

**WEB-BASED WORKSHOP & WEBINAR SERIES: OBESITY
EDUCATION AND RESOURCES FOR MEDICAL STUDENTS**

A Thesis

by

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ABSTRACT

Lack of formal nutrition education in the medical school curriculum has been a key component of barriers in presenting weight loss recommendations to overweight/obese patients, as reported by practicing physicians. Web-based learning tools are becoming more common in medical schools due to their information-laden, time-constrained curriculum as a means to supplement in-class lectures. A web-based workshop and webinar series (WBWWS) was developed as a continuation project including the creation of a three-part online webinar lecture series with corresponding pre and post-tests, as well as updating and revising the previous web-based workshop website content.

The WBWWS was pilot tested on first to fourth year medical students and included information regarding nutrition education and the overweight/obese patient. A Pre-Test Evaluation Survey (PrES) included general participant information questions, as well as specific nutrition attitudes and perceived self-efficacy ranking statements, which was accessed as the first component of the workshop. A Post-Test Evaluation Survey (PoES) was completed after the participants viewed all webinars and workshop content. Similarly, pre-tests were completed for each of the three-webinar lectures, followed by viewing the lecture, and finished with a post-test to measure improvement. Paired Samples T-tests were performed to evaluate changes for each pre to post-test, and frequency and descriptive analyses were obtained for portions of the PrES/PoES.

Each of the three online webinar lectures: Nutrition Assessment (n=14), Obesity and Its Role in Disease (n=13), and Nutritional Recommendations (n=14) showed significance ($p<0.0001$) for improvement from pre-test to post-test after viewing the webinars. The Nutrition Attitudes questionnaire, as a part of the PrES and PoES, did not change significantly after the intervention, but Nutrition Attitudes⁴ suggested the medical school participants still feel as though they need more nutrition training in addition to the WBWWS. The Self-Efficacy questionnaire, also part of the PrES and PoES, showed significance for improvement ($p<0.0001$) after intervention. The self-efficacy questions were divided into three subscales regarding their own self-efficacy of medical knowledge as it relates to nutrition, their likeliness to refer to dietitians and find reliable online nutrition resources, and their abilities to provide nutrition/physical activity advice to overweight/obese patients. All three subscales showed significant improvement ($p<0.01$) from the PrES to the PoES.

DEDICATION

I dedicate this work to my family who have supported me in every way possible and have been a source of encouragement throughout my entire educational experience. I also must thank God from above for this wonderful experience at Texas A&M and being the only thing constant and true in my life.

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NOMENCLATURE

COM	College of Medicine
DTS	Domain Total Score
FG	Focus Group
NutrAssess (pre or post)	Nutrition Assessment Test
NutrAtt (pre or post)	Nutrition Attitudes
NutrAtt DTS	Nutrition Attitudes Domain Total Score
NutrRecomm (pre or post)	Nutritional Recommendations Test
Obesity (pre or post)	Obesity and Its Role in Disease Test
OWP	Seen overweight patients
PARTID #	Participant ID #
PoES	Post-Test Evaluation Survey
PrES	Pre-Test Evaluation Survey
SE (pre or post)	Self-Efficacy
SE DTS	Self-Efficacy Domain Total Score
TAMHSC	Texas A&M Health Sciences Center
WBW	Web-based Workshop
WBWWS	Web-based Workshop & Webinar Series
YRMed	Current year of medical school

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1. INTRODUCTION

Obesity is of major concern in the United States due to the myriad of complications and diseases it fuels. It is associated with more than half of the leading causes of death in the U.S., including cardiovascular disease (CVD), atherosclerosis, type II diabetes mellitus (T2DM), cancer, stroke, and cirrhosis¹. There have not been any significant decreases in obesity in either the adult or adolescent population from 2003-2004 and 2011-2012², proving that the healthcare industry has not been able to successfully reduce the obesity epidemic. In 2010, an estimated 3.4 million deaths worldwide were caused by overweight and obesity³, so it is essential all healthcare providers, including physicians and medical students know how to nutritionally diagnose and advise all overweight/obese patients. Studies have shown individuals diagnosed with T2DM, hyperlipidemia, and hypertension experience significant health benefits with a modest 10% reduction in weight¹. Nutrition education is an essential component of all healthcare professional positions, not only for patient instruction towards weight loss, but also as a preventive measure to ensure a better quality of life for generations to come.

Obesity is now classified as a disease according to the American Medical Association, so it should be viewed as a diagnosis needing medical treatment. Staggering results from surveys report 68% of primary care physicians feel as though they had insufficient nutritional training in medical school and 86% feel more nutrition education needs to be incorporated into the curriculum. Also, nutrition tends to be overlooked in

the medical school lecture setting due to competition with the overcrowded and information-laden curriculum¹. The current nutrition education program at Texas A&M Health Sciences Center (TAMHSC) College of Medicine (COM) requires medical students enroll in a five and a half-week, six-credit-hour Metabolism/GI/Nutrition course⁴, which incorporates, but is not exclusive to nutrition education. This evidence fuels the purpose of an online nutrition education workshop, a Web-Based Workshop & Webinar Series (WBWWS), to be presented to Texas A&M medical students, who are our future physicians, and is complete with tools, resources, and webinar lectures regarding the overweight/obese patient. Due to the lack of available classic in-class lecture time, the novel idea of web-based learning, or e-learning allows students to complete all necessary components of the WBWWS on their own time, at their own pace, by a specified due date. The amount of online education has increased exponentially over the past few years, showing to be more efficient than traditional instructor-led methods due to faster increases in knowledge, skills, attitudes, and content retention. This is essential in medical schools due to advances in medicine, changes in health care delivery, and greater academic demands on faculty⁵, all leading to a lack of time in their curriculum.

Though the nutrition requirement for medical schools, according to the Committee on Nutrition in Medical Education, states a minimum of 25 credit hours of nutrition are needed to be adequately equipped for nutrition concerns among patients^{1,5}, this requirement is overwhelmingly unmet. Certain schools require only 9 hours of instruction spanned across three afternoons as the only nutrition education received

throughout the entirety of medical school; there were no exams, interactions with patients, and only 45 minutes were spent covering obesity⁶. This is not a fluke occurrence within medical schools, either. Statistics from 2010 reviewing 109 medical schools found only 25% of schools had a class specifically for nutrition, while the amount of nutrition education hours was 19.6 hours, short of the 25 credit hour minimum⁴. Of even greater concern is that three quarters of the nutrition education provided in medical schools is provided through basic courses, such as biochemistry or physiology, rather than specific nutrition courses⁷, which is consistent with the nutrition education curriculum provided at TAMHSC COM. It seems obvious as to why over 50% of graduating US medical students feel inadequate in the nutrition education presented throughout their years in school⁸; they simply do not receive enough nutrition education in their curriculum. It is crucial that medical students, our future physicians, obtain adequate nutrition education in order to be a resource for overweight/obese patients both in the clinical setting and in primary care practice.

2. LITERATURE REVIEW

Web-based learning and E-learning are interchangeable terms, and are used to describe Internet technologies used to supplement and enhance knowledge⁹. With the increase of online education through web-based learning, several studies have been conducted to review effectiveness and attitudes towards this type of learning versus traditional instructor-led coursework. A study that reviewed 76 medical, nursing, and dental literature pieces regarding web-based learning showed this online style of learning was equivalent to traditional lecture methods, evidenced by distributing multiple-choice written tests to evaluate knowledge gains. Through post-test improvement scores on multiple-choice examinations, this study proved that web-based learning is effective in enhancing knowledge gained through online education, but did not outperform other educational methods. This study also analyzed the participants feelings towards web-based learning, and reported multiple studies where most learners planned to use this learning method again, who also preferred to use it for lectures, videos, continuing medical education conferences, journals, and text-books¹⁰. Another supporting article analyzed multiple e-learning studies, consistently showing positive aspects regarding product utility, cost-effectiveness, and learner satisfaction. Many of these studies have shown more efficient learning and better retention, proving web-based learning is at least as good as, if not better than, traditional learning methods. This study also reported that though students do not view E-learning as replacing traditional instructor-led courses, they willingly accept it as a complementary form of learning⁹. In conclusion, research

has shown positive results with knowledge gained as well as the convenience of flexibility of web-based learning, both of which are essential in the academically laborious life of a medical student.

It is essential to examine practicing medical doctors' views about their own nutrition knowledge and how effective they feel portraying that information to patients. A study conducted in Washington state observed family physicians and their perceived adequacy of both quality and quantity of nutrition training received in medical school and residency. There is concern for practicing physicians and their nutrition knowledge due to the fact that only 26% of U.S. medical schools require a separate nutrition course in their curriculum outside of the core science classes¹¹. The results from the Washington physician study support this concern by showing that of the 59.2% of respondents who received any sort of nutrition training in medical school, only 22.1% reported adequate training⁸. Though these surveyed physicians had an overall higher rate of nutrition training (59.2% vs. national average of 26.2%), less than one-quarter (22.1%) reported feelings towards adequate training, which is of particular concern. It is vital that all entry level, as well as practicing, medical doctors feel capable with their abilities to perform nutrition assessments, understand the role of nutrition in obesity-related diseases, as well as provide nutritional recommendations or referrals to registered dietitians. A recent study from 2015 supports the above findings stating that nutrition education in current medical schools remains deficient due to a lack of time or commitment to teach a formal nutrition course. The formats of the 26% of medical schools who have a formal course in nutrition are as follows: didactic lectures, informal

rounds, specialty conferences, and web-based programs, ranging from one 45-minute session to 10 one-hour sessions¹¹. These results prove that in the time-constrained medical school curriculum, the inclusions of web-based programs are being used in order to provide nutrition education without requiring instructors or in-class lecture time. A formal nutrition education course, likely in the form of web-based learning, is a necessary addition in medical schools due to an overall lack of adequate training.

In order to see a change in the proportion of physicians providing nutrition counseling, the following need to occur: physicians, residents, and medical students need to be educated about nutrition, resources need to be up-to-date, compensation for nutrition counseling must be improved, and organizational changes need to be made that allow the physician to deliver brief, evidence-based nutrition messages to the patient with support from nurses, dietitians, and others in and out of the office. It is also essential to present a collaborative approach towards obesity management, incorporating registered dietitians into the team approach to further educate overweight/obese patients in weight loss strategies¹². The implementation of the WBWWS pilot-study attempts to increase the proportion of future physicians who are confident in providing nutrition counseling by intervening in the medical student population. This workshop includes up-to-date nutrition resources via website links for nutrition topics ranging from assessment techniques, to fad-diets, to registered dietitian referrals, to the chemistry of a carbohydrate, thus encompassing all aspects to encourage nutrition education and counseling in the medical students' future practice.

The issue of lack of confidence in nutrition education/counseling skills is not limited to medical students, but also includes practicing physicians. One study observing 300 family medicine outpatient visits reported 56% of physicians discussing diet, exercise, or weight loss during the consultation, with only 14%-17% of practitioners offering assistance, and a mere 3%-10% recommending follow-up visits¹³. The deficient nutrition discussion from physician to patient stems from a lack of nutrition education during medical school and residency, thus leading to low confidence in presenting vital nutrition information to the overweight/obese patient. The U.S. Preventive Services Task Force promotes that clinicians screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults, with intensive counseling including two visits per month for the first three months^{14,15}. A systemic review observed countless studies from primary care practice on the management of obesity with only two studies actually meeting the above recommendations¹⁵. Practicing physicians cannot be expected to provide intensive counseling and behavioral interventions to promote weight loss if it was never emphasized in their medical schooling. The WBWWS, particularly the webinar lecture series, attempts to accommodate these deficiencies by providing credible information regarding nutrition assessment/recommendations including anthropometric measures, laboratory values, research-based diets, how to present weight loss advice, and basic registered dietitian referral information.

Case studies are often used in medical schools as an inductive learning method, rather than using deductive reasoning, to learn more from examples rather than basic

principle developmental learning. Case studies simulate real patients and develop skills such as problem solving, decision making in complex situations, analytical tools, and coping with ambiguities¹⁶. Due to overwhelming positive focus group feedback from the initial development of the web-based workshop about inclusion of case studies, as well as their prevalence in most medical school curriculums, the addition of the webinar lectures also incorporates a case study series. Several strategies were implemented to create a realistic case study including: telling a real and engaging story, raising a thought-provoking issue, including elements of conflict, promoting empathy with the character, encouraging students to think and take a position, and providing data about character, location, and context¹⁷, all of which were taken into consideration for the WBWWS case study development. The *interrupted* case study was used for the webinar post-test case study series, which is a variation of problem-based learning, using progressive disclosure of information that builds upon each previous case study¹⁸. This is shown to mimic the way physicians analyze patient problems in the majority of primary care settings, by assessing them over time and monitoring their symptoms/lab values with each consultation. In this pilot-study, the introduction of the case study patient takes place after the Nutrition Assessment webinar, with progression of obesity-related symptoms in the second part of the case study after the Obesity and Its Role in Disease webinar, and concluded after the final Nutritional Recommendations webinar, thus providing a three-part *interrupted* case study in the WBWWS.

A final component of this pilot-study involves the use of streaming video lectures as an alternative educational method to in-class learning. There have been few studies

discussing the actual effectiveness of student learning via online lectures and video streaming, even though a majority of medical schools rely on these methods to teach content. A five-year retrospective study was conducted and viewed three different cohorts: the first utilized 2nd year students without access to streaming video and technology, the second offered streaming video for all 2nd year large-group lectures only, and the third offered both 1st and 2nd year streaming video of large-group lectures¹⁹. As more video streaming was available in the form of non-mandatory lectures, shown in the third cohort, better scores were accomplished on the Step 1 test (a U.S. medical licensing examination). Not only did video streaming positively affect test scores, but was also positively received among medical students with 68% of students stating they *always* utilized online video streaming, 21% *often*, and 7% *sometimes* used online streaming for learning purposes¹⁹. Based on these findings, streaming video technology in the form of online lectures is a widely accepted and effective tool to complement in-class delivery in the medical school curriculum. Therefore, the addition of nutrition education via an online lecture webinar series serves to increase nutrition knowledge and efficacy for medical students at Texas A&M University.

In conclusion, there are innumerable literature studies suggesting that currently practicing medical doctors do not feel confident or adequately knowledgeable to recommend a nutrition intervention to overweight/obese patients with or without comorbidities. It is essential to begin nutrition education in the medical school setting, which can be more easily incorporated into their curriculums through web-based learning rather than traditional in-class lectures. The literature shows positive responses

among those who participate in online video lecture streaming, including studies conducted with medical students, in order to improve test scores and effectively retain more learned information. Based on the current obesity epidemic, a Web-Based Workshop & Webinar Series that provides medical students with nutritional tools, resources, and video lectures specific to adult and childhood obesity was proposed, implemented, and analyzed in order to provide future healthcare professionals with the skills to reduce the prevalence of obesity in the United States.

3. RESEARCH OBJECTIVE AND HYPOTHESES

3.1 Research Objective

The objective of the Web-Based Workshop & Webinar Series: Obesity education and resources for medical students was to provide nutrition education to Texas A&M University Health Sciences Center (TAMHSC) College of Medicine (COM) students through web-based learning including accessible literature/government website links, educational videos and tools, as well as a three-part webinar series regarding nutrition assessment, obesity and its role in disease, and nutritional recommendations.

3.2 Research Hypotheses

The following hypotheses were projected for this pilot-study:

1. TAMHSC medical students will improve their nutrition knowledge regarding nutrition assessment, obesity and its role in disease, and nutritional recommendations after viewing the three related webinar lectures, as measured by statistically significant improvement in total scores from pre-test to post-test.
2. TAMHSC medical students will improve their nutrition attitudes towards nutrition's role in the medical setting and their involvement in providing nutrition education to the overweight/obese patient, as evidenced by improvement in domain total score from the Pre-Test Evaluation Survey (PrES) to the Post-Test Evaluation Survey (PoES).

3. TAMHSC medical students will improve their self-efficacy towards their medical nutrition knowledge, where to access supplemental nutrition resources, and their own self-confidence to provide nutrition education, as measured by improvement in domain total score from the PrES to the PoES.

4. METHODS

The Web-Based Workshop & Webinar Series (WBWWS) pilot-test study was carried out in three phases over the course of 11 months: 1) Pre-Implementation, 2) Implementation, and 3) Evaluation & Revision. A Logic Model was created for this study, as seen in Appendix A, in order to outline the details of each phase of the pilot study including defining the situation, describing inputs, activities, and outputs, and determining outcomes and future impacts. A Gantt chart was created, as seen in Appendix B, to visually display an organized timeline of the three phases mentioned above, as well as corresponding dates for each phase. The Gantt chart also includes a timeline for meetings with the previous graduate student and principle investigator, proposal submission, thesis development, and thesis defense. There were two main components to this pilot study, the Web-Based Workshop (WBW), and the three-part Webinar Series including online nutrition lectures regarding Nutrition Assessment, Obesity and Its Role in Disease, and Nutritional Recommendations. A Pre-Test Evaluation Survey (PrES) was available on the WBW homepage as the first task the participants were to complete. The three online lectures were also located on the website homepage for convenient accessibility and less confusion about where to find the webinars. Each webinar category included a pre-test, followed by the participants viewing the provided online lecture, and finished with a case study post-test. The final objective of the WBWWS was for the medical students to browse the provided nutrition

content, videos, outside resources, and scholarly articles before finishing the pilot-test on the “Evaluation” page with completion of the Post-Test Evaluation Survey (PoES).

4.1 *Webinar Development*

Webinar development began in the Pre-Implementation portion of this pilot-study from July to February, as seen on the Gantt chart in Appendix B. A previous focus group meeting from the first portion of this pilot-study, conducted by Terhune 2014, was held to discuss potential topics that the medical students would find most beneficial in an online lecture series. The topics were devised through discussion of nutrition and obesity-related topics with a COM faculty member, which were then presented to the focus group and ranked based on the medical students’ feelings regarding topic importance as seen in Table 1.

Table 1 Focus Group Feedback Potential Webinar Topics

Topic	Ranking of Topic
Pathophysiological Development of Obesity and Adiposity	1
Physiological dysfunction of adipose tissue in obesity leading to the development of CVD, T2DM, and certain cancers	2
How to assess overweight/obesity	4
How to communicate with adults and children about overweight and obesity concerns	5
Nutrition therapy for reducing adiposity and chronic disease/risk symptoms	3
Role of ethnicity and gender in development of obesity	7

Based on the previous medical students' rankings of topics, the highest-ranking topics, 1 and 2, were combined into one webinar titled, Obesity and Its Role in Disease. This webinar encompassed both the pathophysiological development of obesity and the adipocyte, as well as its effects on the body leading to the progression of CVD, hypertension (HTN), T2DM, and certain cancers. The third highest-ranked topic was regarding nutrition therapy for reducing adiposity, which led to the development of the webinar titled, Nutritional Recommendations. Not only did this webinar include dietary recommendations, but it also included exercise therapy (topic 6), how to communicate to the patient about overweight/obesity (topic 5), bariatric procedures, and referral to a registered dietitian. The fourth highest-ranked topic involved assessment of overweight/obesity, hence the creation of another webinar titled, Nutrition Assessment. After the three topics were determined, research was conducted by obtaining scholarly articles through the PubMed and MEDLINE database, as well as reputable government websites. The order of the webinars was 1) Nutrition Assessment, 2) Obesity and Its Role in Disease, and 3) Nutritional Recommendations because that is the order in which physicians should complete a patient consultation-beginning with initial assessment, then understanding how obesity can lead to various disorders, and ending with nutritional recommendations to prevent or treat obesity-related diagnoses.

The following key words as shown in Table 2 were searched in the databases and in reputable government websites to create the content for each of the three webinars.

Table 2 Key Words for Webinar Development

Body Mass Index	Waist Circumference	Weight Loss	Calorie Intake	DASH Diet	Mediterranean Diet
Physical Activity Guidelines	Bariatric Surgery	Hamwi Method	Dietitian Referral	Presenting Weight Loss Information	Obesity & Cancer
Cardiovascular Disease	Type II Diabetes	Hypertension	Obesity	Adipocyte	Adipokine

Objectives were then constructed based on the topics included in Table 1, as well as from specific focus group feedback response from the previous phase of this pilot-study.

4.1.1 *Objectives for Nutrition Assessment*

The following objectives were created as an outline for the first webinar topic narrated by Mrs. Karen Geismar, a nutrition faculty member at Texas A&M University.

- Students will be able to define the term obesity including BMI, know the units of measurement to calculate BMI, and know the cut-points for the stages of obesity.
 - Students will recognize BMI should not be used as a measure of obesity in children, rather to be used as guidelines, as well as know how to use child/adolescent BMI charts.
- Students will be able to properly measure waist circumference and know the values that indicate central obesity for both men and women.
- Students will be able to calculate ideal body weight for an obese patient (BMI>30) using the Hamwi method and calculate a hypocaloric regimen for obese patients based on their ideal body weight.

- Students will recognize the stages of hypertension based on the NIH systolic and diastolic cut-point values.
- Students will be able to identify laboratory values for hyperglycemia (HbA1c, fasting glucose, glucose tolerance test) and which values indicate normalcy, pre-diabetes, or T2DM.
- Students will be given the WHO prerequisites for “metabolic syndrome” in order to know how obese individuals can fall under this diagnosis, as well as how it leads to the progression of various diseases.

4.1.2 *Objectives for Obesity and Its Role in Disease*

The following objectives were created as an outline for the second webinar topic narrated by Dr. Karen Kubena, a nutrition professor at Texas A&M University.

- Students will learn the definition of obesity and how it develops over time, as well as the function of the adipocyte.
- Students will be able to list examples of key adipokines secreted in altered levels during the state of obesity and understand why this process occurs.
- Students will be able to identify the differences between visceral and subcutaneous adipocytes and how their location is related to the development of different diseases.
- Students will recognize how obesity leads to a state of systemic, chronic inflammation, and how this results in CVD, insulin resistance, metabolic syndrome, etc.

- Students will be able to identify the altered adipokines and immune function assisting the development of T2DM, HTN, and endothelial dysfunction.
- Students will know how excess adiposity contributes to CVD and certain cancers.

4.1.3 *Objectives for Nutritional Recommendations*

The following objectives were created as an outline for the third webinar topic narrated by Dr. Peter Murano, a nutrition professor at Texas A&M University.

- Students will know the recommendations for BMI cut-points for weight loss, as well as the comorbidities indicating weight loss should take place.
- Students will review the MyPlate government website guidelines and resources for overweight/obese patients.
- Students will learn the components and specific guidelines for the Dietary Approaches to Stop Hypertension (DASH) diet, and for the Mediterranean diet.
- Students will learn how to better present weight loss information to patients.
- Students will be able to identify the physical activity guidelines for both adults and children.
- Students will be able to identify the best technology apps, websites, and devices to recommend to patients for weight loss.
- Students will learn the most common bariatric procedures and when to recommend surgery.
- Students will recognize the advantages for registered dietitian referral for overweight/obese patients.

