instructors involved.<sup>5,8,10,22</sup> The cooking portion of each module was held in a commercial-grade kitchen and led by a professional chef.<sup>22</sup> All of these aspects contributed to the overall strengths of this study.

In efforts to combat chronic diseases related to lifestyle choices, the fields of

medicine, nutrition, and culinary science are starting to make substantive efforts to educate medical students, practitioners, and patients on how to take preventive measures including dietary changes. A variety of culinary medicine programs have been implemented into undergraduate medical education, residency programs, fellowship programs, and interprofessional education courses.<sup>4,23-27</sup> Efforts such as these are striving to teach culinary medicine, nutrition, exercise, and lifestyle education in health care education in hopes that clinical practitioners will incorporate these practices in their own lives and counsel their patients using these foundational principles. Programs such as these are propelling forward nutrition and culinary education as well as lifestyle, culinary, and preventive medicine awareness in the field of medicine and health care as a whole.<sup>4,13,28,29</sup>

Though many culinary medicine programs have successfully been implemented, there is much work to be done to further advance this field. Resources such as funding, facilities, and medical student/resident availability of time seem to be the most frequent barriers at this time.<sup>23,24,27</sup> Further research, resources, and more collaborative efforts are necessary for the field of culinary medicine to have a maximal impact.

## REFERENCES

1. World Health Organization. Noncommunicable diseases. [https://www.who.int/health-topics/non-communicable-diseases#tab=tab\\_1](https://www.who.int/health-topics/non-communicable-diseases#tab=tab_1). Accessed April 22, 2020.
2. Trilk J, Nelson L, Briggs A, Muscato D. Including lifestyle medicine in medical education: rationale for American College of Preventive Medicine/American Medical Association Resolution 959. *Am J Prev Med*. 2018;56(5):e169-e175.
3. Weininger J. Nutritional disease. Encyclopedia Britannica. <https://www.britannica.com/science/nutritional-disease>. Accessed November 2019.
4. The Loma Linda University Health Lifestyle Medicine Fellowship. Loma Linda University Medical Center Web site. <http://lluprevmed.com/lifestylefellowship/>. Accessed November 2019.
5. Lifestyle Medicine Distinction Track. University of South Carolina School of Medicine Greenville Web site. [https://sc.edu/study/colleges\\_schools/medicine\\_greenville/curriculum/distinctiontracks/lifestylemedicine.php](https://sc.edu/study/colleges_schools/medicine_greenville/curriculum/distinctiontracks/lifestylemedicine.php). Accessed April 14, 2018.
6. Plano Clark VL, Ivankova NV. *Mixed Methods Research: A Guide to the Field*. Los Angeles, CA: SAGE; 2016.
7. Sale JEM, Lohfeld LH, Brazil K. Revisiting the quantitative-qualitative debate: implications for mixed-methods research. *Qual Quant*. 2002;36(1):43-53. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4623759/>. Accessed October 10, 2018.
8. Health Meets Food. Partner sites using health meets food courseware. Culinary Medicine Where Health Meets Food Web site. <https://culinarymedicine.org/about-us/partner-schools/>. Published 2018. Accessed April 14, 2018.
9. Culinary Medicine. Where Health Meets Food. <https://culinarymedicine.org/>. Accessed November 2019.