After the objectives were discussed and created, PowerPoint presentations were developed with detailed content, tables, and figures in order to mimic an in-classroom PowerPoint lecture. Specific scripts for each webinar were devised, as seen in Appendix L, and were sent out to the respected nutrition lecturers. After each instructor revised their scripts and PowerPoint lectures, they were sent back for final editing before each presentation was to be filmed. The software, Camtasia provided through TAMU Informational Technology, was used to video capture the presented PowerPoint on the computer screen, and also to record the audio narration as each lecturer discussed the script and content on each slide. After the three webinars were successfully recorded, each webinar file was edited separately. This process included the addition of introductory remarks describing each lecturer and their previous experience in the nutrition field while their professional photo was displayed on the screen in order to create a more personal online experience. Any mistakes or stutters were cropped out of the videos, as well as additions of transitions between slides, animations to enhance emphasis on certain displayed diagrams, and alterations in sound options to provide the most audibly pleasing product. Each completed webinar was then translated to a YouTube video for participant access. The web addresses are as follows:

Nutrition Assessment: <http://www.youtube.com/watch?v=eXGzgQE5GXQ>

Obesity and Its Role in Disease: <http://www.youtube.com/watch?v=RNUvCBwD-A8>

Nutritional Recommendations: http://www.youtube.com/watch?v=_31qhYG4wW0

Each YouTube video was uploaded to a private account and can only be accessed with the URL, or through the WBW. The above links were attached to the WBW

through the online website creator, Wix.com, in order for the participants to access the webinars.

4.2 *Survey and Webinar Pre/Post-Test Development*

Survey and webinar pre and post-test development began in the Pre-Implementation portion of this pilot-study. The online software, Qualtrics Survey Application provided through TAMU Informational Technology, was used to create and distribute the surveys and tests. A change in nutrition attitudes, perceived self-efficacy, and participant screening/demographics were evaluated through one Pre-Test Evaluation Survey (PrES) and one Post-Test Evaluation Survey (PoES). For this pilot-study, “Nutrition attitudes” is defined as medical students’ feelings toward and position on the importance of nutrition in patient care. Similarly, “Perceived self-efficacy” is defined by the degree of confidence medical students have in delivering nutrition and weight-management education to overweight and obese patients. The purpose of the PrES was to collect demographic and screening information, and to assess changes in nutrition attitudes and perceived self-efficacy after intervention of the WBWWS. Previous work done with the development of the WBW also included a Pre and Post-Test Evaluation Survey, which acted as a guideline to the provided questions in this continuation pilot-study. Resources to understand proper format and information that should be included in surveys or questionnaires included Feren et al., McGaghie et al., Niederhauser & Mattheus, and Parmenter & Wardle. Key words that were used for searching online databases for medical survey development are shown in Table 3.

Table 3 Key Words for PrES/PoES Development

Survey	Evaluation	Physician
Medical	Education	Nutrition
Perception	Knowledge	Attitudes

The PrES and PoES consisted of the exact same questions including multiple choice (MC), fill-in-the-blank (FIB), and Likert-scale (LS) format with responses ranging from strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree. LS format is particularly beneficial in public health evaluation, specifically for attitudes, beliefs, and behavior items. This is why all Nutrition Attitudes (NutrAtt) and Self-efficacy (SE) questions were designed using the LS format. The SE questions were further divided into three subcategories due to the fact that the content included in the SE portion had three distinct themes: Medical Knowledge, Supplemental Nutrition Resources, and Self-Efficacy Abilities. This division was purposed for creating a more accurate depiction of change in SE scores when the results were analyzed. Table 4 represents the classification of the questions and their corresponding numbers in the PrES/PoES, as well as the type of question.

Table 4 PrES/PoES Questions

PrES/PoES Classification	Question Number(s)	Type of Question
Screening and Demographics	Q1-Q9	MC, FIB
Nutrition Attitudes	NutrAtt 1-8	LS
Perceived Self-Efficacy	SE 1-13	LS
SE Subscales	SE 1-13	LS
Medical Knowledge	SE3, 10-13	LS
Supplemental Nutrition Resources	SE 5-9	LS
SE Abilities	SE 1, 3, 4	LS

Six additional questionnaires were developed in the Qualtrics software including one pre-test and one post-test for each of the three online webinar lectures. It is important to note that focus group feedback from the previous WBW pilot-study strongly indicated case study incorporation as a means to learn a real life application of the material being presented to them. With that, each webinar post-test was created in a case study format, where a patient was described and developed including medical/family history, a description of personal information, lab values, and signs/symptoms. Herreid describes using case studies to teach science and discusses the inclusion criteria when creating case studies, which were used as guidelines to create an *interrupted* case study, or the progressive disclosure of information building upon each previous case study¹⁸, for each webinar post-test. That being said, a fictional character, Tiana, mimicked an individual who progressively became more obese with related complications, and each webinar built upon this patient as seen in the *interrupted* case study approach. Appendix E, G, and I provide the case study, lab data, and related post-

test questions for each of the three-webinar lectures. Laboratory values as seen in the disease state of pre-diabetes, T2DM, HTN, and metabolic syndrome were obtained from the CDC and the WHO in order to provide accurate values. The remaining laboratory data, including comprehensive metabolic panel values, fasting blood glucose/HbA1c, cholesterol and triglycerides, were referenced from Merck manuals, a credible online resource for laboratory values.

Each webinar pre and post-test consisted of the same eight MC questions, with the caveat that the post-test questions were tailored to the case study patient, which slightly changed the wording of the questions. The post-test answers for each question were also placed in a different order than the pre-test answers to avoid the participants simply memorizing the answer choice they selected during the pre-test and submitting the same answer for the post-test. Dr. Karen Kubena assisted with the pre/post-questions created for each webinar lecture, and also with the development of the case study patient. This particular case study used a reference patient with uncontrolled T2DM, provided by the American Diabetes Association in order to create a more accurate and realistic depiction of a patient developing this disease and its associated signs/symptoms²⁰. Similar to the distribution of the webinar series, each pre/post-test for the three webinars was made active and linked to the WBW homepage. The participants were then able to access the pre-test, view the corresponding webinar lecture, and take the post-case study test.

4.3 *Web-Based Workshop Revisions/Updates*

Revisions were made to the WBW website in addition to the creation of the three online webinar lectures. Each provided link was tested to ensure their respected websites were still valid, and those that were expired were either re-routed to the new URL or deleted from the WBW entirely. A new homepage was created with detailed instructions on how to navigate through the workshop, the required surveys and tests that needed completion, and the order in which the components were to be finished. All written content was thoroughly reviewed and all grammatical and spelling errors were revised. The learning objectives were updated with a few additions based on more specific nutrition information presented in the webinar series-for example, “Students will learn about the role of the adipocyte in the initiation and progression of the following diseases: HTN, T2DM, atherosclerosis/CVD, and certain cancers”. Previous focus group feedback from the original WBW pilot-study suggested condensing the external links provided on the website and including only the most relevant information. Subsequently, several of the resources that were repetitive of another source were removed from the website entirely. The format of titles, subtitles, and text were altered to reduce empty space, as well as additional placement of several pictures, videos, and descriptions on the website to enhance understanding of the material.

Several supplemental diagrams created for the webinar series were copied and pasted onto the website for easy access without having to watch the entire online lecture in order to view them. Additionally, a short video about how to properly take a waist circumference measurement was created by two Texas A&M nutrition graduate students

via iMovie. Similarly to the webinar lectures, this video was uploaded to a private YouTube account, and was included in the Nutrition Assessment webinar, as well as linked to a webpage on the WBW website.

4.4 *Recruitment/Implementation*

Targeted participants for this pilot-study were first through fourth year TAMHSC COM students. The recruitment email can be seen in Appendix K. After IRB approval, emails were distributed by a TAMHSC COM staff representative to every TAMHSC COM student (n=620). This was done on a weekly basis during the duration period of five weeks (February 10-March 20), and included a link to the WBWWS, a brief description of the study, as well as the research study information sheet and consent form. A formal five-minute presentation before a mandatory Wellness Class at the College Station medical school campus was performed as a way to obtain more participation in the WBWWS. This brief announcement was video conferenced to the Temple location and was only viewed by first and second year medical students at both campuses. Students interested in participating emailed their virtually signed consent forms and whether they were interested in participating in a focus group feedback meeting to be held after the pilot study. As an incentive to participate, medical students who accessed the WBWWS and who completed the PrES, PoES, Nutrition Assessment (NutrAssess) pre/post-tests, Obesity and Its Role in Disease (Obesity) pre/post-tests, and Nutritional Recommendations (NutrRecomm) pre/post-tests, were entered to win one of twelve \$25 Amazon.com gift cards. Also, four medical students who were interested in participating in the focus group meeting received an additional \$25 Amazon.com gift

card.

4.5 *Statistical Analysis*

The WBWWS was a cross sectional observational design study assessing data collected from TAMHSC COM students regarding nutrition attitudes and self-efficacy. It was also considered a quasi-experimental study because it utilized pre and post-tests in order to determine whether the intervention (nutrition webinar series) had the intended effects on the medical students or not. The statistical software used to analyze the results from the PrES, PoES, and all pre/post-tests for the webinar series was IBM SPSS Statistics Version 23. The PrES had n=14, while the PoES had n=12, so all paired statistics comparing the two surveys used n=12 in order to determine results. The NutrAssess webinar and NutrRecomm webinar had n=14 for both the pre and post-tests, so n=14 was used for all paired statistics. The Obesity webinar had n=14 for the pre-test, but n=13 for the post-test, so n=13 was used for all paired statistics.

Each participant was assigned a number, or PART ID#, which was determined by both their IP Addresses and provided emails. The IP Address could not be the only component used to match each participant to their responses because multiple students used more than one computer for the different tests, hence different IP Addresses. Two participants utilized different computers from both the PrES to the PoES and from the NutrAssess pre-test to the NutrAssess post-test, while all of the participants utilized the same computers for the Obesity pre and post-tests, and NutrRecomm pre and post-tests. For those participants who could not be matched to their corresponding test results via IP Address, their provided email addresses were also matched to each PART ID#. PART

ID#s ranged from 1-14 and those numbers were used in SPSS as a means to identify each participant with their corresponding test results.

4.5.1 *Participant Information*

For both the PrES and PoES, frequencies analyses were performed for gender, age, BMI category, current year in medical school, number of overweight/obese patients they have seen in the past year, and prior nutrition training or coursework. Percent and valid percent were calculated for each of the above questions in both table and graph formats. One graph looked at the participants' year in medical school and corresponding number of overweight/obese patients seen in the past year as a means to observe third and fourth year students, who are completing rotations, see more patients and subsequently, more obese patients than first and second year students.

4.5.2 *Nutrition Attitudes, Pre and Post*

Prior to statistical analysis, one NutrAtt question (NutrAtt 7) was reverse-coded, i.e. 5→1, 4→2, etc. because the question was stated negatively. Descriptive statistics for each of the eight NutrAtt questions were calculated including mean score, variance, minimum, and maximum. The NutrAtt Domain Total Score (DTS) was determined by calculating the sum of the responses for each subscale-combined score (1=Strongly Disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree). A paired samples correlation test was calculated for NutrAtt 4 pre & post, as well as frequency statistics and a graph for this particular question. A Paired Samples T-test was calculated for NutrAtt DTS post – NutrAtt DTS pre. A paired samples correlation test was performed for NutrAtt DTS post – NutrAtt DTS pre.

4.5.3 *Self-Efficacy, Pre and Post*

Descriptive statistics for each of the 13 SE questions were calculated including mean score, variance, minimum, and maximum. The SE DTS was determined by calculating the sum of the responses for each subscale-combined score (1=Strongly Disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree). A paired samples correlation test was calculated for SE 9 pre & post, as well as frequency statistics and a graph for this particular question. A Paired Samples T-test was calculated for SE DTS post – SE DTS pre. A paired samples correlation test was performed for SE DTS post – SE DTS pre.

4.5.4 *Self-Efficacy Subscales, Pre and Post*

A Paired Samples T-test was also performed for each of the three SE subscales (Subscale 1=SE 3, SE 10-13; Subscale 2=SE 5-9; Subscale 3=SE 1, SE 2, & SE 4). Descriptive statistics were calculated for each SE subscale pre and post, as well as paired samples statistics due to the differing N values (pre=14; post=12).

4.5.5 *Webinar Series*

The Domain Total Score (DTS) for each webinar was determined by calculating the sum of the values for the correct and incorrect responses. Each participant received a DTS for each pre and post-test based on the amount of questions they answered correctly, which were then used in statistical analysis. If a student answered a question “correct”, they received a score of 1, while “incorrect” received a score of 0. The highest DTS possible was 8, and the lowest obtainable DTS was 0. Paired sample statistics for each of the NutrAssess pre/post-tests, Obesity pre/post-tests, and NutrRecomm pre/post-

tests were calculated including total mean score, sample size, standard deviation, and standard error mean. Paired sample statistics were calculated because the Obesity webinar had n=14 for the pre-test and n=13 for the post-test, thus n=13 was used for the Obesity webinar. A Paired Samples T-test was calculated for each webinar post DTS – pre DTS to determine significance. A paired samples correlation test was also performed for all three webinar pre and post-tests.

4.6 *Focus Group Question Development/Recruitment*

As indicated in the Logic Model in Appendix A, a focus group feedback meeting was held after the WBWWS pilot study on April 3. The focus group consisted of four medical student participants who had expressed interest via email consent, a registered dietitian, an assistant moderator, an IT specialist, and one nutrition graduate student as the moderator. The principle investigator was not able to attend, but viewed the video-recorded focus group meeting in order to hear the valuable feedback provided by the medical students. Three of the four medical students were located either in Temple, TX or Dallas/Ft. Worth, TX, so they were video conferenced in via Google+ Hangouts. The video was recorded via Google+ Hangouts and added to the same private YouTube account as the uploaded webinars for the viewing purposes of any current and future students/staff working with this project. Appendix K shows the recruitment email that was sent out via listserv to first through fourth year TAMHSC COM students, which informed the students about the focus group meeting. Development of the questions were guided by the previous WBW focus group questions, as well as Krueger's guide to conducting focus groups²¹. The previous study's coordinator was also in contact with a

Texas A&M AgriLife focus group expert to learn how to conduct a professional focus group, so their protocol was reviewed in detail for the implementation of the WBWWS focus group meeting.

There were 15 questions on the original focus group Word document and was broken down into the following categories: opening question (1), introductory question (2), transition question (3), webinar key questions (5-8), workshop key questions (9-13), summary question (14), and ending question (15). This format was presented in Krueger's guide in order to cover all necessary aspects of the topic at hand. Due to the one-hour time allotment, two of the questions (11 and 13) were bypassed in order to move on to the next topic to be discussed. These two questions were similar to previous content, so no pertinent feedback was lost. The assistant moderator and I, the moderator, documented participant responses by creating separate Word documents as they answered each question in addition to video recording the meeting with Google+ Hangouts. Materials needed for this focus group included a whiteboard, laptops (for myself and the assistant moderator), a hard copy of focus group questions for each of the four physically present members and an electronic copy for the three distance medical students, a monitor for displaying the video conferenced medical students, and a TAMU computer used to access Google+ Hangouts for the video conference and recording purposes. The provided feedback will be discussed in the Future Aims section of this document.

5. RESULTS

The overall research question that was considered for this portion of the pilot study asked whether or not Texas A&M medical students improved their nutrition knowledge after viewing the online webinar lecture series regarding Nutrition Assessment, Obesity and Its Role in Disease, and Nutritional Recommendations.

5.1 *Participants*

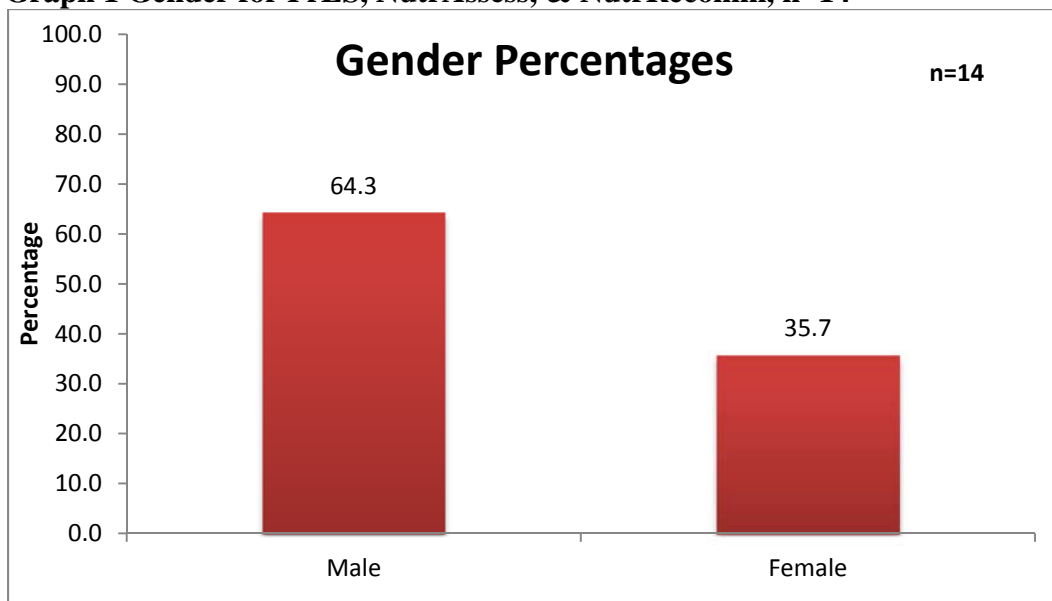
The sample sizes were determined by each of the evaluation surveys and webinar pre/post-tests. The Pre-Test Evaluation Survey (PrES) had a sample size of n=14, the Post-Test Evaluation Survey (PoES) had a sample size of n=12, the NutrAssess and NutrRecomm webinars had a sample size of n=14, and the Obesity webinar had a sample size of n=13 TAMHSC COM students. The Obesity pre-test webinar had n=14, while the post-test had n=13, thus all paired results for the Obesity webinar used a total n=13. The PoES had n=12, which equates to an 85.7% completion rate from PrES to PoES with only two participants who did not complete the PoES. This was likely due to the fact that the PoES was located on a different webpage than the rest of the surveys/quizzes, thus two participants overlooked the final survey of the WBWWS. All observations regarding gender, year in medical school/participant age, BMI category, number of overweight/obese patients seen, and prior nutrition training used n=14 to accurately represent the population size for the majority of the results, with the exception of the Obesity webinar and PoES. All webinar results used their respected paired

participant values of n=14 and n=13. All Nutrition Attitudes and Self-Efficacy results, which were included in the PrES and PoES, used a paired participant value of n=12.

5.2 PrES/PoES Participant Information

The first component of the WBWWS instructed the participants to complete the PrES. This survey included questions regarding participant age, gender, anthropometric information, number of overweight/obese patients they have seen in the past year, prior nutrition education, a series of Nutrition Attitudes (NutrAtt) questions, and a series of Self-Efficacy (SE) questions. Question 2 (PrES 2) asked for the participants to indicate their gender, of which five out of 14 were female (35.7%), and nine were male (64.3%). Graph 1 shows the percentages of the male and female participants using n=14 from the PrES.

Graph 1 Gender for PrES, NutrAssess, & NutrRecomm, n=14



5.2.1 *Year in Medical School and Participant Age*

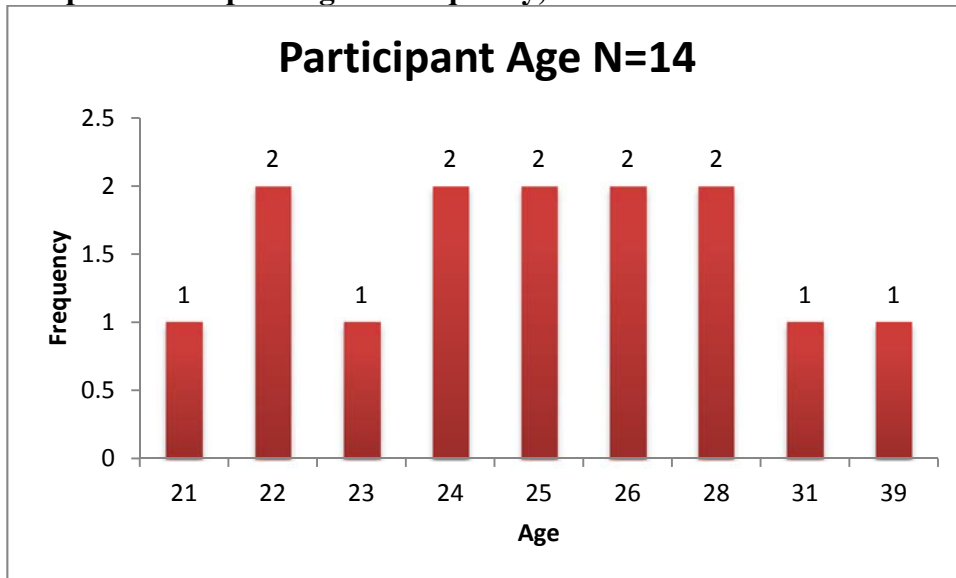
The PrES included a question (PrES 6) that indicated the participants' year in medical school. Of the n=14 participants, 10 (71.4%) were first year students, one (7.1%) was a second year student, one (7.1%) was a third year student, and two (14.4%) were fourth year students. Table 5 indicates the number of participants in each year of medical school, showing the frequency for each year in medical school as well as those values as a percentage.

Table 5 Year in Medical School, n=14

Year in Medical School-Pre					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	71.4	71.4	71.4
	2	1	7.1	7.1	78.6
	3	1	7.1	7.1	85.7
	4	2	14.3	14.3	100
	Total	14	100	100	

The PrES included a question (PrES3) that asked the participants to indicate their age. Graph 2 shows the participant age distribution using n=14, which ranged from 21 years old to 39 years old. There was one-21 year old, two-22 year olds, one-23 year old, two-24, 25, 26, and 28 year olds, one-31 year old, and one-39 year old, thus showing an age range of 18 years. Graph 2 includes the number of medical students with their corresponding ages, as indicated by the numbers above each bar.

Graph 2 Participant Age & Frequency, n=14



5.2.2 Participant BMI Category

The PrES included anthropometric questions regarding height and weight in order to determine participant BMI status. PrES 4 asked the participants to indicate their height in non-metric values, and PrES 5 asked them to indicate their weight in non-metric values. Those values were then converted to height in meters, and weight in kilograms to mimic the units used when calculating BMI. The formula $[(\text{weight (lbs.)}/2.2)/((\text{height (inches)}*0.0254)^2)]$ was entered into Excel in order to calculate BMI. Those values were then copied to SPSS Statistics software as a new variable, “BMI”, and those BMI values were then labeled as the categories indicated in Table 6.

Table 6 SPSS Software Value Labels

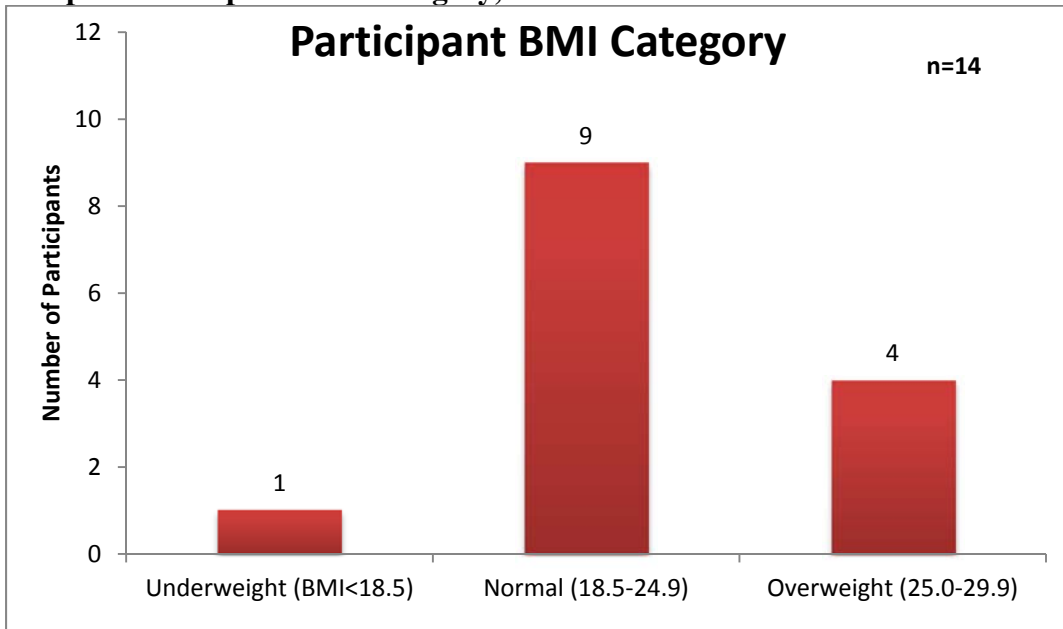
1.00	Underweight (BMI<18.5)
2.00	Normal (BMI 18.5-24.9)
3.00	Overweight (BMI 25.0-29.9)
4.00	Obese (BMI >30.0)

A frequency analysis was computed, as seen in Table 7. This showed one participant as underweight (7.1%), nine participants as normal weight (64.3%), and four participants as overweight (28.6%). No participants were determined to have a BMI>30, so 0% were classified as obese. Graph 3 shows the BMI category distribution with the y-axis representing number of participants and the x-axis representing BMI categories, thus showing the participants' current BMI status.

Table 7 Participant BMI Category, n=14

BMI Category					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Underweight (BMI<18.5)	1	7.1	7.1	7.1
	Normal (18.5-24.9)	9	64.3	64.3	71.4
	Overweight (25.0-29.9)	4	28.6	28.6	100.0
	Total	14	100.0	100.0	

Graph 3 Participant BMI Category, n=14



5.2.3 Number of Overweight/Obese Patients Seen

The PrES included a question (PrES 7) about the medical students' experience with number of overweight/obese patients seen in the past year. As seen in Table 8, the farther into medical school a student has gone, the more overweight/obese patients they have encountered. Three of the ten first year medical students reported seeing no overweight/obese patients, six reported seeing 1-10 overweight/obese patients, and one first year student reported seeing 11-20 overweight/obese patients. The remaining four participants, one second year, one third year, and two fourth years, all reported seeing >21 overweight/obese patients in the past year. This supports the medical school curriculum where as a student progresses into their third and fourth years of schooling,

they have more clinical clerkships where they experience patients, and subsequently more overweight/obese patients.

Table 8 PrES 7 Year Med School & # Overweight/Obese Patients Seen, n=14

YRMed-Pre * Seen overweight/obese patients-Pre Crosstabulation						
		Seen overweight/obese patients-Pre				Total
		None	1-10 patients	11-20 patients	>21 patients	
YRMed-Pre	1st Year	3	6	1	0	10
	2nd Year	0	0	0	1	1
	3rd Year	0	0	0	1	1
	4th Year	0	0	0	2	2
Total		3	6	1	4	14

5.2.4 *Prior Nutrition Education*

The PrES included a question (PrES 8) that inquired if the participants had any nutrition training prior to completing the WBWWS. This survey question, developed in the software Qualtrics, was programmed to detect a difference between a “no” response and a “yes” response, where a negative response skipped PrES 9 and continued the survey to the NutrAtt questionnaire. A “yes” response led to completion of PrES 9 followed by the NutrAtt questionnaire. PrES 9 looked more closely at the type of prior nutrition training with the specific response options shown in Table 9.

Table 9 PrES 9 Response Options

PrES9(a)	At least 1 undergraduate course
PrES9(b)	Nutrition major in college
PrES9(c)	Master’s in nutrition

Table 9 Continued

PrES9(d)	At least 1 graduate class
PrES9(e)	Required nutrition course in medical school
PrES9(f)	Elective nutrition course in medical school
PrES9(g)	Other (text describe)

A cross tabulation table for PrES 8, as shown in Table10, resulted in seven first year students admitting to never engaging in prior nutrition training, while three responded positively and were directed to PrES 9 to specifically indicate their previous type of education. The two-second and third year students engaged in prior nutrition training, as well as one of the fourth year students. The cross tabulation table shows that 87.5% of students who did not have prior nutrition training were first year students, with the remaining 12.5% coming from the other fourth year student.

Table 10 PrES 8 Prior Nutrition Training Yes/No, n=14

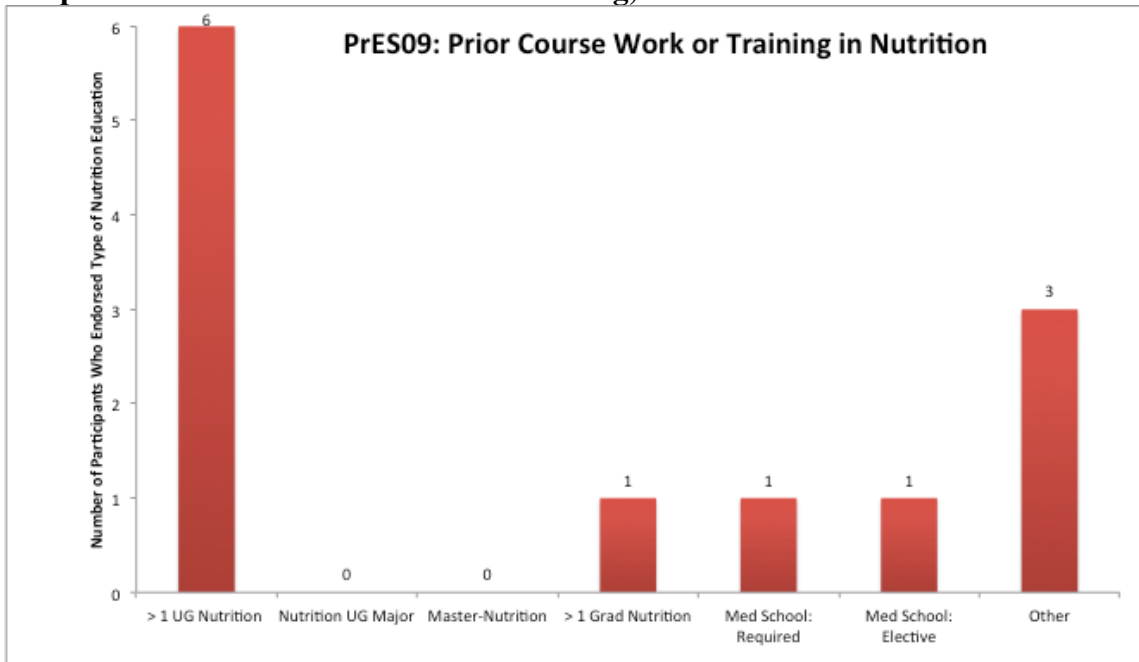
YRMed-Pre * Prior Course Work or Training in Nutrition: Crosstabulation				
		Have you had prior nutrition education?		Total
		Yes	No	
YRMed-Pre 1st Year	Count	3	7	10
	% within YRMed-Pre	30.0%	70.0%	100.0%
	% within Have you had prior nutrition education?	50.0%	87.5%	71.4%
	% of Total	21.4%	50.0%	71.4%
2nd Year	Count	1	0	1
	% within YRMed-Pre	100.0%	0.0%	100.0%
	% within Have you had prior nutrition education?	16.7%	0.0%	7.1%
	% of Total	7.1%	0.0%	7.1%
3rd Year	Count	1	0	1
	% within YRMed-Pre	100.0%	0.0%	100.0%
	% within Have you had prior nutrition education?	16.7%	0.0%	7.1%
	% of Total	7.1%	0.0%	7.1%
4th Year	Count	1	1	2
	% within YRMed-Pre	50.0%	50.0%	100.0%
	% within Have you had prior nutrition education?	16.7%	12.5%	14.3%
	% of Total	7.1%	7.1%	14.3%
Total	Count	6	8	14
	% within YRMed-Pre	42.9%	57.1%	100.0%
	% within Have you had prior nutrition education?	100.0%	100.0%	100.0%
	% of Total	42.9%	57.1%	100.0%

Graph 4 shows the distribution of students (n=6) for PrES 9 who indicated they had prior nutrition training with a response option of “check all that apply”. All six students in this category chose response (a), indicating at least one undergraduate course in nutrition. Zero students selected choices (b) and (c). One student selected choice (d), (e), and (f). Three students selected choice (g) with the following text submissions:

- Course at a Harvard School of Public Health CME class
- Self-learned for body building
- Required to take nutrition classes in the military as a part of special operations fitness programs and medical training

More specifically, those n=6 who were able to answer the PrES 9 “check all that apply” had the following responses: two of the six students selected only choice (a); one student selected choices (a) and (g); one student selected choices (a), (f), and (g); one student selected choices (a), (d), and (g); and one student selected choices (a) and (e).

Graph 4 PrES 9 Prior Course Work/Training, n=14



5.3 PrES/PoES NutrAtt Survey Questions

Table12 and Table13 show the statistics for the eight-question Nutrition Attitudes pre and post portions of the PrES. Each question was coded in SPSS with the rank system as seen in Table 11.

Table 11 NutrAtt PrES/PoES SPSS Rank Values

-99	Missing
1	Strongly Disagree
2	Disagree
3	Neither Agree nor Disagree
4	Agree
5	Strongly Agree

It is important to note that NutrAtt 7 was reverse-coded in SPSS due to the fact that ranking Strongly Disagree as a 5 instead of a 1 (1→5), Disagree as a 4 instead of a 2 (2→4), etc., was more accurate when calculating the NutrAtt Domain Total Score (NutrAtt DTS). A mean score was calculated for each NutrAtt question and the NutrAtt DTS represented the sum of all eight NutrAtt questions. The NutrAtt DTS before viewing the webinar series and WBW content, as seen in Table 5, was valued at 33.5714. The NutrAtt DTS, as seen in Table 13, was valued at 34.9167 after viewing the webinar series and WBW content, showing an improvement of mean score 1.3453 from pre to post-NutrAtt DTS. Though there was not a statistically significant improvement of NutrAtt DTS after intervention ($p=0.103$), the slight increase in mean scores suggests the participants' changed their attitudes to an extent, as evidenced by Table 24.

Table 12 PrES Nutrition Attitudes, n=14

Statistics										
		NutrAtt 1- Change toward healthier lifestyle important- Pre	NutrAtt 2- Nutr assess & counsel should be in routin appt like diagnosis?/tr eatment-Pre	NutrAtt 3- Obligation to improve health of patients by discussing nutrition-Pre	NutrAtt 4- Most med students not adequately trained discuss nutrition-Pre	NutrAtt 5- Most patients will change lifestyle if I advise them- Pre	NutrAtt 6- Specific advice about dietary changes could help improve eating habits- Pre	NutrAtt 7 Pre Reverse: Most patients, health education does little to promote adherence to healthy lifestyle- Pre	NutrAtt 8- Important I recommend dietary changes prior to drugs whenever possible- Pre	NutrAtt Domain Total Score Pre
N	Valid	14	14	14	14	14	14	14	14	14
	Missing	0	0	0	0	0	0	0	0	0
Mean		5	4.6429	4.6429	4.4286	3	4.2143	3.4286	4.2143	33.5714
Variance		0	0.247	0.247	0.571	0.615	0.643	0.879	0.489	7.341
Minimum		5	4	4	3	2	2	2	3	29
Maximum		5	5	5	5	4	5	5	5	38

Table 13 PrES Nutrition Attitudes-Post, n=12

Statistics										
		NutrAtt 1- Change toward healthier lifestyle important- Post	NutrAtt 2-Nutr assess & counsel should be in routin appt like diagnosis?/treat ment-Post	NutrAtt 3- Obligation to improve health of patients by discussing nutrition-Post	NutrAtt04- Most med students not adequately trained discuss nutrition- Post	NutrAtt 5- Most patients will change lifestyle if I advise them- Post	NutrAtt 6- Specific advice about dietary changes could help improve eating habits- Post	NutrAtt 7 Post Reverse: Most patients, health education does little to promote adherence to healthy lifestyle- Pre	NutrAtt 8- Important I recommend dietary changes prior to drugs whenever possible-Post	NutrAtt Domain Total Score Post
N	Valid	12	12	12	12	12	12	12	12	12
	Missing	2	2	2	2	2	2	2	2	2
Mean		4.9167	4.5833	4.6667	4.5	3.1667	4.5833	3.6667	4.8333	34.9167
Variance		0.083	0.265	0.242	0.455	0.515	0.265	0.97	0.152	6.447
Minimum		4	4	4	3	2	4	2	4	30
Maximum		5	5	5	5	4	5	5	5	38

5.3.1 *PrES/PoES NutrAtt 4*

Looking more specifically at the difference in NutrAtt 4 post – pre, which states, “Most medical students are not adequately trained to discuss nutrition to overweight/obese patients”, it should be noted that 14.3% of participants felt undecided (Neither Agree nor Disagree) about adequacy of nutrition training in medical school before viewing the WBWWS, while only 8.3% felt undecided after the intervention, as seen in Table 14 and Table 15. The 6% difference between the pre and post-NutrAtt 4 was added to the “Agree” response option in the post-NutrAtt 4, resulting in a total of 33.3% of participants who “Agreed” with the statement that most medical students are not adequately trained to discuss nutrition to overweight/obese patients after intervention. Therefore, it can be assumed that the WBWWS made the medical participants realize that they still have much to learn about nutrition in the overweight/obese population and may not have known as much as they thought in order to adequately discuss nutrition with these patients.

Table 14 NutrAtt 4-Pre Valid Percent, n=14

NutrAtt 4-Most med students not adequately trained discuss nutrition-Pre					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither Agree nor Disagree	2	14.3	14.3	14.3
	Agree	4	28.6	28.6	42.9
	Strongly Agree	8	57.1	57.1	100.0
	Total	14	100.0	100.0	

Table 15 NutrAtt 4-Post Valid Percent, n=12

NutrAtt 4-Most med students not adequately trained discuss nutrition-Post					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither Agree nor Disagree	1	7.1	8.3	8.3
	Agree	4	28.6	33.3	41.7
	Strongly Agree	7	50.0	58.3	100.0
	Total	12	85.7	100.0	
Missing	System	2	14.3		
Total		14	100.0		

5.4 PrES/PoES SE Survey Questions

Table 16 and Table 17 show the statistics for the 13-question Self-Efficacy pre and post portions of the PrES. Each question was presented with the same rank system used for the NutrAtt questionnaire, as seen in Table 11. A mean score was calculated for each SE question and the SE Domain Total Score (SE DTS) represented the sum of all 13 SE questions. The SE DTS before viewing the webinar series and WBW content, as seen in Table 16, was valued at mean 45.8571. The SE DTS after viewing the webinar series and WBW content, as seen in Table 17, was valued at mean 56.3333, showing an improvement of mean score 10.4762 from pre to post-SE DTS. This difference showed significance ($p < 0.0001$), as shown in Table 24. It should be noted that the paired SE DTS difference from the PrES to PoES, using $n=12$, showed a mean score difference of 11.16667, as shown in Table 24. These results suggest the medical students' self-efficacy regarding their abilities to provide nutrition education, medical knowledge about certain obesity-related diseases, and where to find credible outside resources significantly improved after intervention

Table 16 PrES Self-Efficacy Pre, n=14

Statistics															
		SE 1-Feel comfortable w/ ability to provide nutr. educ. to overweight/ obese patients-Pre	SE 2-Feel comfortable w/ ability to provide PA educ. w/ overweight/ obese patients-Pre	SE 3- Knowledgeable how obesity contributes to HTN, T2DM, atheros/CVD, cancer-Pre	SE 4-Feel comfortable w/ discuss strategies for disease prevention/ treatment, nutr & lifestyle-Pre	SE 5-Likely to refer overweight/ obese patient to RD-Pre	SE 6-Likely to refer diabetic patient to RD-Pre	SE 7-Know where to find reliable online sources on nutrition-Pre	SE 8-Know where to find reliable online sources on PA-Pre	SE 9-Online lecture series are beneficial to learn more about nutr. & role in obesity-Pre	SE10-Feel comfortable diagnosing overweight/obese by BMI/waist circumference-Pre	SE11-Feel comfortable recommending specific caloric allotment weight loss-Pre	SE12-Feel comfortable diagnosing stages HTN/ state of diabetes from labs-Pre	SE13- Understand role of adipose tissue in progression of certain diseases-Pre	Self Efficacy Domain Total Score Pre
N	Valid	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3.2857	3.5714	3.5714	3.1429	3.5714	3.7857	3.0714	3.2143	4.2143	4.0714	3.2143	3.7143	3.4286	45.8571
Variance		1.604	1.802	1.033	1.209	1.187	0.489	1.61	1.258	0.335	0.841	1.258	1.297	0.571	61.209
Minimum		1	1	2	2	1	3	1	2	3	3	2	2	2	34
Maximum		5	5	5	5	5	5	5	5	5	5	5	5	5	60

Table 17 PrES Self-Efficacy Post, n=12

Statistics															
		SE 1-Feel comfortable w/ ability to provide nutr. educ. to overweight/ obese patients-Post	SE 2-Feel comfortable w/ ability to provide PA educ. w/ overweight/ obese patients-Post	SE 3- Knowledgeable how obesity contributes to HTN, T2DM, atheros/CVD, cancer-Post	SE 4-Feel comfortable w/ discuss strategies for disease prevention/ treatment, nutr & lifestyle-Post	SE 5-Likely to refer overweight/ obese patient to RD-Post	SE 6-Likely to refer diabetic patient to RD-Post	SE 7-Know where to find reliable online sources on nutrition-Post	SE 8-Know where to find reliable online sources on PA-Post	SE 9-Online lecture series are beneficial to learn more about nutr. & role in obesity-Post	SE10-Feel comfortable diagnosing overweight/obese by BMI/waist circumference-Post	SE11-Feel comfortable recommending specific caloric allotment weight loss-Post	SE12-Feel comfortable diagnosing stages HTN/ state of diabetes from labs-Post	SE13- Understand role of adipose tissue in progression of certain diseases-Post	Self Efficacy Domain Total Score Post
N	Valid	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Missing	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mean		3.9167	4.1667	4.3333	4.0833	4.3333	4.4167	4.5	4.4167	4.3333	4.5833	4.5	4.5	4.25	56.3333
Variance		0.811	0.515	0.242	0.629	0.424	0.447	0.455	0.629	0.606	0.447	0.273	0.273	0.568	49.879
Minimum		2	3	4	3	3	3	3	3	3	3	4	4	3	45
Maximum		5	5	5	5	5	5	5	5	5	5	5	5	5	65

5.4.1 *PrES/PoES SE 9*

Looking more specifically at the difference in SE 9 post – pre, which states, “Online lecture series are beneficial to learn more about nutrition and its role in obesity”, it should be noted that before accessing the WBWWS, 64.3% of participants “Agreed” that online lecture series were beneficial to learn more about nutrition and its role in obesity as evidenced by Table 18, while only 33.3% “Agreed” post-intervention, as seen in Table 19. This difference of 31% in the “Agreed” category from pre to post was distributed and mainly added to the “Strongly Agree” category in the post-test, which increased it from 28.6% pre-WBWWS to 50% post-WBWWS. This increase in participants who answered “Strongly Agree” on SE 9 in the PoES showed a 21.4% increase in participants strongly agreeing that online lecture series are beneficial in learning more about nutrition and its role in obesity, as pictured in Graph 5. This lead to the conclusion that the medical students had a positive experience with the online webinar lecture series and increased their beliefs from “Agree” to “Strongly Agree” that these web-based lectures were beneficial in expansion of their nutrition education. With the prevalence of web-based learning in educational institutions, especially medical schools, these results validate the ever-growing acceptance of online educational tools.