10. The Goldring Center for Culinary Medicine. *Overview of 18 Continuing Medical Education Courses*. New Orleans, LA: Tulane University School of Medicine; 2016.
11. The Goldring Center for Culinary Medicine. *GCCM First and Second Year Medical Student Curriculum*. New Orleans, LA: Tulane University School of Medicine; 2016.
12. The Goldring Center for Culinary Medicine. *Introduction to Culinary Nutrition, Mediterranean Diet*. New Orleans, LA: Tulane University School of Medicine; 2015.
13. The Goldring Center for Culinary Medicine. *GCCM Overview*. New Orleans, LA: Tulane University School of Medicine.
14. Condrasky MD, Williams JE, Catalano PM, Griffin SF. Development of psychosocial scales for evaluating the impact of a culinary nutrition education program on cooking and healthful eating. *J Nutr Educ Behav*. 2011;43(6):511-516. <https://www.ncbi.nlm.nih.gov/pubmed/21840764>. Accessed February 18, 2018.
15. Michaud P, Condrasky M, Griffin SF, McGregor JU. *Development and Evaluation of Instruments to Measure the Effectiveness of a Culinary and Nutrition Education Program*. Clemson, SC: Clemson University; 2007. [https://tigerprints.clemson.edu/cgi/viewcontent.cgi?article=1239&context=all\\_theses](https://tigerprints.clemson.edu/cgi/viewcontent.cgi?article=1239&context=all_theses). Accessed April 10, 2018.
16. Warmin A, Sharp J, Condrasky MD. Cooking with a chef a culinary nutrition program for college aged students. *Topics Clin Nutr*. 2012;27(2):164-173.
17. Warmin A, Condrasky M, Fraser A, Williams J. *Cooking With a Chef: A Culinary Nutrition Intervention for College Aged Students*. Clemson, SC: Clemson University; 2009. [https://tigerprints.clemson.edu/cgi/viewcontent.cgi?article=1556&context=all\\_theses](https://tigerprints.clemson.edu/cgi/viewcontent.cgi?article=1556&context=all_theses). Accessed April 10, 2018.
18. Vanderbilt. REDCap. <http://www.project-redcap.org/>. Published 2004. Accessed July 2018.
19. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a meta-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377-381.
20. Microsoft Corporation. Microsoft Excel for Mac 2011. Redmond, WA: Microsoft Corporation; 2019.
21. SAS Institute Inc. *JMP, Version Pro 13*. Cary, NC: SAS Institute Inc; 2019.
22. Culinary Institute of the Carolinas. Greenville Technical College Web site. [https://www.gvltec.edu/academics\\_learning/Health\\_Wellness/culinary\\_institute/index.html](https://www.gvltec.edu/academics_learning/Health_Wellness/culinary_institute/index.html). Published 2018. Accessed April 14, 2018.
23. Pang B, Memel Z, Diamant C, Clarke E, Chou S, Harlan G. Culinary medicine and community partnership: hands-on culinary skills training to empower medical students to provide patient-centered nutrition education. *Med Educ Online*. 2019;24(1):1630238.
24. Hauser M. A novel culinary medicine course for undergraduate medical education. *Am J Lifestyle Med*. 2019;13(3):262-264. doi:10.1177/1559827619825553.
25. Stauber Z, Razavi A, Sarris L, Harlan T, Monlezun D. Multisite medical student-led community culinary medicine classes improve patients' diets: machine learning-augmented propensity score-adjusted fixed effects cohort analysis of 1381 subjects [published online ahead of print June 29, 2020]. *Am J Lifestyle Med*. doi:10.1177/1559827619893602.
26. Lawrence J, Knol L, Clem J, de la OR, Henson S, Streiffer R. Integration of interprofessional education (IPE) core competencies into health care education: IPE meets culinary medicine. *J Nutr Educ Behav*. 2019;51(4):510-512.
27. Land R, Jennings M, Lam C, Yeh H, Zhu C, Kumra T. Community culinary workshops as a nutrition curriculum in a preventive residency program. *MedEd-PORTAL*. 2019;15:10859. doi:10.15766/mep\_2374-8265.10859.
28. Brannon K. Tulane's new teaching kitchen cooks up lessons in "culinary medicine." <http://www2.tulane.edu/news/releases/tulane-teaching-kitchen-cooks-up-lessons-in-culinary-medicine.cfm?RenderForPrint=1>. Published August 22, 2014. Accessed February 8, 2018.
29. Hauser M. *Culinary Medicine Curriculum*. Chesterfield, MO: American College of Lifestyle Medicine; 2019. <https://lifestylemedicine.org/culinary-medicine>. Accessed April 19, 2020.