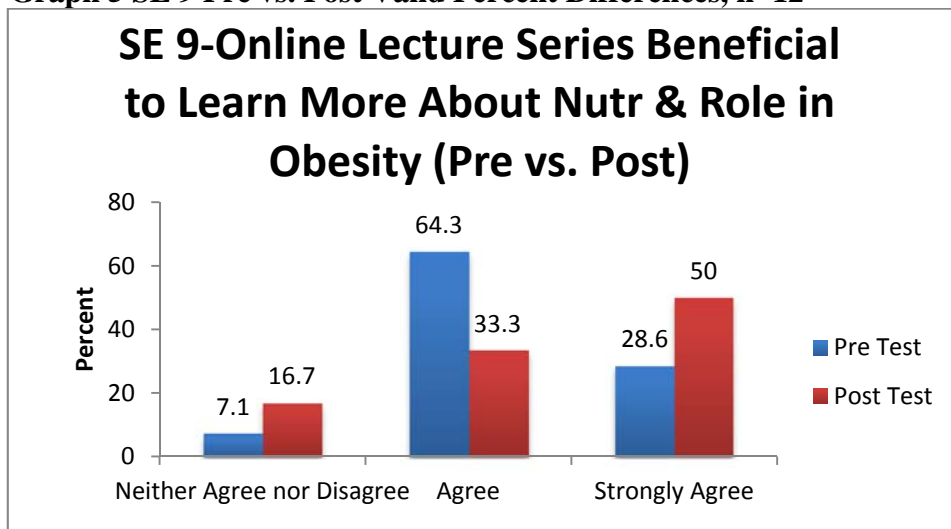
Table 18 SE 9 Valid Percent Pre, n=14

SE 9-Online Lecture Series Are Beneficial to Learn More About Nutr. & Role in Obesity-Pre					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither Agree nor Disagree	1	7.1	7.1	7.1
	Agree	9	64.3	64.3	71.4
	Strongly Agree	4	28.6	28.6	100
	Total	14	100	100	

Table 19 SE 9 Valid Percent Post, n=12

SE 9-Online Lecture Series Are Beneficial to Learn More About Nutr. & Role in Obesity-Post					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither Agree nor Disagree	2	14.3	16.7	16.7
	Agree	4	28.6	33.3	50
	Strongly Agree	6	42.9	50	100
	Total	12	85.7	100	
Missing	System	2	14.3		
Total		14	100		

Graph 5 SE 9 Pre vs. Post Valid Percent Differences, n=12



5.4.2 PrES/PoES SE Subscales

Three subscales were created from the SE PrES and SE PoES in order to better group the question content and accurately determine significance based on related items. The intent of the three separate subscales within the SE PrES/PoES questions was to measure the statement content within each subscale that were not compatible with one another. As previously discussed, Table 24 showed the SE DTS Post – SE DTS Pre had significance ($p < 0.0001$), but it was pertinent to compare specific questions within the SE Evaluation Surveys. Table 20 shows the three subscales within the SE PrES/PoES and the specific corresponding SE statements, which used the same Likert scale rank system as the NutrAtt questionnaire seen in Table 11.

Table 20 SE Subscales

Medical Knowledge Subscale including questions: (mean from 18 to 22.17); Paired mean from 18.25 to 22.17	
SE 3:	I feel knowledgeable in how obesity contributes to hypertension, type II diabetes mellitus, atherosclerosis/cardiovascular disease, and certain cancers.
SE 10:	I feel comfortable diagnosing a patient as overweight or obese depending on their BMI and waist circumference.
SE 11:	I feel comfortable recommending a specific caloric allotment to aid in weight loss.
SE 12:	I feel comfortable diagnosing the stages of hypertension and state of diabetes from lab values.
SE 13:	I understand the role of adipose tissue in the progression of certain diseases.
Supplemental Nutrition Resources Subscale including questions: (mean from 17.86 to 22); Paired mean from 17.08 to 22	
SE 5:	I am likely to refer overweight/obese patients to a registered dietitian for dietary assessment and treatment.
SE 6:	I am likely to refer diabetic patients to a registered dietitian for dietary assessment and treatment.
SE 7:	I know where to find reliable online resources on general nutrition.

Table 20 Continued

SE 8:	I know where to find reliable online resources on physical activity.
SE 9:	I believe online lecture series are beneficial to learn more about nutrition and its role in obesity.
Self Efficacy Abilities Subscale including questions: (mean from 10 to 12.17); Paired mean from 9.83 to 12.17	
SE 1:	I feel comfortable with my ability to provide nutrition education to overweight/obese patients.
SE 2:	I feel comfortable with my ability to provide physical activity education with overweight/obese patients.
SE 4:	I feel comfortable with my ability to discuss strategies for disease prevention and treatment, including nutrition and lifestyle.

Table 21 shows significance ($p < 0.01$) using a Paired Samples T-test for all three SE Subscales. These results show participant improvement regarding their own self-efficacy of medical knowledge as it relates to nutrition, their likeliness to refer to dietitians and find reliable online nutrition resources, and their abilities to provide nutrition and physical activity advice to overweight/obese patients after the WBWWS intervention.

Table 21 SE Subscales Paired Samples T-test, n=12

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					<i>Lower</i>	<i>Upper</i>			
Pair 1	SE Medical Knowledge Subscale Post - SE Medical Knowledge Subscale Pre	3.91667	3.26018	0.94113	1.84525	5.98809	4.162	11	0.002
Pair 2	SE Ability Subscale Post - SE Ability Subscale Pre	2.33333	2.14617	0.61955	0.96972	3.69695	3.766	11	0.003
Pair 3	SE Supplemental Nutr Resources Subscale Post - SE Supplemental Nutr Resources Subscale Pre	4.91667	3.17543	0.91667	2.8991	6.93424	5.364	11	0.000

The mean values for the SE Subscales were compared using n=14 for the PrES SE questions, and n=12 for the PoES SE questions. Table 22 shows the mean values for the SE Medical Knowledge Subscale as SE-pre=18.0000 and SE-post=22.1667; SE Ability Subscale as SE-pre=10.0000 and SE-post=12.1667; and SE Supplemental Nutrition Resources Subscale as SE-pre=17.8571 and SE-post=22.0000. The difference in means were calculated to be SE Medical Knowledge Subscale=4.1667, SE Ability Subscale=2.1667, and SE Supplemental Nutrition Resources Subscale=4.1429.

Table 22 Mean Values for SE Subscales, n=12

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
SE Medical Knowledge Subscale Pre	14	12	25	18	3.8829
SE Medical Knowledge Subscale Post	12	18	25	22.16	2.4433
SE Ability Subscale Pre	14	4	15	10	3.53009
SE Ability Subscale Post	12	8	15	12.16	2.24958
SE Supplemental Nutrition Resources Subscale Pre	14	14	24	17.85	2.82454
SE Supplemental Nutrition Resources Subscale Post	12	16	25	22	3.04512
Valid N (listwise)	12				

The mean values for the SE Subscales were then paired and compared using n=12 for the PrES SE questions, and n=12 for the PoES SE questions. Table 23 shows the mean values-paired for the SE Medical Knowledge Subscale as SE-pre=18.2500 and SE-post=22.1667; SE Ability Subscale as SE-pre=9.8333 and SE-post=12.1667; and SE Supplemental Nutrition Resources Subscale as SE-pre=17.0833 and SE-post=22.0000. The difference in means were calculated to be SE Medical Knowledge Subscale=3.9167,

SE Ability Subscale=2.3334, and SE Supplemental Nutrition Resources Subscale=4.9167. As seen in Table 21, the Paired Samples T-test used the above differences in paired mean SE Subscale values when determining significance ($p < 0.01$) for the three SE Subscales after the WBWWS intervention. This value indicates improvement from the PrES to the PoES.

Table 23 Mean Values for SE Subscales-Paired, n=12

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	SE Medical Knowledge Subscale Post	22.1667	12	2.4433	0.70532
	SE Medical Knowledge Subscale Pre	18.25	12	4.15878	1.20054
Pair 2	SE Ability Subscale Post	12.1667	12	2.24958	0.6494
	SE Ability Subscale Pre	9.8333	12	3.7132	1.07191
Pair 3	SE Supplemental Nutrition Resources Subscale Post	22	12	3.04512	0.87905
	SE Supplemental Nutrition Resources Subscale Pre	17.0833	12	2.10878	0.60875

5.5 *NutrAtt DTS and SE DTS Paired Samples Tests*

Table 24 shows the Paired Samples T-test, using $n=12$, for both NutrAtt DTS Post – Pre and for SE DTS Post – Pre. The $n=12$ was used for comparing the difference between pre-intervention and post-intervention in order to accommodate a paired value, which was used to determine the statistical significance rather than comparing between $n=14$ for the PrES and $n=12$ for the PoES. The SE DTS Paired Samples T-test showed significance ($p < 0.0001$) for improvement of mean 11.167, and the NutrAtt DTS showed

an improvement, without significance, of mean 1.0833 after the WBWWS intervention ($p=0.103$). Therefore, due to the lack of a p value less than 0.01, the NutrAtt questionnaire cannot be statistically supported to measure improvement from the PrES to the PoES. However, it can be concluded with significance that the medical student participants improved their self-efficacy perceptions after viewing the webinar lecture series and website content through its provided nutrition videos, external resources, scholarly articles, and basic nutrition information. As previously discussed in section 5.4.2, the SE questionnaire was further divided into three subcategories to score the difference between PrES scores and PoES scores, which also showed significant improvements after viewing the WBWWS. The only questionnaire that could not be supported by a statistically significant p value was for changes in the medical students' nutrition attitudes.

Table 24 NutrAtt DTS Post – Pre and SE DTS Post – Pre Paired Samples T-test, n=12

		Paired Samples Test					t	df	Sig. (2-tailed)
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					<i>Lower</i>	<i>Upper</i>			
Pair 1	NutrAtt Domain Total Score Post - NutrAtt Domain Total Score Pre	1.0833	2.10878	0.60875	-0.25652	2.42319	1.78	11	0.103
Pair 2	Self Efficacy Domain Total Score Post - Self Efficacy Domain Total Score Pre	11.167	5.02418	1.45036	7.97445	14.35888	7.699	11	0.000

5.6 *NutrAssess, Obesity, and NutrRecomm Pre/Post-Tests*

The next component of the WBWWS included completion of a pre-test for each webinar: Nutrition Assessment (NutrAssess), Obesity and Its Role in Disease (Obesity), and Nutritional Recommendations (NutrRecomm), followed by viewing the corresponding online lecture webinar, and finished by completion of a post-test for each webinar. Paired Samples T-tests showed significance ($p < 0.0001$) for improvement between NutrAssess pre and post-tests, Obesity pre and post-tests, and NutrRecomm pre and post-tests. Each question was given a value and label in SPSS as seen in Table 25 for each question they answered for the pre and post-tests:

Table 25 SPSS Software Value Labels

0	Incorrect
1	Correct
-.99	Missing

Based on the values for the correct and incorrect responses, a Domain Total Scores (DTS) was computed for each participant. Each participant received a DTS for each pre and post-test based on the amount of questions they answered correctly, with zero being the lowest possible attainable score and eight being the highest. Each pre/post-test had a total of eight questions, so if a participant answered every question correctly they received a score of eight, if they missed one they received a score of 7, etc. Table 27 shows the mean value for each pre and post-webinar DTS. The difference in means used in the Paired Samples T-test is seen in Table 26, and was calculated by

subtracting the DTS pre-mean from DTS post-mean for each webinar. The NutrAssess webinar showed an improvement of mean 3.8571 additional questions answered correctly from the pre-test to the post-test ($p < 0.0001$). The Obesity webinar showed an improvement of mean 2.6154 additional questions answered correctly from the pre-test to the post-test ($p < 0.0001$). The NutrRecomm webinar showed an improvement of mean 2.6429 additional questions answered correctly from the pre-test to the post-test ($p < 0.0001$). The overall research question can be validated due to the significant results found through Paired Samples T-tests ($p < 0.0001$), which indicate improvement after viewing each online nutrition webinar.

Table 26 Webinar DTS Post – Pre Paired Samples T-test, n=14; n=13

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 NutrAssessment Domain Total Score Post - NutrAssessment Domain Total Score Pre	3.8571	1.16732	0.31198	3.18315	4.53113	12.363	13	0.000
Pair 2 Obesity Domain Total Score Post - Obesity Domain Total Score Pre	2.6154	1.66024	0.46047	1.61211	3.61866	5.68	12	0.000
Pair 3 NutrRecomm Domain Total Score Post - NutrRecomm Domain Total Score Pre	2.6429	1.49908	0.40065	1.77731	3.5084	6.596	13	0.000

Table 27 shows the mean scores for NutrAssess DTS pre (mean=3.1429) and post (mean=7.0000), Obesity DTS pre (mean=5.0769) and post (mean=7.6923), and NutrRecomm DTS pre (mean=4.9286) and post (mean=7.5714). The differences were taken between each of the above pre and post-DTS in order to calculate the mean score shown in Table 26. Each webinar pair showed improvement from pre-test to post-test, as indicated Table 26 with $p < 0.0001$ for each mean difference.

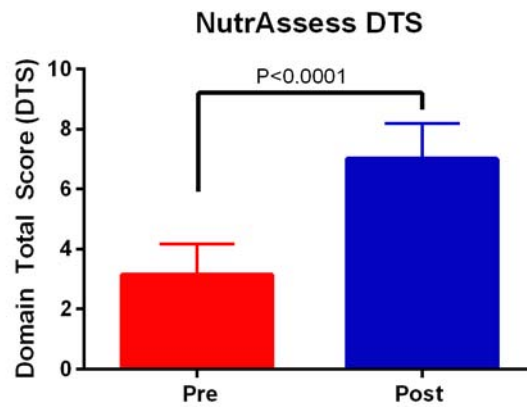
Table 27 Webinar DTS Post and Pre Statistics, n=14; n=13

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Assessment Domain Total Score Post	7	14	1.1767	0.31449
	Assessment Domain Total Score Pre	3.1429	14	1.02711	0.27451
Pair 2	Obesity Domain Total Score Post	7.6923	13	0.48038	0.13323
	Obesity Domain Total Score Pre	5.0769	13	1.70595	0.47314
Pair 3	Recomm Domain Total Score Post	7.5714	14	0.64621	0.17271
	Recomm Domain Total Score Pre	4.9286	14	1.32806	0.35494

5.6.1 *NutrAssess Webinar, n=14*

Graph 6 shows the change in DTS from the pre to post-Nutrition Assessment webinar intervention ($p < 0.0001$), with an improvement of mean score 3.8571 from the eight question tests using $n=14$.

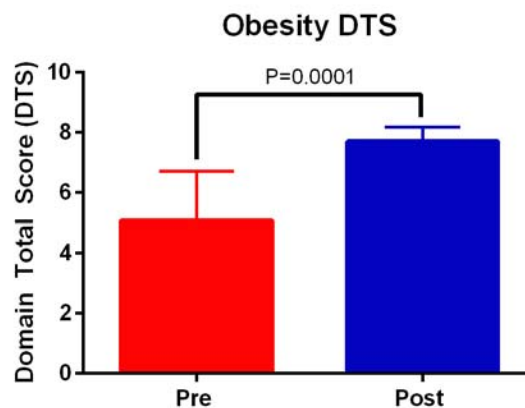
Graph 6 NutrAssess DTS Paired Samples T-test, n=14



5.6.2 Obesity Webinar, n=13

Graph 7 shows the change in DTS from the pre to post-Obesity and Its Role in Disease webinar intervention ($p < 0.0001$), with an improvement of mean score 2.6154 from the eight question tests using $n=13$.

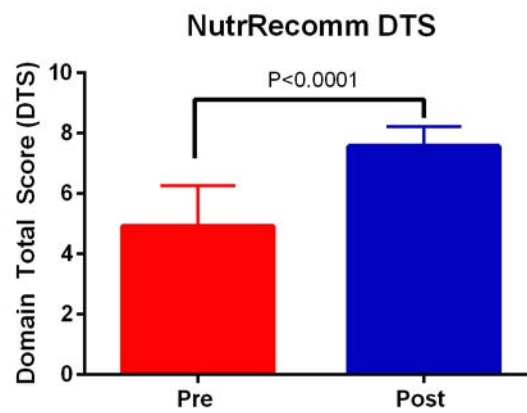
Graph 7 Obesity DTS Paired Samples T-test, n=13



5.6.3 *NutrRecomm Webinar, n=14*

Graph 8 shows the change in DTS from the pre to post-Nutrition Recommendations webinar intervention ($p < 0.0001$), with an improvement of mean score 2.6429 from the eight question tests using $n=14$.

Graph 8 NutrRecomm DTS Paired Samples T-test, $n=14$



6. DISCUSSION

The Web-Based Workshop and Webinar Series (WBWWS) was developed to pilot-test the incorporation of more nutrition education, specifically regarding the overweight/obese patient, to Texas A&M Health Science Center (TAMHSC) College of Medicine (COM) students. With previous studies indicating that more than half of graduating medical students evaluate their nutrition knowledge as inadequate, and physicians claiming they have not received adequate nutrition education for patient consultation²², the WBWWS is intended to bridge this gap between lack of nutrition education and future healthcare professionals. The most recent medical school survey update from 2010 indicated results showing only 25% of medical school respondents who require a dedicated nutrition course, and only 27% of the schools meet the minimum 25 hours of required nutrition education, as administered by the National Academy of Sciences⁶. Due to the fact that 69% of the American adult population is overweight, including obesity, and over 18% of American children/adolescents are obese [CDC], adequate nutrition education among medical students is vital to effectively administer weight loss advice to reduce the number of overweight/obese individuals. Therefore, the goals of this study were to increase medical students' nutrition attitudes, increase perceived self-efficacy regarding nutrition and delivering obesity education to their patients, and improve knowledge regarding nutrition assessment, obesity and its role in disease, and nutritional recommendations to the overweight/obese patient.

6.1 *Key Findings for Online Webinars*

The intervention for this study involved the medical school participants viewing three different online nutrition lectures provided on the WBW website. For each of the three nutrition subjects: Nutrition Assessment, Obesity and Its Role in Disease, and Nutritional Recommendations, participants were asked to take a pre-test, observe the respected webinar lecture, and finish each module with a post-test to measure improvement. Participants were required to refrain from utilizing outside resources for both the pre and post-tests in order to obtain the most valid results. Significant results ($p < 0.0001$) showed improvement from mean pre-test scores to mean post-test scores for all three webinar presentations. These results prove that presenting nutrition education through means of e-learning, or web-based learning is effective in improving test scores, and subsequently enhancing knowledge in these medical school participants. Web-based learning is becoming more prevalent in the medical school curriculum, and studies keep showing that students willingly accept it as a complementary form of learning⁹. Video streaming technology in lecture form has also been shown to positively affect test scores, and is widely accepted among medical students, with almost three-quarters admitting to *always* utilizing online lecture streaming¹⁹. The results from the WBWWS support the ever-growing popularity and effectiveness of web-based learning via video lectures, as evidenced by the improvement in mean test scores after viewing the associated webinar. Focus group feedback also indicated a strong liking for web-based lecture presentations, which will be discussed in more detail in section 6.1.5.

6.1.1 *Participant Information (PrES)*

The Pre-Test Evaluation Survey (PrES) was a key component in observing participant gender, BMI category, year in medical school, number of overweight/obese patients seen in the past year, and previous nutrition education/training. Of the 14 participants, one (7.1%) was classified as underweight, nine (64.3%) were classified as normal weight, and four (28.6%) were classified as overweight. According to the CDC, BMI is a measure of excess body weight instead of excess body fat, and does not distinguish between body fat, muscle, or bone mass, thus leading to some inaccuracy when defining an individual to a BMI category. The cut-point for the overweight BMI category is 25.0-29.9, and it is noteworthy that three of the four overweight participants had a BMI < 26.5 and were all males, who tend to have a higher muscle mass. These results further support that though BMI is a valid correlation of body fatness and potential obesity-related health issues, there are clinical limitations that may put a person in a higher or lower BMI category than is representative of their state of health.

As a medical student progresses through their four years in medical school they are exposed to more patient interaction, and subsequently, more overweight/obese patients. In a classic medical school curriculum, first and second year students attend class lectures (or view them online) and measure their knowledge through test taking, while third and fourth year students rotate through clinical clerkships²³. The WBWWS showed that the third and fourth year students (n=3) all reported seeing >21 overweight/obese patients during the past year, while nine of the 10 first year medical students reported seeing either no overweight/obese patients or 1-10 overweight/obese

patients. The other first year student reported seeing 11-20 overweight/obese patients in the past year. These results show that first year students have not yet been exposed to the clinical rotations involved with the third and fourth year medical curriculum, thus have experienced few, if any encounters with overweight/obese patients. With the prevalence of overweight/obese Americans, it is expected that the more exposure medical students have to clinical situations, the more overweight/obese patients they will see, as supported by the results from the WBWWS.

Prior nutrition education was included as a question in the PrES in order to gauge the amount and types of nutrition education the medical student participants have experienced. Eight (57.1%) out of the 14 participants reported having no previous nutrition training, with seven of those eight students being first year medical students. Astonishingly, one fourth-year student reported no prior nutrition education to the WBWWS, which further supports the lack of formal nutrition education in the medical school curriculum. Six of the 14 participants reported having prior nutrition education: two of which had it in the form of only undergraduate class(es); one student in the form of at least one undergraduate class and a required medical school class; and another student in the form of at least one undergraduate class, an elective course in medical school, and a course at a Harvard School of Public Health CME class. Another student who reported having prior nutrition education indicated having taken at least one undergraduate and graduate course in nutrition as well as self-learning for bodybuilding. The final student who had prior nutrition education was required to take nutrition classes in the military as a part of special operations fitness programs and medical training. It is

of great concern that only *one* of the 14 participants, or 7%, indicated having previous nutrition training as a required course in medical school. This demonstrates the need for required nutrition education in the Texas A&M medical school curriculum and mirrors the current literature regarding insufficient, if any, specific nutrition education in medical schools.

6.1.2 *Key Findings for NutrAtt (PrES/PoES)*

For the purpose of this workshop, nutrition attitudes are defined as the medical students' feelings and positions on the importance of nutrition in patient care. The Nutrition Attitudes (NutrAtt) questionnaire included eight items and was incorporated in the Pre-Test Evaluation Survey (PrES) and Post-Test Evaluation Survey (PoES) in order to measure changes in nutrition attitudes after participants accessed the web-based workshop content and webinars. Though there wasn't statistical significance in the difference between NutrAtt pre and post mean Domain Total Scores (DTS), the reported mean DTS values increased 1.0833 after intervention. A closer analysis of NutrAtt 4, which used a Likert scale raking system for the statement, "Most medical students *are not* adequately trained to discuss nutrition with patients", suggested that even after the intervention of viewing three nutrition-related online lectures, the medical students still feel inadequate to provide nutrition education to patients. This supports that medical students would benefit from learning specific methods to present weight loss information, which is also supported in focus group feedback in section 6.5.1 regarding how to present nutrition advice to patients for weight loss.

6.1.3 *Key Findings for SE (PrES/PoES)*

For the purpose of this workshop, self-efficacy is defined by the degree of confidence medical students have in delivering nutrition and weight-management education to overweight and obese patients. This questionnaire consisted of 13 items using a Likert scale ranking system and was included in the PrES and PoES in order to measure changes in SE after the WBWWS intervention. The SE DTS showed significance ($p < 0.0001$) between the SE PrES and PoES, with a DTS mean value increase of 11.167 after intervention. A closer analysis of the SE 9 statement, “I believe online lecture series are beneficial to learn more about nutrition and its role in obesity”, showed a change in distribution from the percent of participants who “Agreed” and “Strongly Agreed” from the PrES to the PoES. There was a 36% difference between the PrES “Agree” and “Strongly Agree” option, and half of this percentage was added to the “Strongly Agree” option for the PoES. After the intervention, half of the participants strongly agreed, with an additional one-third who agreed, that online lecture series are beneficial to learn more about nutrition and its role in obesity after accessing the three online webinars that were available through this pilot-study. This 83% approval for educational online lecture series coexists with other literature that states video streaming in the form of lectures is widely accepted among medical students¹⁹, supporting the addition of online nutrition lectures to be effective in a medical school curriculum.

The 13 item SE questionnaire was further divided into three categories based on their content: Medical Knowledge subscale (5 questions), Supplemental Nutrition Resources subscale (5 questions), and Self-Efficacy Abilities subscale (3 questions).

This was implemented to better compare the differences from PrES to PoES due to the fact that the above subscales contain related self-efficacy questions. Though comparing all 13 SE items without division into subcategories showed significance ($p < 0.0001$), comparing the three different categories of SE questions was executed to show content compatibility for each set of related questions. All three subscales included a Likert scale raking system, and the Medical Knowledge subscale included statements referring to the participants' comfort or knowledge with obesity and various disease states, assessment techniques, and recommendations to overweight/obese patients. The Supplemental Nutrition Resources subscale involved items regarding referrals to registered dietitians for various obesity-related disease states, knowing where to find reliable online resources for nutrition and/or physical activity, and their beliefs regarding the usage of supplemental online lecture series for nutrition education. The final subscale, Self-Efficacy Abilities, contained material regarding their comfort with providing nutrition/physical activity education to overweight/obese patients, and their ability to discuss strategies for disease prevention and treatment.

The specific SE questions within each subscale are shown in Table 22 of the Results section. All three SE subscales showed significance ($p < 0.01$) for improvement of SE from the PrES to the PoES. The Medical Knowledge subscale showed an improvement of mean DTS 3.917, the Supplemental Nutrition Resources subscale showed an improvement of mean DTS 4.917, and the SE Abilities subscales showed an improvement of mean DTS 2.333. The above results show that with online nutrition education, the medical students' confidence in their self-efficacy significantly improved

after implementation of the WBWWS. Improving the future physicians' abilities to provide accurate advice, strategies, and resources to patients for weight loss while they are in medical school will ultimately decrease the more than two-thirds of primary care physicians who feel as though they had insufficient nutritional training in medical school². The induction of the WBWWS acts as a stepping stone in providing a basis of nutrition education to medical students, and further development of more tailored online lectures relating nutrition to certain disease states will further improve our future medical doctors' confidence to recommend nutritional interventions as a means of treatment.

6.1.4 *Key Findings for Focus Group Feedback*

A focus group was convened after completion of the pilot-test for the WBWWS in order to provide valuable insight to medical students' thoughts and opinions regarding the workshop, in addition to several other topics. For the purpose of this study, a focus group served the purpose to aid in generation of qualitative data, or descriptive language, in order to gain insight into Texas A&M medical school participants' opinions regarding various aspects of the WBWWS, and to aid in future investigation of nutrition education in their curriculum. Guidelines from the literature were followed to create a focus group consisting of four medical school WBWWS participants, as well as three additional healthcare professionals/moderators in order to create a comfortable environment where each student had enough time and did not feel intimidated to express their views²⁴. The format of the focus group questions, as guided by Krueger, as well as general participant responses are as follows:

- What was *known* and then *confirmed* by the focus group?
 - It should be the role of the healthcare provider not only to treat chronic diseases, but also to prevent them through health and nutrition.
 - It is the role of healthcare providers to treat chronic diseases through nutritional advice in addition to prescription medication, or in full replacement of medication when applicable.
 - E-learning, or web-based learning is widely accepted and preferred. It can be accessed on an individuals' own time at any location with Internet services, at their own pace, can be sped-up, slowed-down, or repeated, and improves productivity.
 - There were appropriate amounts of credible external resources provided on the website; there was not a feeling of being “bombarded” by information.

- What was *suspected* and then *confirmed* or *challenged* by this focus group?
 - The relevancy of the content provided in the three webinars was reliable and a good nutrition overview, but challenged by the fact that more specific and in-depth nutrition concepts should be taught as one progresses through their four year medical program.
 - Providing the online webinar videos via YouTube allowed access to increase the speed of play in order for the students to view the content at a faster pace and in less time. This is essential for the information-laden curriculum of the medical student.

- Incorporation of case studies for learning is widely used in medical schools, and participants enjoyed the *interrupted* case study format where each post-webinar case study and test built upon the same patient described in the previous case study.
- What was *new* that *was not* previously suspected?
 - The medical students want to see more specific online nutrition lectures they can choose from that related to certain disease states and as pertains to their future field of study.
 - A provided handout, or lecture notes, would be beneficial while watching each webinar in order to better follow the content and take additional notes for learning purposes.
 - Participants do not know how to refer to a registered dietitian, and in what circumstances to do so. They are unsure what to tell patients in terms of number of allowed visits, insurance policies, and what to expect when attending a registered dietitian consultation.
 - Specific handouts for patients should be provided on the website as a means of getting started towards their weight loss goals because physicians do not have time to create these resources. This could include a list of certain diets and letting the patient choose a particular one they can best work with, ideas for weight loss if they don't like to exercise, and making small changes in their diet or lifestyle at first and working towards larger goals over time.

6.2 *Strengths and Limitations*

Strengths of this pilot-study were having previous focus group feedback coming directly from TAMHSC COM students in order to help develop the webinar topics, as well as the suggestion of case studies as a means to improve the workshop. The previous focus group feedback was well-documented, closely analyzed, and also used to make content/layout revisions to the website created during the first phase of the Web-Based Workshop pilot-study.

The Pre and Post-Test Evaluation Surveys provided valuable information regarding participants' previous nutrition training (or lack thereof), changes in nutrition attitudes, and changes in perceived self-efficacy after accessing the WBWWS. Another strength was the paired participant responses for each set of surveys or webinar tests. Two of the three webinars had a paired response rate of n=14 (NutrAssess & NutrRecomm) and one of the webinars had a rate of n=13 (Obesity). A suspected reason why the PoES had a missing value of two respondents, or n=12, is due to its location on a separate webpage than the rest of the tests. Directions provided on the workshop homepage specifically stated to access the Post-Test Evaluation Survey located on the "Evaluation" tab on the top windowpane, but these directions could have been overlooked.

In the PrES, it was not expected to see a second year medical student who indicated seeing more than 21 overweight/obese patients due to the medical school curriculum, but perhaps they are involved in extra-curricular volunteering activities

where they view patients on a more regular basis than other first and second year students at Texas A&M University.

A limitation of this pilot-study was that participants were not monitored while they completed the pre and post-tests. Though the directions explicitly stated that they should not access additional resources while taking the tests, it cannot be proven that the participants remained true to the instructions. In the future, having the participants access the online lectures and tests in a controlled and proctored setting will ensure adherence to these guidelines. The WBWWS was a voluntary research study, so there is also a potential for bias in that only students who have interest in nutrition could have participated in the study. We do not believe this to be the case, however, because eight of the 14 participants reported no prior nutrition training to the workshop, which leads us to believe this study population was not necessarily nutrition savvy. A final limitation was that the case study development and pre/post-webinar tests were not tested for construct validity and reliability, rather guided by previous literature regarding case study development and TAMU nutrition faculty assistance. A final limitation of the WBWWS was the small sample size of n=14 for two of the webinars, n=13 for the third webinar, and n=12 for the evaluation surveys, leading to less statistical power when analyzing results. Also, all participants were from one school in one state (TAMHSC COM), which limits inferences that might be drawn from the study for broader application.

6.3 *Future Aims of Study*

Focus group feedback yielded positive responses towards the WBWWS as well as essential insider recommendations from the target population themselves: medical students. Future aims of this study include additional online lectures catered to more specific disease states and the effect nutrition and different diet components have on that specific disease. For example, more nutrition lecture topics discussing certain diet components could include patients with chronic kidney disease, congestive heart failure, and Crohn's disease, just to name a few. The medical students would complete the current WBWWS exercises in their first year of medical school, or directly before entering medical school due to the somewhat basic nutrition concepts introduced in each of the current online lectures. The two first year students who participated in the focus group meeting admitted to feeling satisfied with the content included in the webinars and learned a great deal of nutrition knowledge, but the third and fourth year medical students felt it was more of a review from what they learned the first two years of their curriculum. That being said, the more specific nutrition lectures would be targeted to third and fourth year students as they venture through their clinical clerkships.

Each of the additional specific online nutrition lectures is recommended to provide a related case study as well. Focus group feedback from this phase of the pilot-study, in addition to the previous feedback from last year's pilot study, was overwhelmingly in favor of incorporating many case studies in order to provide a more realistic learning experience. As the *interrupted* case study created for this WBWWS

was structured based on a case study provided in the literature, reputable resources should also guide each future case study.

The structure of the current WBWWS is intended to become a mandatory online nutrition workshop at TAMHSC COM to be completed by the end of a students' first year in medical school. It is suggested to contact a COM teaching faculty member to include this workshop into a specific course block and to be counted as credit toward an end of semester grade. This would ensure completion of the nutrition workshop and will ultimately enhance the students' understandings of basic nutrition concepts to better prepare them for their future as healthcare professionals. It is also recommended to create three to four specific allotments of time throughout the year at a common location where the first year medical students can complete all components of the WBWWS. This will ensure students are not accessing outside resources while taking pre/post-tests via proctor management, and will also allow the students schedule flexibility in choosing one of the multiple dates this will be offered.

It is of utmost importance that a specific lecture be developed to educate the future medical doctors at Texas A&M about the role of the registered dietitian in patient care. Though this workshop and webinar series supported the vision for medical students to understand the relationship between diet, obesity and chronic diseases, their role as physicians in assessment and in general weight loss recommendations, the intent was not to replace the role of the registered dietitian in specific diet advice and nutrition counseling. This leads to the vision of a healthcare "team" approach, where physicians and registered dietitians work together in bettering the overall health of patients. Medical

students, as evidenced by focus group participants failing to understand components of a registered dietitian consultation, need to be instructed about specifics regarding patient referral to a registered dietitian. The suggested inclusion criteria for this topic are as follows:

- When to suggest referral to a registered dietitian (e.g. diabetics, overweight/obese, etc.)
- Patient insurance coverage for visiting a registered dietitian
- Number of visits allowed
- What to expect in a registered dietitian consultation
- Benefits for patients visiting a registered dietitian
- Benefits of connecting with a local registered dietitian, not only for the patient, but for the physicians' practice

With the suggestions, revisions, and implementation of the discussed topics above, the continuation of the WBWWS has the potential to incorporate nutrition education into every medical doctor profession through their experience in medical school. Through the course of this study I have gained perspective as to how passionate medical students are in wanting to learn/incorporate specific nutrition concepts into their education curriculum. The focus group meeting was inspirational to hear the students' positive feedback about the workshop, as well as their inquiry regarding more tailored nutrition education beyond the overweight/obese patient, and their hopes to see more nutrition courses throughout their medical education. The mandatory implementation of the current state of the WBWWS, as well as the future intent to create specific online

lectures catered to various disease states, will educate our future physicians about the importance of nutrition in every aspect of healthcare.

7. CONCLUSIONS

The continuation pilot-test titled, “Web-Based Workshop and Webinar Series: Nutrition and obesity education tools and resources”, was distributed among TAMHSC COM students in efforts to incorporate more nutrition education into the Texas A&M medical school curriculum, with the ultimate goal of nationwide distribution. This phase of the continuation project introduced a three-part online webinar lecture series as an addition to the WBW, where the medical school participants significantly improved their nutrition knowledge regarding nutrition assessment, obesity and its role in disease, and nutritional recommendations after viewing each respected webinar. There was significant enhancement of their perceived self-efficacy regarding their medical nutrition knowledge, where to find outside nutrition/physical activity resources, and their own self-efficacy abilities to discuss nutrition information with overweight/obese patients. Though not statistically significant, there was an increase in nutrition attitudes among the participants as an entire category. There was, however, significance in a particular nutrition attitudes question showing a nearly perfect positive correlation, which concluded the medical students still felt they needed more nutrition training in their curriculum in addition to the WBWWS. Two of the three hypotheses for this phase of the pilot-study were met with statistical power, showing improvement in knowledge gained through viewing the webinar lecture series and growth in perceived self-efficacy. The only area that fell short of the expected outcomes was a significantly higher nutrition attitudes score after intervention. Though the WBWWS was an effective study

regarding basic nutrition and the overweight/obese patient, there is much room for growth in providing varying depths of nutrition education to first through fourth year students, as well as specific webinars tailored to various disease states learned in the medical school curriculum.

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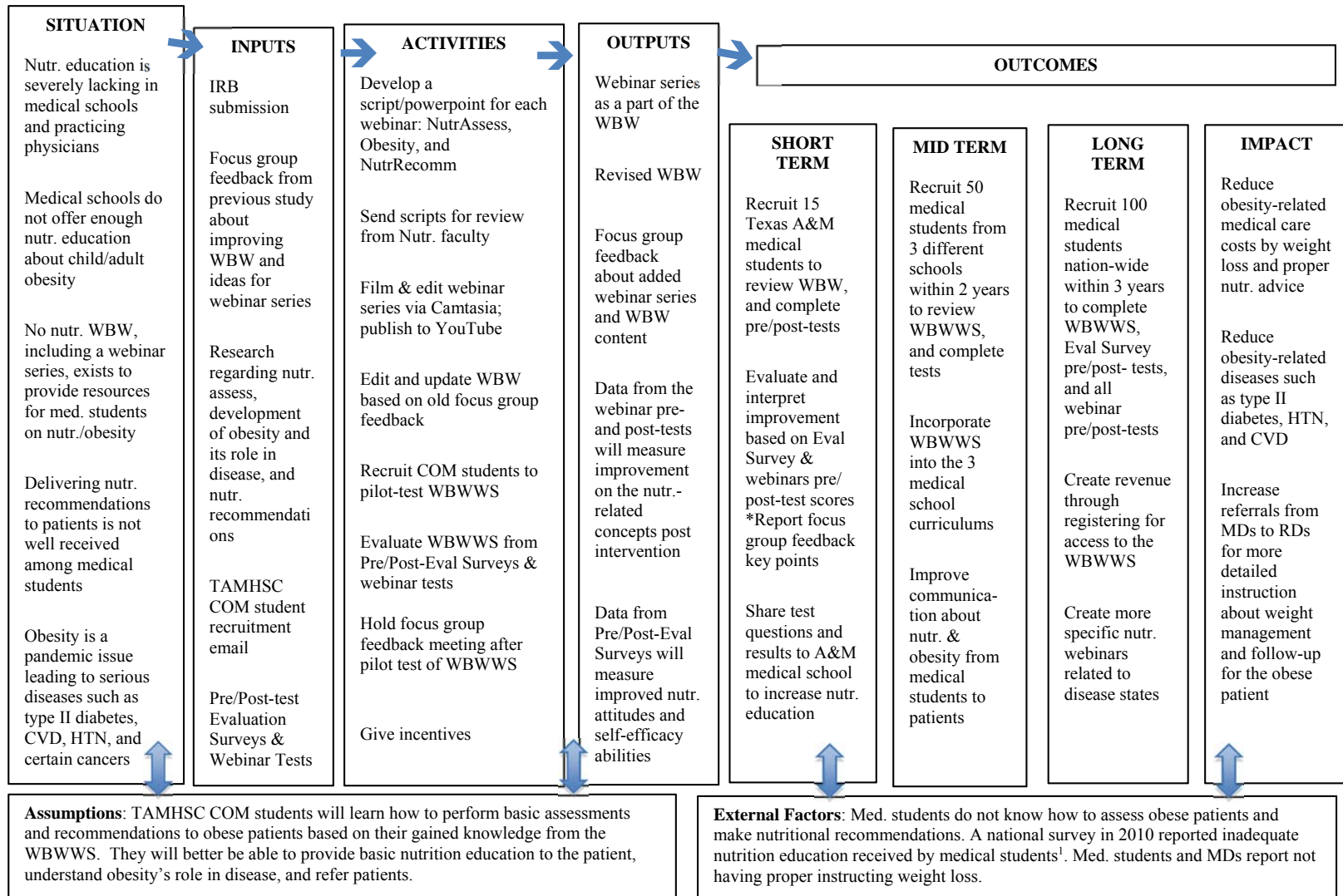
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APPENDIX A

LOGIC MODEL



APPENDIX B

GANNT CHART

Initiative: Gantt Chart												
Task Name	Q3 2014			Q4 2014			Q1 2015			Q2 2015		
	July	August	September	October	November	December	January	February	March	April	May	June
Pre-Implementation Phase												
Meeting with Tamren Terhune discussing her work on web-based workshop												
Meeting with Dr. Murano discussing addition of webinar series												
Submit TAMU IRB application form												
Prepare script for each webinar speaker and receive feedback												
Film webinar via Camtasia												
Edit webinar via Camtasia												
Edit web-based workshop based on previous focus group feedback												
Proposal submission												
Implementation Phase												
Make web-based workshop and webinar series available to TAMU med students												
Develop Thesis												
Evaluation & Revision Phase												
Evaluate results from webinar series and develop statistics												
Revisions based on feedback from committee												
Thesis Defense												

APPENDIX C

WEB-BASED WORKSHOP PRE/POST-TEST EVALUATION SURVEY

Q1. Are you currently enrolled as a Texas A&M Health Science Center College of Medicine Student?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To End of Survey

Q1. Please provide your email (for incentive purposes):

Q2. Please indicate your gender:

- Male (1)
- Female (2)

Q3. Please indicate your age:

Q4. Please indicate your height: [use non-metric (American) values]

Q5. Please indicate your weight: [use non-metric (American) values]

Q6. What year of medical school are you currently completing?

- 1st year (1)
- 2nd year (2)
- 3rd year (3)
- 4th year (4)
- Other (describe) (5) _____

Answer If What year of medical school are you currently completing? 3rd year Is Displayed And What year of medical school are you currently completing? 4th year Is Displayed

Q7. In the past year, how many patients have you come into contact with who are overweight or obese?

- 1-10 patients (1)
- 11-20 patients (2)
- >21 patients (3)
- None (4)

Q8. Have you had any nutrition training prior to completing the Web-Based Workshop and Webinar Series?

- Yes (1)
- No (2)

Answer If Have you had any nutrition training prior to completing the Web-Based Workshop and Webinar Series? Yes Is Selected

Q9. What prior coursework in nutrition or training have you received? (Check all that apply)

- At least 1 undergraduate class (1)
- Nutrition major in college (2)
- Master's in nutrition (3)
- At least 1 graduate class (4)
- Required nutrition course in medical school (5)
- Elective nutrition course in medical school (6)
- Other (describe) (7) _____

Q10. On a scale of 1 to 5 please indicate the degree to which you disagree or agree with each of the statements below by selecting the appropriate option that best reflects your views on the following Nutrition Attitudes questions:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
A change toward a healthier lifestyle is important in any stage of life. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nutrition assessment and counseling should be included in any routine appointment, just like diagnosis and treatment. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have an obligation to improve the health of my patients by discussing nutrition with them. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most medical students are NOT adequately trained to discuss nutrition with patients. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most patients will try to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>change their lifestyle if I advise them to do so. (5)</p> <p>Specific advice about how to make dietary changes could help patients improve their eating habits. (6)</p> <p>For most patients, health education does little to promote adherence to a healthy lifestyle. (7)</p> <p>It is important that I recommend dietary changes prior to initiating drug therapy whenever possible. (8)</p>	○	○	○	○	○
	○	○	○	○	○
	○	○	○	○	○

Q11. On a scale of 1 to 5 please indicate the degree to which you disagree or agree with each of the statements below by selecting the appropriate option that best reflects your views on the following Perceived Self-Efficacy questions:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I feel comfortable with my ability to provide nutrition education to overweight/obese patients. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel comfortable with my ability to provide physical activity education with overweight/obese patients. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel knowledgeable in how obesity contributes to hypertension, type II diabetes mellitus, atherosclerosis/cardiovascular disease, and certain cancers. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel comfortable with my ability to discuss strategies for disease prevention and treatment, including nutrition and lifestyle. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am likely to refer overweight/obese patients to a registered dietitian for dietary assessment and treatment. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am likely to refer diabetic patients to a registered dietitian for dietary assessment and treatment. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know where to find reliable online resources on general	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>nutrition. (7)</p> <p>I know where to find reliable online sources on physical activity. (8)</p> <p>I believe online lecture series are beneficial to learn more about nutrition and its role in obesity. (9)</p> <p>I feel comfortable diagnosing a patient as overweight or obese depending on their BMI and waist circumference. (10)</p> <p>I feel comfortable recommending a specific caloric allotment to aid in weight loss. (11)</p> <p>I feel comfortable diagnosing the stages of hypertension and state of diabetes from lab values. (12)</p> <p>I understand the role of adipose tissue in the progression of certain diseases. (13)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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APPENDIX D

WEBINAR SERIES: NUTRITION ASSESSMENT PRE-TEST

Q1a. Please complete the following pre-test, then view the Nutrition Assessment Webinar, and complete the post-test.

Q1b. Please provide your email (for incentive purposes):

Q2. A patient who is 5'3" and weighs 180.6 lbs. falls under which weight class? To calculate BMI, use the following conversions to metric units: Weight (lbs.)/2.2 to convert to kilograms, and [height (inches) X 0.0254m/inch]² Click on the following link to access an online calculator, then make sure to press the back button instead of exiting out of the tab: <http://web2.0calc.com>

- Overweight (1)
- Obese Class I (2)
- Obese Class II (3)
- Obese Class III-Morbidly Obese (4)

Q3. Should BMI be used as a diagnostic tool in children/adolescents?

- Yes (1)
- No (2)

Q4. A waist circumference of which of the following is an indicator for greater risk of disease?

- Men: >95 cm; Women: >84 cm (1)
- Men: >100 cm; Women: >87 cm (2)
- Men: >98 cm; Women: >86 cm (3)
- Men: >102 cm; Women: >88 cm (4)

Q5. Which measurement derived from the Hamwi method is most effective in determining an estimated caloric allotment for weight loss in an overweight/obese patient?

- Ideal Body Weight X 22 calories/kg (1)
- Lower Ideal Body Weight X 22 calories/kg (2)
- Upper Ideal Body Weight X 22 calories/kg (3)
- Specific caloric allotments should not be used (4)

Q6. A patient whose blood pressure reads 140/93 indicates which stage stage of hypertension (HTN)?

- Normal (1)
- Stage I HTN (2)
- Stage II HTN (3)
- Pre-hypertensive (4)

Q7. Which of the following does a fasting glucose value of 123 mg/dL and hemoglobin A1c (HbA1c) of 6.1% indicate?

- Pre-diabetes (1)
- Normal (2)
- Poorly controlled diabetes (3)
- Type II Diabetes Mellitus (4)

Q8. According to the World Health Organizations'; definition, which of the following levels of triglycerides is a cut-point for aiding in the diagnosis of metabolic syndrome?

- 130-150 mg/dL (1)
- ≥ 150 mg/dL (2)
- 130-200 mg/dL (3)
- (4)

Q9. Which of the following contribute(s) to the World Health Organizations' definition of metabolic syndrome? (select all that apply)

- Fasting Blood Glucose > 110 mg/dL (1)
- HDL of 41 (2)
- BMI > 30 (3)
- Triglycerides ≥ 150 mg/dL (4)

APPENDIX E

WEBINAR SERIES: NUTRITION ASSESSMENT POST-TEST CASE STUDY

Q1. Please provide your email (for incentive purposes):

Please read the following case study and answer all post-test questions. Tiana is a 48-year-old African American woman who schedules check-up after her sister was recently diagnosed with type II diabetes being concerned that she, too, is at risk. She is artistically inclined and has been working for Walt Disney Animation Studios as one of the lead animators for 15 years. That being said, Tiana spends most of her days sitting in front of a computer screen and often stays at work for 12 hours or more, thus claiming she has no energy or time to exercise. She is 5'3" and weighs 180.6 pounds. Her blood pressure is 140/93 and her waist circumference measures 102 cm. You also discover Tiana's father died at a young age of a heart attack, causing her mother to turn to food as a coping mechanism. Tiana's mother and sister developed type II diabetes as a result of their obesity, so Tiana is concerned for her own health due to high prevalence of T2DM and cardiovascular disease in her family. You decide to order a fasting plasma glucose test, a glucose tolerance test, lipid panel, and comprehensive metabolic panel based on her weight and family history.

Lab Results: Fasting (normal values from source⁵⁴)

Sodium (136-145 mEq/L):	138 mEq/L	Normal
Potassium (3.5-5 mEq/L):	4.2 mEq/L	Normal
Chloride (98-106 mEq/L):	99 mEq/L	Normal
CO ₂ (23-28 mEq/L):	26 mEq/L	Normal
BUN (8-20 mg/dL):	17 mg/dL	Normal
Creatinine (0.7-1.3 mg/dL):	0.8 mg/dL	Normal
Glucose:	123 mg/dL	???
Magnesium (1.8-3 mg/dL):	2.5 mg/dL	Normal
Calcium (9.0-10.5 mg/dL):	9.3 mg/dL	Normal
Bilirubin, total (0.3-1.2 mg/dL):	0.6 mg/dL	Normal
Protein, total (6-7.8 g/dL):	7.1 g/dL	Normal
Albumin (3.5-5.5g/dL):	4.6 g/dL	Normal
Prealbumin (16-35 mg/dL):	28 mg/dL	Normal
Ammonia (9-33 µmol/L):	29 µmol/L	Normal
Alkaline Phosphatase (36-92 IU/L):	63 IU/L	Normal
ALT (0-35 IU/L):	51 IU/L	High
AST (0-35 IU/L):	49 IU/L	High

Cholesterol, total (150-199 mg/dL):	234 mg/dL	High
LDL:	170 mg/dL	???
HDL:	41 mg/dL	???
Triglycerides:	280 mg/dL	???
HbA1c:	6.1%	???
Glucose Tolerance: (<140 mg/dL)	167 mg/dL	High

Q2. According to the criteria, which weight class does Tiana fall under? To calculate BMI, use the following conversions to metric: Weight (lbs.)/2.2 to convert to kilograms, and [height (inches) X 0.0254m/inch]² Click on the link below to access an online calculator, then make sure to press the back button instead of exiting out of the tab: <http://web2.0calc.com>

- Overweight (1)
- Obese Class I (2)
- Obese Class II (3)
- Obese Class III-Morbidly Obese (4)

Q3. Should BMI be used as a diagnostic tool in children/adolescents?

- Yes (1)
- No (2)

Q4. A waist circumference of which of the following centimeters in an indicator for greater risk of disease?

- Men: >100 cm; Women: >87 cm (1)
- Men: >102 cm; Women: >88 cm (2)
- Men: > 95 cm; Women: >84 cm (3)
- Men: >98 cm; Women: >86 cm (4)

Q5. Which measurement derived from the Hamwi method is most effective in determining an estimated caloric allotment for weight loss for Tiana?

- Lower Ideal Body Weight X 22 calories/kg (1)
- Upper Ideal Body Weight X 22 calories/kg (2)
- Ideal Body Weight X 22 calories/kg (3)
- Specific caloric allotments should not be used (4)

Q6. Tiana's blood pressure indicates which stage of hypertension (HTN)? (refer to case study)

- Pre-hypertensive (1)
- Stage 1 HTN (2)
- Stage 2 HTN (3)
- Normal (4)

Q7. Which of the following does Tiana's fasting glucose value of 123 mg/dL indicate?

- Normal (1)
- Pre-diabetes (2)
- Type II Diabetes Mellitus (3)
- Poorly controlled diabetes (4)

Q8. According to the World Health Organizations' definition, which of the following levels of triglycerides is a cut-point for aiding in the diagnosis of metabolic syndrome?

- 130-150 mg/dL (1)
- 130-200 mg/dL (2)
- (3)
- ≥ 150 mg/dL (4)

Q9. Which of the following are true of Tiana's results and contribute to the World Health Organizations' definition of metabolic syndrome? (select all that apply)

- Fasting Blood Glucose of 123 mg/dL (1)
- Triglycerides of 280 mg/dL (2)
- HDL of 41 (3)
- BMI > 30 (4)

APPENDIX F

WEBINAR SERIES: OBESITY AND ITS ROLE IN DISEASE PRE-TEST

Q1a. Please complete the following pre-test, then view the Obesity and Its Role in Disease Webinar, and complete the post-test.

Q1b. Please provide your email (for incentive purposes):

Q2. Which of the following is true regarding the adipocyte?

- Adipocytes only serve as fat storage and insulation during times of fasting in between available meals (1)
- Adipocytes are involved in regulation of blood pressure, immune function, and angiogenesis (2)
- We are born with the exact amount of adipocytes we will ever have, but they have the ability to undergo only hypertrophy (3)
- Adipocytes are inert stores of energy with no endocrine function (4)

Q3. Which of the following altered levels of hormones are correct, as seen in the obese state?

- Increased leptin; increased adiponectin; increased resistin (1)
- Increased leptin; decreased adiponectin; increased resistin (2)
- Decreased leptin; increased adiponectin; increased resistin (3)
- Decreased leptin; decreased adiponectin; decreased resistin (4)

Q4. Which of the following does not contribute to the state of chronic inflammation, as seen in obesity?

- High levels of adiponectin (1)
- Hypoxic cell environment (2)
- Increased levels of monocyte/macrophage infiltration (3)
- Increased blood flow and angiogenesis (4)

Q5. Which of the following does a fasting blood glucose of 231 mg/dL indicate?

- Normal (1)
- Pre-diabetes (2)
- Type II Diabetes Mellitus (3)
- Poorly controlled diabetes (4)

Q6. One of the contributing factors to Type II Diabetes Mellitus (T2DM) in the obese patient is abnormal secretion of the hormone, leptin, from adipocytes. Why does this occur?

- Obese patients have low circulating leptin, leading to decreased insulin sensitivity (1)
- Obese patients have high circulating leptin, leading to leptin resistance and decreasing insulin sensitivity (2)
- Obese patients have low circulating leptin, which acts as a transporter for glucose into the cell, leading to impaired glucose transport (3)
- Leptin does not contribute to T2DM (4)

Q7. Which of the following is not a contributing factor to atherosclerosis?

- Insulin resistance (1)
- Low levels of leptin and high levels of adiponectin (2)
- Oxidized lipoproteins (3)
- High levels of free fatty acids (4)

Q8. A patient with uncontrolled T2DM, hypertension, and high LDL/triglycerides is at risk for which of the following diseases?

- Atherosclerosis (1)
- Certain cancers (2)
- Osteoporosis (3)
- Both choice 1 and choice 2 (4)

Q9. Which cancer is an obese patient with several comorbidities more at risk of developing?

- Ovarian (1)
- Lymphatic (2)
- Stomach (3)
- Colon (4)

APPENDIX G

WEBINAR SERIES: OBESITY AND ITS ROLE IN DISEASE POST-TEST/CASE STUDY

Q1. Please provide your email (for incentive purposes):

Please read the following continued case study and answer all post-test questions
You inform Tiana about her diagnosis of pre-diabetes, stage I HTN, and obesity class I from the results of her initial consultation, however you do not prescribe any diabetic or anti-hypertensive medications yet because she insists she can lose weight in order to improve her health status. Due to her lipid profile, however, you prescribe Atorvastatin (Lipitor) to help control her high LDL, TGs, and total cholesterol. Tiana does not return until two years later complaining of a recent decline in her vision and waking up multiple times throughout the night to use the bathroom. She constantly feels fatigued and admits her job has been extremely stressful lately due to a deadline for a featured Disney movie releasing soon. She was experiencing muscle and joint pain and looked up Lipitor online, seeing these as common side effects, so she discontinued usage. Tiana now weighs 190.5 lbs. and she claims there hasn't been any dramatic change in her diet in the past two years, but she lost 10 pounds after her initial consultation, and has gained it all back plus a few additional pounds. Her blood pressure is 142/91 mmHg. You order another fasting plasma glucose test, a glucose tolerance test, lipid panel, and comprehensive metabolic panel based on her weight gain and described symptoms.

Lab Results: Fasting (normal values from source⁵⁴)

Sodium (136-145 mEq/L):	139 mEq/L	Normal
Potassium (3.5-5 mEq/L):	4.0 mEq/L	Normal
Chloride (98-106 mEq/L):	98 mEq/L	Normal
CO2 (23-28 mEq/L):	26 mEq/L	Normal
BUN (8-20 mg/dL):	16mg/dL	Normal
Creatinine (0.7-1.3 mg/dL):	0.9 mg/dL	Normal
Glucose:	231 mg/dL	???
Magnesium: (1.8-3 mg/dL):	2.4 mg/dL	Normal
Calcium (9.0-10.5 mg/dL):	9.6 mg/dL	Normal
Bilirubin, total (0.3-1.2 mg/dL):	0.7 mg/dL	Normal
Protein, total (6-7.8 g/dL):	6.9 g/dL	Normal
Albumin (3.5-5.5 g/dL):	4.3 g/dL	Normal
Prealbumin (16-35 mg/dL):	29 mg/dL	Normal
Ammonia (9-33 µmol/L):	35 µmol/L	High

Alkaline Phosphatase (36-92 IU/L):	89 IU/L	Normal
ALT (0-35 IU/L):	68IU/L	High
AST (0-35IU/L):	60IU/L	High
Cholesterol, total (150-199 mg/dL)	304 mg/dL	High
LDL:	192 mg/dL	???
HDL:	38 mg/dL	???
TG:	390mg/dL	???
Hb A1c:	9.1%	???
Glucose Tolerance: (<140 mg/dL)	246 mg/dL	High .

Q2. Which of the following is true regarding the adipocyte?

- We are born with the exact amount of adipocytes we will ever have, but they have the ability to undergo only hypertrophy (1)
- Adipocytes only serve as fat storage and insulation during times of fasting in between available meals (2)
- Adipocytes are inert stores of energy with no endocrine function (3)
- Adipocytes are involved in regulation of angiogenesis, immune function, and blood pressure (4)

Q3. Which of the following altered levels of hormones are occurring in Tiana's obese state?

- Increased leptin; decreased adiponectin; increased resistin (1)
- Decreased leptin; decreased adiponectin; decreased resistin (2)
- Increased leptin; increased adiponectin; increased resistin (3)
- Decreased leptin; increased adiponectin; increased resistin (4)

Q4. Which of the following does not contribute to the state of chronic inflammation, as seen in Tiana's obese state?

- Hypoxic cell environment (1)
- High levels of adiponectin (2)
- Increased blood flow and angiogenesis (3)
- Increased levels of monocyte/macrophage infiltration (4)

Q5. Which of the following does Tiana's increased fasting blood glucose of 231 mg/dL indicate?

- Normal (1)
- T2DM (2)
- Poorly controlled diabetes (3)
- Pre-diabetes (4)

Q6. One of the contributing factors to T2DM in Tiana's state of obesity is abnormal secretion of the hormone leptin from adipocytes. Why does this occur?

- Obese patients have low circulating leptin, which acts as a transporter for glucose into the cell, leading to impaired glucose transport (1)
- Obese patients have low circulating leptin, leading to decreased insulin sensitivity (2)
- Obese patients have high circulating leptin, leading to leptin resistance and decreasing insulin sensitivity (3)
- Leptin does not contribute to T2DM (4)

Q7 Which of the following is not a contributing factor for atherosclerosis?

- Low levels of leptin and high levels of adiponectin (1)
- High levels of free fatty acids (2)
- Insulin resistance (3)
- Oxidized lipoproteins (4)

Q8 Based on her fasting glucose, blood pressure and lipid panel, Tiana is at risk for which of the following diseases?

- Atherosclerosis (1)
- Osteoporosis (2)
- Certain cancers (3)
- Both choice 1 and choice 3 (4)

Q9 Which cancer is Tiana more at risk of developing due to her state of obesity and comorbidities?

- Lymphatic (1)
- Colon (2)
- Stomach (3)
- Ovarian (4)

APPENDIX H

WEBINAR SERIES: NUTRITIONAL RECOMMENDATIONS PRE-TEST

Q1a. Please complete the following pre-test, then view the Nutritional Recommendations Webinar, and complete the post-test.

Q1b. Please provide your email (for incentive purposes):

Q2. Which of the following does a fasting glucose value of 125 mg/dL and HbA1c of 6.3% indicate?

- Normal (1)
- Pre-diabetes (2)
- T2DM (3)
- Poorly controlled diabetes (4)

Q3. What are the sodium restrictions for the Dietary Approaches to Stop Hypertension (DASH) diet?

- $\leq 2,500$ mg/day to reduce blood pressure & 1,500 mg/day for certain populations (1)
- $\leq 2,500$ mg/day to reduce blood pressure & 2,000 mg/day for certain populations (2)
- $\leq 2,300$ mg/day to reduce blood pressure & 1,500 mg/day for certain populations (3)
- $\leq 2,300$ mg/day to reduce blood pressure & 2,000 mg/day for certain populations (4)

Q4. The Mediterranean diet can result in decreased adiposity, blood pressure, and rates of metabolic syndrome, with an improved lipid profile and insulin sensitivity. Which of the following does the Mediterranean diet not emphasize intake of?

- Fatty fish (1)
- Vegetables/fruits (2)
- Legumes (3)
- Red meat (4)

Q5. A reduction in how many calories per day will result in 1 pound of weight loss per week?

- 250 calories (1)
- 500 calories (2)
- 1,000 calories (3)
- 3,500 calories (4)

- Q6. What are the current physical activity guidelines for children/adolescents?
- ≥ 30 minutes daily aerobic physical activity; At least 3 days/week muscle-strengthening physical activity; At least 3 days/week bone strengthening physical activity (1)
 - ≥ 60 minutes daily aerobic physical activity; At least 3 days/week muscle-strengthening physical activity; At least 3 days/week bone strengthening physical activity (2)
 - ≥ 30 minutes daily aerobic physical activity; At least 2 days/week muscle-strengthening physical activity; At least 2 days/week bone strengthening physical activity (3)
 - ≤ 60 minutes daily aerobic physical activity; At least 2 days/week muscle-strengthening physical activity; At least 2 days/week bone strengthening physical activity (4)
- Q7. What are the current aerobic physical activity guidelines for adults?
- At least 120 minutes (2 hours) of moderate-intensity physical activity/week (1)
 - At least 60 minutes (1 hour) of vigorous-intensity physical activity/week (2)
 - At least 150 (2.5 hours) of moderate-intensity physical activity/week (3)
 - At least 120 minutes (2 hours) of vigorous-intensity physical activity/week (4)
- Q8. Which of the following indicates a patient who is not a candidate for bariatric surgery?
- BMI ≥ 35 with obesity-related comorbidities (1)
 - BMI ≥ 30 with obesity-related comorbidities (2)
 - BMI ≥ 40 (3)
 - Obese patients (with at least the cut-point BMI value) who have not been able to successfully lose weight in the past (4)
- Q9. Who should you refer an overweight/obese patient to in order to provide professional nutrition education/counseling and monitoring?
- Nutritionist (1)
 - Registered Dietitian (2)
 - Physical Trainer (3)
 - Dietetic Technician (4)

APPENDIX I

WEBINAR SERIES: NUTRITIONAL RECOMMENDATIONS POST-TEST/CASE STUDY

Please read the following continued case study and answer all post-test questions. After diagnosing Tiana with T2DM, stage I HTN, dyslipidemia, and obesity you inform her of her future risk for disease and insist something must be done. She insists she does not want to start taking cholesterol-lowering medication again due to her previous adverse effects. Tiana vows to lose weight in order to control her T2DM and hypertension, but does not know how where to begin with weight loss. You suggest various nutritional websites/diets to learn proper portion sizes, types of foods to consume, and helpful tips including the MyPlate government webpage, the Dietary Approaches to Stop Hypertension (DASH diet), and the Mediterranean diet. You provide her with handouts from the MyPlate website catering to her lifestyle of eating out and not having enough time to eat right/exercise, and inform her of the specifications of the DASH & Mediterranean diet. You also inform her of the importance of exercise and provide the recommendations for adults, as well as including tips to incorporate more physical activity into her daily schedule. You also write a referral to a local Registered Dietitian (RD) in order to provide a more specific diet plan and for monitoring purposes. You warn Tiana that if she does not lose weight and improve her lipid panel, fasting blood glucose, and blood pressure in six months, then she will be prescribed the appropriate medications to improve these complications.

Six months later... Tiana returns for a check-up after six months, and you are pleasantly surprised with her results. She has lost 20.5 pounds, weighing 170 pounds, with a reduction in BMI to 30.1. Her blood pressure has reduced to 128/86 and she states she has not felt this alive in 20 years. She has been following the DASH diet and eating more fish/olive oil for the past six months, as well as exercising every day at her lunch break, and has even convinced a few co-workers to join in. She has also been visiting the referred RD for any additional questions and monitoring. As promised, you order another fasting plasma glucose test, a glucose tolerance test, lipid panel, and comprehensive metabolic panel to measure her results.

Lab Results: Fasting (normal values from source⁵⁴)

Sodium (136-145mEq/L):	138mEq/L	Normal
Potassium (3.5-5mEq/L):	3.8mEq/L	Normal
Chloride (98-106mEq/L):	99mEq/L	Normal
CO2 23-28mEq/L):	25mEq/L	Normal
BUN 8-20mg/dL):	15mg/dL	Normal
Creatinine (0.7-1.3 mg/dL):	0.9 mg/dL	Normal
Glucose:	125 mg/dL	???

Magnesium: (1.8-3 mg/dL):	2.2 mg/dL	Normal
Calcium (9.0-10.5 mg/dL):	9.7 mg/dL	Normal
Bilirubin, total (0.3-1.2 mg/dL):	0.7mg/dL	Normal
Protein, total 6-7.8g/dL):	6.7g/dL	Normal
Albumin (3.5-5.5g/dL):	4.1g/dL	Normal
Prealbumin (16-35 mg/dL):	30mg/dL	Normal
Ammonia (9-33µmol/L):	28µmol/L	Normal
Alkaline Phosphatase (36-92 IU/L):	84 IU/L	Normal
ALT (0-35 IU/L):	34 IU/L	Normal
AST 0-35IU/L):	46 IU/L	High
Cholesterol, total (150-199 mg/dL):	210 mg/dL	High
LDL:	157mg/dL	Borderline High
HDL:	49 mg/dL	???
TG:	200 mg/dL	???
HbA1c:	6.3%	???
Glucose Tolerance: (<140 mg/dL):	161mg/dL	High

Q2. Which of the following does Tiana's fasting glucose of 125 mg/dL and HbA1c of 6.3% indicate?

- Normal (1)
- Pre-diabetes (2)
- T2DM (3)
- Poorly controlled diabetes (4)

Q3. What are the sodium restrictions for the Dietary Approaches to Stop Hypertension (DASH) diet that Tiana has been following the past 6 months?

- ≤2,300 mg/day to reduce blood pressure & 2,000 mg/day for certain populations (1)
- ≤2,500 mg/day to reduce blood pressure & 1,500 mg/day for certain populations (2)
- ≤2,500 mg/day to reduce blood pressure & 2,000 mg/day for certain populations (3)
- ≤2,300 mg/day to reduce blood pressure & 1,500 mg/day for certain populations (4)

Q4. The Mediterranean diet can result in decreased adiposity, blood pressure, and rates of metabolic syndrome, with improved lipid profile and insulin sensitivity. Which of the following does the Mediterranean diet not emphasize intake of?

- Vegetables/fruits (1)
- Fatty fish (2)
- Red meat (3)
- Legumes (4)

Q5. How many fewer calories should Tiana be consuming per day to result in 1 pound of weight loss per week?

- 3,500 calories (1)
- 1,000 calories (2)
- 500 calories (3)
- 250 calories (4)

Q6 What are the current physical activity guidelines for children/adolescents?

- ≥ 30 minutes daily aerobic physical activity; At least 3 days/week muscle-strengthening physical activity; At least 3 days/week bone-strengthening physical activity (1)
- ≥ 30 minutes daily aerobic physical activity; At least 2 days/week muscle-strengthening physical activity; At least 2 days/week bone-strengthening physical activity (2)
- ≤ 60 minutes daily aerobic physical activity; At least 2 days/week muscle-strengthening physical activity; At least 2 days/week bone-strengthening physical activity (3)
- ≥ 60 minutes daily aerobic physical activity; At least 3 days/week muscle-strengthening physical activity; At least 3 days/week bone-strengthening physical activity (4)

Q7. Which of the following aerobic physical activity guidelines should be recommended to Tiana?

- At least 120 minutes (2 hours) of moderate-intensity physical activity per week (1)
- At least 60 minutes (1 hour) of vigorous-intensity physical activity per week (2)
- At least 120 minutes (2 hours) of vigorous-intensity physical activity per week (3)
- At least 150 (2.5 hours) of moderate-intensity physical activity per week (4)

Q8. Tiana is not a candidate for bariatric surgery. Which of the following indicates a reason why she is not a candidate for bariatric surgery?

- Tiana has not been able to successfully lose weight in the past (having at least the cut-point BMI value) (1)
- Tiana has a BMI ≥ 35 with obesity-related comorbidities (2)
- Tiana has a BMI ≥ 40 (3)
- Tiana has a ≥ 30 with obesity-related comorbidities (4)

Q9. Which referred professional is able to provide Tiana with professional nutrition education/counseling and monitoring?

- Dietetic Technician (1)
- Registered Dietitian (2)
- Nutritionist (3)
- Physical Trainer (4)

Q10. *In case you were wondering...*

Tiana took your advice and kept exercising as well as following the DASH diet combined with components of the Mediterranean diet. Six months after her previous appointment, she had additional weight loss, a normal fasting glucose/HbA1c, normal blood pressure, and an upper normal blood lipid panel. She was truly thankful that you took the time to inform her of her future disease risk, as well as providing nutrition guidelines and a referral to a registered dietitian.

Thank you for participating in the Web-based Workshop & Webinar Series and answering the pre & post-test questions. We hope you have learned valuable information regarding Nutrition Assessment, Obesity and Its Role in Disease, and Nutritional Recommendations to use in your everyday practice as a medical doctor. Please view the rest of the WBW website, explore the provided resources, and complete the Post-Test Evaluation Survey as the final component of this pilot test. Thank you!

APPENDIX J

FOCUS GROUP QUESTIONS AND RESPONSES

Focus Group Questions 4/3/2015

Welcome to the focus group for the pilot test you all successfully completed, a “Web-based Workshop & Webinar Series: Obesity education and resources for medical students”. I am Laurie Shroads, the graduate student who sent you all those emails and created the webinar series with the assistance of several professors at Texas A&M.

We are here today, from all over Texas I might add, to discuss the effectiveness, content, presentation, and future aim of the web-based workshop, and what you would like to see as an addition or replacement to the workshop as a part of your medical school curriculum. The results from this focus group will help us fill in the gaps of nutrition and obesity education not provided in medical schools, and will define the most critical areas in the workshop to refine the content/layout for a more successful online learning experience.

Everyone here, in person or via teleconference, is either a current or future health professional and resides in College Station/Bryan, Temple, or Dallas/Fort Worth.

There are no right or wrong answers, only differing points of view and feedback advice. Please provide your honest opinions even if it differs from others.

As was included in the consent form, we are video recording this focus group meeting to document each comment that will be used to revise the workshop. This video will not be shared with anyone but the main researcher, Laurie Shroads, but the commentary will be used in the written future aim of this study. Is everyone willing to be on a first name basis during this focus group meeting? We will not use any of your names in the reports, so there will be complete confidentiality.

- Does anyone have any questions before we begin?

Opening Question:

1. I have written everyone’s names on this white board so we can remember each other’s names and make this a more personal experience. Let’s find out a little more about each of you before we begin. [Start with Jorge] Please tell us your name and what you believe the most serious health concern facing health care professionals in the United States today.

- a. Jorge: Why we are here right now. Shift mentality education status of patients and docs put more emphasis on health and nutrition. Our title is to be a provider of health-contradictory to teach how to treat and not prevent. Change how education is and put more emphasis on nutrition with a scientific spin (studies, proof)
- b. Kim: Managing chronic diseases, part of the problem is not preventing it in the first place. Develop healthy habits when young. Nutrition and exercise is medicine-prevent chronic disease in the future. Unhealthy habits are what is killing us (e.g. diabetes)
- c. Sam: Medicine: delaying death, but are we prolonging life? QOL. On dialysis, in hospital, if primary care physician 20 years ago had them make change, things would be different. Smoking, every time ask if they quit smoking, but do not acknowledge for overweight/obesity (don't want to hurt people's feelings). Need to address it-assume it's not a problem
- d. Saad: Lifestyles have become sedentary. Increasing obesity, not just in adults, but in children. Leading to other diseases, eventually heart disease. Address broader issue.

Introductory Question:

2. Research consistently shows that eating a healthful diet and getting regular physical activity reduces the risk of obesity and some of the most common chronic diseases such as CVD, type II diabetes, and certain cancers.

Do you believe, as healthcare providers, it is our role to prevent and treat these chronic diseases through nutritional advice in addition to, or in replacement of, the prescription of pills? Why or why not?

All consensus: absolutely

- a. Sam: Cheaper. Can't bill for how I eat right.
- b. Jorge: as physicians, it comes down to lack of time with a patient. Sad-in the end it is all about money. You don't want to be working for free or in debt-motivation due to monetary issues. Absolutely our duty. 15 minutes is not enough. I hope when we start practicing-whoever is calling the shots will acknowledge this is beneficial and we get compensated to educate patients.
- c. Saad: can bill for smoking cessation. Why aren't they on the same level? I don't want to say medications don't have a role, but the balance is shifted more on that aspect vs. foregoing preventative measures.
- d. Jorge: want an easy fix. Drive home the point of education
- e. Kim: For doctors, who don't have 15 minutes, having a dietitian, utilizing medical students, as soon as patient leaves room make it convenient to see dietitian (make it local in office). Having to find your own nutritionist or gym not likely. More likely if it is in your own office.

- f. Sam: One-hour session with a group of patients. Helpful in making life changes-save time.
- g. Jorge: Good ideas, but Sam, you are practicing and do conferences weekly? See if this is compensated or own personal benefit?
- h. Sam: probably wouldn't worry about being compensated.

Transition Question:

- 3. What are your experiences and attitudes towards e-learning, or online learning as a supplement to traditional classroom education? How about towards webinar lectures?
 - a. Saad: I think they're great. Quick, own pace. Get as much info, maybe even more due to versatility.
 - b. Kim: likes them better. Able to get certifications all webinar. Own time, review, repeat. Watch multiple times. To review later on, can go back to videos-as long as free
 - c. Sam: Students love it. Own terms, schedule. Improves productivity.
 - d. Kim: Fourth year: E-learning classes online (due to travelling for interviews). These are good.
 - e. Jorge: Continuing an education like this for medical students. We have wellness classes mandatory-not positive. Like the idea, but become frustrated
 - f. Sam: Frustrated with wellness classes. We made a curriculum, prof said she liked it and it fell through. Nothing happened in follow up. Failing to recognize healthy diet and exercise helps take care of emotional issues.
 - g. Kim: know supposed to exercise, but why don't they?
 - h. Jorge: if they were online it would be better. Instead of being forced for not paying attention, make it online.
 - i. Sam: nothing on nutrition and wellness. Needs to help increase test scores.

Webinar Key Questions:

- 4. After viewing the three webinars provided on the web-based workshop- Nutrition Assessment, Obesity and Its Role in Disease, and Nutritional Recommendations- what are your thoughts on the relevancy of the content to your career as medical doctors?
 - a. Kim: depends on what year we watch the videos. Exposed to all for 4th year besides Hamwi method. She likes the specifics. Need to include specifics for pediatrics. Different for people with comorbidities: CVD, low-salt diet. Too general. Determine when they watch the videos.
 - b. Sam: Fits in with basic science stuff from first year. If we had this baseline nutrition in videos and then later in school learn specifics (counseling, etc.).

Depends on what field you are going into. Going into gen surgery may not use this stuff.

- c. Saad: Good refresher overview (M1). Haven't seen or wasn't familiar with. I thought they served relevant reliable content in short amount of time.
 - d. Jorge: Covered a lot of points.
5. Within the webinars, what methods of information presentation did you like the most/least?
- a. Jorge: Outside resources are always good. People want to see evidence, good element in this kind of education. I am auditory listener, like how someone was narrating. Case studies are good-knowledge into real life situation.
 - b. Saad: Liked the videos. Liked different people, catered tot heir expertise
 - c. Kim: Liked double speed videos.
 - d. Sam: One of the most helpful things was the hyperlinks-share with patients.
 - e. Kim: list of resources, like books. Med diet, DASH,
 - f. Sam: include an overview of the most popular diets. Majority work as long as you stick with them. Give list of diets that are nutritionally sound, so which one can you work with? To patients.
6. What did you like best about the webinar series?
- a. Kim: I liked the statistics-can tell patients. Give them an idea of how bad, important it is. Emphasize it.
 - b. Sam: Liked the case studies: close to being unhealthy, came back and had problems. Good story, want to say the time is now and do not put it off
 - c. Kim: liked they were short.
7. What are the largest areas for improvement for the webinar series?
- a. Sam: practical tools, not only for med students but to share with patients. Maybe some sample meal plans or specific exercises. Ideas for weight loss if you don't like to exercise. Have a way to put people put feedback in.
 - b. Kim: very specific advice. Top 10. Make small changes at first. Pick one thing first, do one step at a time. List of practical tips. No time to look for it.
 - c. Jorge: Agree with Sam. Need a plan, something to get started. For doctors sake: advanced class: components of food and how they interact/benefit with our physiology. Make it optional for those who want to take it. I would like to see it go that way.
 - d. Sam: Where they are in life and nutrition for that. CKD-what they need to eat, etc.

- e. Kim: What about patients who have tried all these diets, how can we motivate them?
 - f. Saad: student perspective: If there was a handout when I followed along with the videos.
- 8.** Are there any major nutrition topics about obesity that you would add or want to see in the webinars that were not included?
- a. Sam: Nutrition for particular diseases
 - b. Saad: can't get them too long
 - c. Kim: As a physician, when you refer to a dietitian, what exactly do they do. As doctor, she wants to know this. This is how an RD is going to fix. Let your patient know the benefits of that.
 - d. Kristen: we get a brief background and what they are most interested in-home in on methods we can slightly modify their behavior.
 - e. Kim: how many sessions can I tell them?
 - f. Kristen: 6 free visits a year usually. See every month for 4 or 5 sessions to see progress. Within each session give handouts.
 - g. Sam: need to be away they need to do work. Can't think they will automatically lose weight. Counsel it won't be easy.

Workshop Key Questions:

Within the workshop we included tools and resources on basic nutrition principles, information on diets, myths, and misconceptions, obesity assessment, nutrition and disease, methods for reducing disease risks and communicating with patients about nutrition, and other resources including short handouts, mobile fitness apps and reviews, and the dietitians' role in health care.

- 9.** After viewing this workshop, what are your thoughts on the amount of content provided?
- a. Saad: It was thorough, good amount of info. Count all the links, more than meets the eye.
 - b. Sam: you get out of it what you put into it.
 - c. Kim: good amount
 - d. Jorge: good amount. Being bombarded is too much. Having enough is good. Provided links to high points
- 10.** Did you find the information provided to be useful in learning about nutrition and the obese patient? How?
- a. Sam: on paper yes, practically, not so much.

- b. Kim: yeah, we need real world cases
- c. Sam: have to start with facts and basics, next step is clinical and practical application
- d. Jorge: Add psychosocial issue. Understanding why someone would get to that point. Understand where they are coming from-easy to judge from the outside. Take a different approach.
- e. Sam: sometimes your patient doesn't even know. Talk to patient and figure out the barriers. Are ways to examine mental and physical barriers
- f. Kristen: a lot of benefit for a dietitian. We try to think about their barriers and overcome them.
- g. Kim: We need to give those tools, I don't know what to give them
- h. Saad: I agree, everything presented needs evidence backing. Physicians want to see. Why is it going to work?

11. What did you like best about the workshop?

SKIPPED QUESTION; REPETITIVE AND LOW ON TIME

12. What are the largest areas for improvement for the workshop?

- a. Jorge: what I said earlier, more practical sense. Get basic facts, how do we take that to the next level. How to approach patient with this info
- b. Sam: practical applications: doctor can write a prescription for exercise and nutrition.

13. One thing I wish I knew more about is...

SKIPPED QUESTION; REPETITIVE AND LOW ON TIME

Summary Question:

Assistant moderator (Christina) will give a 2-3 minute summary of key questions and ideas that emerged from the discussion.

14. Is this an adequate summary?

Ending Question:

Once again, the purpose of this project is to develop nutrition knowledge in regards to the overweight/obese patient, who you will come in contact with often as a future medical doctor through nutrition education tools, resources, and online webinars.

15. Is there anything we did not discuss that you think is important? Is there anything you would like to add?

a. Kim: when patient makes lifestyle change, it affects their family. Find a way to have whole family support. Provide handouts or specific advice about support-we need to know where these are.

LIVE ON YOUTUBE: <https://youtu.be/X60xzmhIGJY>

Thank you for your time. As a reward for your time today, here is a \$25 Amazon.com gift card. For those located in Temple-we will mail your reward to the XXXX to be picked up at your convenience.

APPENDIX K

RECRUITMENT EMAIL

Dear Texas A&M Medical Students,

You are invited! Please participate in a *Web-Based Workshop and Webinar Series* study where you will further your knowledge regarding **nutrition** and its role in obesity. The purpose of this thesis project is to incorporate more nutrition education regarding the obese patient whom you will interact with on a daily basis in your future practice, *so your response is vital in campaigning for more nutrition education in your curriculum*. You will be asked to view three online webinar lecture series including: Nutrition Assessment, Obesity and Its Role in Disease, and Nutritional Recommendations, as well as complete their corresponding pre- and post-tests. You will also be asked to view each section of the Web-Based Workshop website and complete an evaluation survey regarding demographic information, nutrition attitudes, and perceived self-efficacy BEFORE and AFTER viewing the website.

Participating in this online workshop will put you in a drawing to **win one of twelve \$25 Amazon.com gift cards** to reward your time and effort!

Click on the following link to access the Web-based Workshop & Webinar Series:
<http://tamrenterhune.wix.com/comwbwobesity>

This entire process should take you *no longer than 1.5 hours total*, so please take a small amount of time to complete this workshop! You DO NOT have to complete all the webinars in one sitting, thus providing a flexible window to participate amongst your busy schedules. It is available ***NOW THROUGH MARCH 20, 2015!***

A focus group feedback meeting will also be held after completion of the workshop in **March**, and four Texas A&M Health Science Center College of Medicine (TAMHSC COM) students will be able to participate and provide valuable feedback. This is your opportunity to voice your opinion on the value of nutrition education in your curriculum, so please sign up! Please email lshroads@tamu.edu to participate in the focus group. Four students will be randomly selected to meet in-person with several other professionals in the field of nutrition. Each of the four focus group participants will receive a **\$25 gift card to Amazon.com** for your efforts in improving this project.

IMPORTANT:

Please read the attached Information Form and Consent Form to fully understand the purpose and protocol of this study. Please electronically initial and sign all designated spaces on the Consent Form and email back to lshroads@tamu.edu before beginning the Web-Based Workshop and Webinar Series study.

Thank you and email lshroads@tamu.edu for any further questions. We truly appreciate your time and efforts in furthering the incorporation of nutrition education in the medical school curriculum.

Sincerely,

Laurie Shroads

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APPENDIX L

WEBINAR SCRIPTS

Nutrition Assessment Script:

My introduction:

Experience: Mrs. Geismar has ten years of clinical experience working with the hospitalized population, particularly the acutely, critically ill patient. She is a Certified Nutrition Support Dietitian (CNSD) which focuses on the care of patients who have specialized nutritional needs and was most recently employed as a nutrition support dietitian for a trauma intensive care unit (ICU) before moving to the College Station/Bryan area. She is currently employed at Texas A&M University in the Nutrition department, teaching Fundamentals of Human Nutrition and Nutrition Assessment and Planning. Please welcome Mrs. Karen Geismar, who will be presenting Nutrition Assessment.

Mrs. Geismar:

Hello and welcome to Nutrition Assessment. It is crucial as physicians to be able to determine one's health status based on a few anthropometric measures, laboratory values, family history, and the relative risks associated with that person.

Statistics:

A staggering 34% of US adults ages 20 and older are classified as obese, and 6% of US adults are classified as morbidly obese⁶⁴. It is crucial to be able to correctly assess obese patients, their risks for disease, and provide recommendations to help put an end to this epidemic.

Obesity: What's the Definition?

An obese person has an increased likelihood of health problems and diseases. Though the definitions differ, the commonality between the two leads back to health, which is controlled by proper nutrition and fuels the purpose of this educational lecture series about the role of nutrition on the overweight/obese patient. [Read slide definitions]⁵⁸

Body Mass Index (BMI) in Adults:

First and foremost, let's look at the definition of obesity. The CDC considers obesity as a range of weight that exceeds what is considered healthy for the height of that individual, and an obese person has an increased likelihood of health problems and diseases⁵⁸. A quantitative measurement, known as body mass index or BMI, is a more accurate method to determine body fatness than the previous definition.

It is a strong correlative measure for body fatness and associated health outcomes for either under or overweight individuals. It doesn't require any specialty equipment that most of you will not have access to, such as DEXA-all it requires is a simple calculation. The only times BMI is less accurate is in an athlete who has an increased percentage of fat-free mass, underestimation in elderly patients who have a loss of body mass²⁵, or with a patient who has a fluid imbalance, such as edema³¹. BMI is calculated using metric measurements of weight over height squared, or kg/m².

Here are the following conversions for pounds to kg and inches to meters. (Show on screen):

BMI=weight (kg)/height (m²)

Lbs./2.2 = weight in kg

1 inch= 0.0254 meters

A more simple and convenient method to determine BMI is by using the following link to the NIH website and entering the patients height and weight using the standard system⁴².

- http://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm

BMI Cut-Points for Adults

You can now assess the classification of your patient based on the WHO Body Mass Index Cut-Points for Adults⁶⁴:

- BMI classifications:
 - <18.5: Underweight
 - 25-29.9= Overweight
 - 30-34.9 = Obesity Class I
 - 35-39.9= Obesity Class II
 - >=40 = Obesity Class III
- Morbidly Obese: BMI of >=40 or BMI >=35 with comorbidities of HTN or diabetes.

BMI Calculator: Children/Adolescents:

Children and adolescents do not use the same formula to calculate BMI, instead, BMI-for-age growth charts are used to determine a percentile ranking that compares the child's BMI with the BMI of children who are the same sex and age⁵⁹.

The link provided below allows you to input information about the child to calculate their relative BMI based on age, height, and gender⁶⁰:

<http://nccd.cdc.gov/dnpabmi/Calculator.aspx>

BMI in Adolescents:

Once the child's BMI is calculated, the following sex-specific charts are used to determine the body mass index-for-age percentiles:

- Males, age 2-20³³:
<http://www.cdc.gov/growthcharts/data/set1clinical/cj411023.pdf>
- Females, age 2-20³³:
<http://www.cdc.gov/growthcharts/data/set1clinical/cj411024.pdf>

Adolescent Weight Status:

After the percentile range has been determined based on the child's age and BMI, they can be placed into the following table to determine their weight status category:

Weight Status Category	Percentile Range
Underweight	Less than the 5 th percentile
Healthy weight	5 th percentile to less than the 85 th percentile
Overweight	85 th percentile to less than the 95 th percentile
Obese	Equal to or greater than the 95 th percentile

It is important to note that BMI is not a diagnostic tool amongst the ages 2-19; it is merely a screening method for underweight, healthy weight, overweight, or obesity⁶¹. Data from the Fels Longitudinal Study shows childhood obesity as being indicative for adulthood obesity with data showing girls aged 12-20 years old with BMI in the 95th percentile having a $\geq 60\%$ chance of being obese during adulthood⁴⁹. Obese boys also show similar odds of developing adulthood obesity, which further proves the importance of weight management not only for adults, but also for children.

Waist Circumference:

Another anthropometric measurement known as waist circumference is an indicator of disease risk. Waist circumference is associated as the measure for visceral adipose tissue and is more associated with a higher risk for metabolic disorders⁶⁴. The NIH cutoffs for a normal waist circumference are ≤ 102 cm for men and ≤ 88 cm for women, while a high waist circumference is considered >102 cm for men and >88 cm for women⁴⁵. It has been shown that waist circumference, combined with BMI, predicts cardiovascular disease and its risk factors better than only using BMI⁴⁵.

A waist circumference of >102 cm in men and >88 cm in women indicates visceral adiposity, which has been shown to correlate to higher mortality and a greater risk of developing type II diabetes, heart disease, hypertension, gall-bladder disease, and certain forms of cancer²⁵. A high BMI is associated with hypertension, as well as visceral adipose tissue as compared to subcutaneous adipose tissue and lower body fat³⁰. These findings support the importance of measuring waist circumference in an obese individual.

It is important to make sure waist circumference measurements are taken correctly, so here is a quick instructional video on where to place the measuring tape and how tight to make the measure.

Show video.

Video content: In order to obtain the most accurate waist measurement make sure the patient is wearing a tight shirt or have them lift their shirt just above their waist, if they are comfortable. Next, find the narrowest part of the torso between the umbilicus and bottom of the rib cage⁶. Place the tape measure around the waist, parallel to the ground, snugly fit but not pinching the skin. Take the measurement in centimeters, and you are done.

Risk of Disease:

This table is adapted from the National Heart, Lung, and Blood Institute to assess disease risk based on both BMI and waist circumference. As stated earlier, a combination of both these measurements seems to be more accurate than BMI alone when determining risk of disease, so this chart will help you to discuss the severity of their disease risk with an overweight or obese patient.

Ideal Body Weight:

You may come across a situation where a patient asks what their ideal body weight should be so they have an idea of how much weight they have to lose to be considered a “healthy” weight. The most accepted and accurate formula to use is the Hamwi method to determine a range of ideal body weight³¹.

- Men: 106 lbs. for the first 5 feet + (6 lbs. X each additional inch) ±10%
 Example: 6’2”
 106 lbs. + (6 lbs. X 14 inches) = 190 lbs. ±19 lbs.
 Ideal Body Weight range: 171 lbs. – 209 lbs.
 You will often hear the term “upper ideal body weight” when calculating a caloric regimen, which refers to the 209 lbs. in this case.
- Women: 100 lbs. for the first 5 feet + (5 lbs. X each additional inch) ±10%

When dealing with the obese patient, hypertension and diabetes are common findings²⁷. In this section we will discuss the stages of hypertension, classes of diabetes and its indicative lab values. The pathophysiology of these diseases will be discussed in the next section.

Assessing Blood Pressure:

Let’s begin with the stages of HTN⁶⁴:

Stage of Hypertension	Systolic Blood Pressure (mmHg)		Diastolic Blood Pressure (mmHg)
Normal	<120	And	<80
Prehypertension	120-139	Or	80-89
Hypertension Stage I	140-159	Or	90-99
Hypertension Stage II	≥160	Or	≥100

Hypertension is associated with obesity in many more physiological processes than simply consuming too much salt, which is commonly thought of as the only factor triggering hypertension. You will learn about the physiology of the development of hypertension in the physiological development webinar, and which nutrients to limit or consume more of to reduce hypertension in the nutritional therapy webinar.

Certain populations are more prone to developing hypertension. A study done looking at data from the Multi-Ethnic Study of Atherosclerosis (MESA) showed African Americans had significantly higher amounts of hypertension, defined as >140/90, than the white population⁴⁸. The prevalence in the Hispanic population and Chinese population was slightly greater than the white population, but not significant⁴⁸. This data helps to explain the hypertensive state of Jenny from the case study. It is important to take not only ethnicity into consideration when evaluating an obese patient, but also family history. This is especially true of obese patients and their likelihood of developing type II diabetes. Family history of diabetes doubles the risk for developing diabetes. Obesity also doubles the risk for developing diabetes, so an obese individual with a family history of diabetes is four times as likely to develop this disease themselves⁶⁷. Genetics studies are being conducted to try and explain how diabetes is passed down through families, but the majority of type II DM susceptibility genes are yet to be identified⁶⁷.

Hypertension Resolved, Medication Free: Reductions of approximately 8.5mm Hg SBP and 6.5mm Hg DBP accompany weight loss of 8kg. In overweight hypertensive patients, a combined exercise and weight-loss intervention has been shown to decrease SBP and DBP by 12.5 and 7.9mm Hg, respectively²⁹.

Type II Diabetes Mellitus:

Over 7.8 % of the population has diabetes, with over 90% of all diabetes cases being T2DM

Uncontrolled diabetes (high blood sugar levels) can eventually lead to heart disease, stroke, retinopathy leading to blindness, neuropathy leading to leg and foot amputations, nephropathy leading to kidney disease, and pregnancy complications.

Over 200,000 people die from diabetes-related complications annually⁶⁸

You will see the majority of obese patients also have type II diabetes or uncontrolled blood sugar levels. You have most likely already learned the lab values for insulin resistance, but let's review because these values are important in defining the growing diagnosis of metabolic syndrome³².

Diagnosis	Fasting Blood Glucose (FBG)	Impaired Glucose tolerance (IGT)	HbA1c
Pre-Diabetes	100-125 mg/dL	140-199 mg/dL	5.7%-6.4%
Type II Diabetes Mellitus	≥126 mg/dL	≥200 mg/dL	6.5% and higher

T2DM Lab Tests:

You have most likely already learned the lab values for insulin resistance, but let’s review because these values are important in defining the growing diagnosis of metabolic syndrome.

HbA1c is often used in clinical practice because it is the average plasma glucose for the past eight to 12 weeks and does not require any sort of fasting. In essence, it is a convenient, but less accurate measure of indicating diabetes. The WHO indicates HbA1c can be used as a measure for type II diabetes, but it does not always indicate diabetes as compared to glucose tests. The cut-point value is 6.5% for diagnosing diabetes, but a value less than 6.5% does not mean the patient does not have diabetes if the glucose tests (FBG and IGT) indicate otherwise⁷⁵. It is always a good idea to evaluate all three tests: FBG, IGT, and HbA1c to determine the presence of pre-diabetes or full blown T2DM. Fasting blood glucose is done after at least an 8-hour fasting period, hence the name. The impaired glucose tolerance test also begins in a fasted state with a blood sample drawing. A glucose-containing liquid is then consumed, with blood draws performed again at 30 and 60 minutes after consumption. It is important, for both FBG and IGT, which the patient eats normally a few days before the test is administered.

Some of the classic symptoms of T2DM are: polyuria (frequent urination), polydipsia (excessive thirst), frequent hunger, fatigue, blurred vision, slow healing of cuts/wounds, and tingling extremities.

Family/Medical History:

It is essential to assess family history with the obese patient because it is indicative of their likelihood to develop T2DM. Family history of diabetes doubles the risk for developing diabetes. Obesity also doubles the risk for developing diabetes, so an obese individual with a family history of diabetes is four times as likely to develop this disease themselves⁶⁶.

You should also inquire about every patient’s medical history in order to learn about his or her diet and physical activity routines. Their BMI, waist circumference, and family history of diseases dictate their risks for medical comorbidities. It is also essential to assess a patient’s willingness to change and make subsequent recommendations about diet, exercise, and recommendations to registered dietitians⁵³.

Lipid Guidelines:

American Association of Clinical Endocrinologists shows cut-points for high-risk values of total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides and ApoB. The

highlighted values indicate a substantial increase for risk for coronary artery disease. A TG value greater than 150 may indicate an individual with insulin resistance, so this is an important measurement to focus on⁴⁶.

Metabolic Syndrome:

The presence of insulin resistance or type II diabetes, hypertension, and various other specifications all contribute to a term coined “metabolic syndrome”⁴³. There are multiple definitions from different organizations, but they only differ slightly. The World Health Organization (WHO) definition defines metabolic syndrome in adults as⁶⁴:

- Insulin resistance in the form of:
 - Type 2 diabetes mellitus or
 - Fasting blood glucose (IFG) >110 mg/dL or
 - Impaired glucose tolerance >140 mg/dL
- Plus two of the following:
 - BMI >30 kg/m² and/or waist:hip ratio >0.9 in men and >0.85 in women
 - Triglycerides ≥150 mg/dL
 - HDL <35 mg/dL in men & <39 mg/dL in women
 - Urinary albumin excretion rate ≥20 micrograms/min or albumin:creatinine ratio ≥30 mg/g

The most effective way to intervene for metabolic syndrome is simply by weight reduction which is proven to reduce cholesterol levels, triglycerides, increases HDL, lowers blood pressure and glucose, and reduces insulin resistance⁹.

Caloric Regimen for Weight Loss:

An obese patient might also inquire about how many calories they should consume in a given day in order to lose weight. The Academy of Nutrition & Dietetics recommends a hypocaloric regimen for obese patients (BMI>30) who do not have renal or hepatic dysfunction. It entails 22 calories/kg of upper ideal body weight³¹. Simply take the calculated IBW plus 10% to obtain the upper ideal body weight as previously discussed, divide by 2.2 to convert lbs. to kg, and multiply that number by 22 calories/kg. This will provide an estimated caloric intake for the obese patient.

Example: Alfred weighs 250 pounds and stands 5’9” tall. You calculate his BMI to be 36.9, so he is considered obese (class II to be specific). His ideal body weight is 106 lbs. + (6 lbs. X 9 inches) = 160 lbs. The range for ideal body weight is ±10% of ideal body weight, so Alfred’s range is 144 lbs. - 176lbs.

- To find his daily calorie intake, simply divide upper ideal body weight
 $176 \text{ lbs} / 2.2 = 80 \text{ kg} \times 22 \text{ calories/kg} = 1,760 \text{ calories/day}$

Calculations Made Easy:

An excel sheet has been provided to calculate BMI, ideal body weight, and the amount of calories recommended per day based off the upper ideal body weight. Simply input the patients height in inches, weight in pounds, the amount inches above 5 feet, and the spreadsheet will calculate BMI, ideal body weight (for males and females), upper ideal body weight (for males and females), and recommended calories per day based on The

Academy of Nutrition & Dietetics guidelines of 22 calories/kg of upper ideal body weight.

[Excel Calculations.xlsx](#)

With the given information regarding anthropometric measurements, laboratory values, family history, and caloric calculations you should be able to successfully assess an obese individual.

Conclusion:

Now you can successfully assess an overweight/obese patient through calculating their BMI and knowing its different stages and you can properly measure their waist circumference, knowing cut-point values for disease risk. You can also calculate a patient's ideal body weight, provide weight loss statistics about improving blood pressure and blood glucose levels, know the stages and values for hypertension, type II diabetes mellitus, blood lipids-particularly triglycerides, and metabolic syndrome. Tools such as the provided excel sheet will assist you in calculating BMI, ideal body weight, and caloric regimens for weight loss, giving you an advantage when discussing weight loss with an overweight/obese patient. The amounts of disease can be significantly reduced through weight loss in the obese population, so it is our role as healthcare providers to aid with weight loss, beginning with nutrition assessment. Now that we have discussed many obesity-related diseases, you are ready to learn about obesity and its role in disease!

Obesity and Its Role in Disease Script:

My introduction:

Experience: Dr. Karen Kubena's research interests focus on impact of dietary intake, family, peers, economics and other social and lifestyle factors on health of children and adolescents. She studied magnesium extensively and has several publications due to her research. She teaches Nutritional Treatment of Diseases and Nutrition through the Lifecycle at Texas A&M University, as well as several honors classes.

Please welcome Dr. Karen Kubena, who will be presenting Obesity and Its Related Diseases.

Dr. Kubena:

Welcome to the second webinar of the Web-based Workshop where you will learn about obesity and its role in disease.

Introduce yourself as Dr. Karen Kubena, PhD, RD

Objectives:

At the end of the session you will be able to:

- Students will understand the definition of obesity and how it develops over time, as well as the function of the adipocyte.

- Students will be able to list examples of key adipokines secreted in altered levels during the state of obesity and understand why this process occurs.
- Students will be able to identify the differences between visceral and subcutaneous adipocytes and how their location is related to the development of different diseases.
- Students will understand how obesity leads to a state of systemic, chronic inflammation, and how this results in CVD, insulin resistance, metabolic syndrome, etc.
- Students will be able to identify the altered adipokines and immune function assisting the development of type II diabetes, hypertension, and endothelial dysfunction.
- Students will understand how excess adiposity contributes to CVD and certain cancers.

Development of Obesity:

The definition of obesity is over fatness.

Energy (calories) consumed exceeds energy expended.

- The development of obesity is a process in the making perhaps over several years, but large amounts of weight gain can occur in a few weeks or months. It is ultimately caused by the amount of energy consumed exceeding energy expended. For the first time in the history of the world, an overabundance of food exists in almost all countries. This, along with a lack of physical activity by so many, is a key factor instrumental in accumulation of excess body fat.
- An ingenious method of handling excess energy exists. The body stores it in the form of triglycerides in fat cells or adipocytes. We have a fairly unlimited ability to store fat in adipocytes by expanding their size or hypertrophy, as well as increasing the number through adolescence and in adulthood periods of rapid weight gain⁶³.
- Adipocytes can accept additional triglycerides until cell size reaches its maximum at which time mitosis occurs⁶³. Now two fat cells exist. In people with a lot of fat storage and in some people who have very little fat storage, eventually new fat cells, locations for fat storage, develop in areas not originally intended to contain them. These sites are in vital organs, such as the liver, pancreas, kidney, and others in the abdominal area, what is called visceral adipose tissue or VAT⁴¹.

The Adipocyte:

- Our understanding of the adipocyte has evolved tremendously over the past few years. While our body's ability to respond to a sustained level of energy excess is well developed and normal sites of fat storage can change to meet increasing need for storage at least to a point, other parts of our body may not respond well to an excess of fat cells.

- Adipocytes have been considered to be quiescent bags for storage of energy as needed for periods of low energy intake in comparison to energy needs, such as between meals or fasting, and for insulation to prevent loss of body heat through the skin and cushioning of vital organs against trauma.
- You may also think that adipocytes do not have an active role in metabolism, that is do not produce bioactive compounds. However, research has shown that the adipocyte has quite an active role that can affect function of the entire body and produces a variety of hormones and other bioactive compounds⁶³.
- Adipocytes also have the ability to undergo growth in both size (hypertrophy) and number (hyperplasia)⁶³.

Adipokines:

- Adipokines are involved in energy homeostasis, neural control of appetite, triglyceride storage, fat mobilization, and insulin sensitivity³⁵. With an excess of body fat, the amounts of adipokines and cytokines produced change. Immune cells are attracted to adipocytes, including VAT, and a host of cytokines, hormones, and other substances are released, causing physiological distress⁶².
- Leptin is one of the most well known adipokines and inhibits orexogenic cells in the hypothalamus, thus decreasing appetite. However, the obese patient develops a “leptin resistance”, eliminating leptin’s effect on the regulation of hunger³⁵.
- Adiponectin, another adipokine, is released in smaller amounts as obesity increases. The more obese an individual, the lower the levels of adiponectin. Because it enhances insulin action and acts as an anti-inflammatory agent, this is not a good thing³⁵.
- Resistin impairs insulin-mediated glucose transport and insulin action⁴⁴.
- TNF-alpha is a pro-inflammatory adipokine, which in high levels, reduces insulin secretion and signaling in muscle tissue, pancreatic cells, liver, and adipose tissue. This and IL-6 are particularly related to VAT⁴⁷.
- IL-6 is a pro-inflammatory adipokine. High levels may reduce adiponectin secretion³⁶.

Visceral Vs. Subcutaneous Adipocytes:

- Visceral adipocytes are located in the abdominal viscera and inside intra-abdominal organs, while subcutaneous adipocytes are located below the skin (sub=below and cutaneous=skin). Visceral adipocytes produce more adipokines and have more infiltration of monocytes/macrophages than adipocytes in other areas, as well as lower levels of adiponectin, all leading to a greater risk for cardiovascular complications^{41,57}.

Adipocytes in Disease:

- Inflammation has been shown to play a major role in pathogenesis of many chronic diseases, and now adipocyte mass has been identified as a key factor in

the development of several such diseases, including hypertension, type II diabetes mellitus, atherosclerosis, cardiovascular disease, and certain cancers³⁷.

- Adipokines may be the precipitating factor in the development of inflammation, as well as these disorders³⁴.

Obesity and Inflammation:

- First, let's clarify how inflammation occurs because it directly correlates to all of these obesity-related diseases. A chronic state of inflammation occurs in the obese individual because of expanding adipocyte stores, leading to insufficient vasculature and creating a hypoxic environment for the cells. An inflammatory response, including increased expression of leptin, IL-6 and TNF- α , as well as macrophage infiltration lead to increased blood flow and angiogenesis³⁶.
- As you will see, these hormones/cytokines play a role in the development of many diseases³⁶.

Obesity and Hypertension:

- Many obese individuals also have hypertension due to endothelial dysfunction, which also has a role in the progression of artery plaque build-up. With increased body size, blood volume increases in obesity because of the extra tissue to perfuse. Theoretically, increased activation of the RAAS could occur, which ultimately leads to vasoconstriction^{72,76}.

Obesity & Endothelial Dysfunction:

- The immune response of monocyte/macrophage infiltration into adipose tissue leads to systemic chronic inflammation due to secretion of pro-inflammatory cytokines including TNF- α and IL-6. These alterations in inflammatory markers leads to vascular stiffness, disrupting nitric oxide formation, which acts as a vasodilator, causing vasoconstriction.
 - Macrophage infiltration also leads to impaired insulin sensitivity over time, which directly affects the kidney to retain sodium.
- The leptin resistant state, as seen in obesity, also stimulates the sympathetic nervous system leading to further vasoconstriction.
- Many hormones and signaling pathways are altered due to macrophage infiltration in adipose tissue, all leading to the development of hypertension
- All from source⁷⁷

The Adipocyte & Diabetes:

- Research shows that the more adipocytes as seen in obesity, mainly in the form of visceral adipose tissue, causes increased macrophage infiltration and inflammation, thus leading to³⁷:
 - Increased leptin, leading to “leptin resistance”
 - Decreased adiponectin
 - Increased resistin

- These dysregulated levels contribute to:
 - Insulin resistance
 - T2DM

Adipokines & Diabetes: Leptin & Resistin:

- The adipocyte secretes the hormone leptin, which inhibits cells in the brain that stimulate food intake, that is suppresses appetite. This results in improved peripheral insulin sensitivity and pancreatic beta cell function. Obese individuals have high levels of leptin due to hyperinsulinemia, and develop what is now called “leptin resistance” resulting in overeating due to a lack an appetite-suppressing cue⁵¹.
- Leptin resistance leads to impaired pancreatic beta-cell function and accumulation of TGs in the liver and skeletal muscles, which leads to insulin resistance⁵¹.
- Resistin is secreted mainly from infiltrating monocytes in adipocytes, particularly visceral adipose tissue. Studies have shown a direct correlation between increased levels of insulin, glucose, and lipids, and increased circulating resistin. Resistin has been found to impair insulin suppression of liver gluconeogenesis, thus leading to more glucose released from the liver into the blood, contributing to insulin resistance and T2DM⁶².

Adipokines & Diabetes: Adiponectin:

- It has been found that there are low circulating adiponectin levels in the obese state, which contributes to insulin resistance and T2DM⁵⁶. Normally, adiponectin stimulates insulin secretion, glucose uptake in skeletal muscle, fatty acid oxidation in liver and skeletal muscle, and suppresses gluconeogenesis. Reduced adiponectin in obese individuals also exhibit reduced adiponectin receptors, thus contributing to type II diabetes⁶².

Immune Dysregulation & Diabetes:

These altered levels, stemming from excess visceral adipose tissue, contribute to Type II Diabetes.

- Pro-inflammatory cytokines, mainly produced from macrophages, are directly correlated with resistin levels, leptin levels, and overall insulin resistance leading to T2DM⁶².
- Such immune dysregulation is due to the massive amounts of macrophage infiltration into visceral adipose tissue, contributing to the development of a pro-inflammatory milieu associated with insulin resistance⁵¹.
- This chart shows that macrophages are the major source of TNF-alpha produced by visceral adipose tissue and contributes to approximately 50% of adipose tissue-derived IL-6³⁶.

- High levels of IL-6 are correlated with insulin resistance due to decreased adiponectin levels, as well as increased resistin and plasma glucose leading to insulin resistance³⁶.
- TFN-alpha shows similar findings with increased resistin levels, leptin, and insulin resistance, as well as decreased adiponectin⁶².

The Adipocyte & Cardiovascular Disease:

- Some of the major risk factors for atherosclerosis include: HTN, T2DM, & obesity, especially visceral adipose tissue.
- Many factors contribute to endothelial dysfunction including obesity-related insulin resistance, inflammation from adipokines, increased free fatty acids (FFAs) from lipolysis due to an inability to transport glucose into the cell to use for energy³⁹. The higher the levels of free fatty acids, the more likely some will lead to oxidized lipoproteins and contribute to endothelial dysfunction. As time progresses, injury to the blood vessel wall leads to the infiltration of monocytes differentiating into macrophages, lymphocytes, mast cells, and oxidized LDL, which lead to the classic plaque buildup in atherosclerosis⁷³.

Obesity & Cancer:

- The anabolic environment in obesity is perfect for growing pre-neoplastic and neoplastic cells, with the abundance of glucose (in hyperglycemia) acting as a growth factor enhancing proliferation, inhibiting apoptosis, and leading to tumorigenesis^{65,71}.
 - Cancer cells main source of energy is glucose⁷⁷.
- TNF-a and IL-6 have been found to promote multiple cancers and initiates stromal and endothelial cell proliferation, which in a tumor cell, enhances angiogenesis and fibrosis⁶⁵.
- Chronic inflammation is linked to angiogenesis in the hypoxic adipocyte environment⁶⁵.

The Adipocyte & Cancer

- Read the content on the slide
- Sources ^{61,67, 74}

Conclusion

- Read the content on the slide
- Stay tuned for the final webinar presentation: Nutritional Recommendations to learn how to best direct the obese patient towards achievable weight loss.

Nutritional Recommendations Script:

My introduction:

Experience: Dr. Murano served as Deputy Administrator for Special Nutrition Programs of the Food and Nutrition Service (FNS) and for the U.S. Department of Agriculture (USDA). Dr. Murano was the policy-making official reporting to US secretaries and was responsible for the administration of 13 federal nutrition assistance programs.

In his work for the USDA, he focused his efforts on childhood obesity prevention, increasing fruit and vegetable consumption, food safety, increasing program access and improving program integrity. He created a food safety unit at the Food and Nutrition Service to manage all Agency food safety and bioterrorism issues. He has recently implemented the Center For Obesity Research and Program Evaluation and serves as Director at Texas A&M University. Please welcome Dr. Peter Murano, who will be presenting Nutritional Recommendations.

Dr. Murano:

Hello, and welcome to the nutritional recommendations webinar.

Introduce yourself as Dr. Peter Murano, PhD

Objectives:

- Students will know the recommendations for BMI cut-points for weight loss, as well as the comorbidities indicating weight loss should take place.
- Students will review the MyPlate government website guidelines and resources for overweight/obese patients.
- Students will learn the components and specific guidelines for the Dietary Approaches to Stop Hypertension (DASH) diet, and for the Mediterranean diet.
- Students will learn how to better present weight loss information to patients.
- Students will be able to identify the physical activity guidelines for both adults and children.
- Students will understand the best technology apps, websites, and devices to recommend to patients for weight loss.
- Students will learn the most common bariatric procedures and when to recommend surgery.
- Students will better understand the advantages to a registered dietitian referral for overweight/obese patients.

Who Needs Weight Loss?

- Weight loss is recommended to overweight individuals, classified as having a BMI ≥ 25 , with at least one risk factor or comorbidity, or to obese patients, classified as having a BMI ≥ 30 , with or without comorbidities⁵⁰.
- Comorbidities include diseases such as cancer, T2DM, HTN, coronary artery disease, congestive heart failure, stroke, and dyslipidemia⁴⁰.

- Weight loss is achieved by creating a negative energy balance by reducing caloric intake in combination with increasing energy expenditure through physical activity. It is suggested by the US Preventive Service Task Force that obese individuals with a BMI ≥ 30 should receive behavioral intervention to lose weight, which can be accomplished through the practitioner or through referrals to a registered dietitian⁵⁰.

MyPlate:

- MyPlate is a federal food icon to help consumers understand the balance of food groups leading to healthier eating habits. The plate icon is intended to help people understand the portions of vegetables, fruits, proteins, grains, and low-fat dairy to include in a balanced meal.
- Clicking this link will take you to the MyPlate website where there is a plethora of information to help you provide recommendations to overweight/obese patients regarding eating healthier, increasing physical activity, and feasible strategies to incorporate these approaches into a busy life schedule. Let's click on this link to explore some of the most noteworthy aspects of this website
- (Click on the hyperlink and Go to "MyPlate" tab at the top)
 - (Click on, for example, protein foods)
 - MyPlate provides information for each section of the plate icon, and answers questions such as: What's in this group? How much is needed? What counts as an ounce? MyPlate is a credible resource to present to your patients for nutrition/physical activity advice.
 - (Exit out of website and return to PowerPoint)
- It is important to note that MyPlate bases food intake off a 2,000-calorie/day diet, which may not be accurate for your patient. It is suggested that you calculate a specific caloric intake for each patient based off the Hamwi equation you previously learned about to better predict a daily allotment of calories.

MyPlate:

- If you browse the MyPlate website, you will find helpful resources to reference patients to. Many patients will state, "I don't know how to eat healthy", or "I don't have time to exercise". Direct their attention to this page to help them understand the proper foods, amounts of foods they should be eating, and nutrition education tips including: incorporating more daily fruits/veggies, eating on a budget, making healthier holiday choices, etc. The link "Tips for Increasing Physical Activity" makes realistic recommendations for at home, at work, and at play.
- MyPlate also offers printable brochures and tip sheets, which are provided on the web-based workshop website under "Other Resources". Focus group feedback evidenced that including printable documents to physicians would be an effective strategy to incorporate nutrition education not only to the patient, but also to the physician in providing recommendations.

Dietary Approaches to Stop Hypertension (DASH Diet):

- The DASH diet is a well-researched diet not only to reduce blood pressure, but also for weight-loss and improvement of blood lipid profiles. The DASH diet emphasizes increased intakes of vegetables, fruits, and low-fat dairy. It also includes moderate consumption of whole grains, fish, poultry, beans, seeds, nuts, and vegetable oils. These recommendations contribute to a higher intake of calcium, magnesium, fiber, protein, and blood-pressure reducing potassium directly through the increased consumption of the previous foods. The DASH eating plan limits sodium, sweets, red meats, sugary beverages, and calories, which ultimately leads to weight loss, reduced blood pressure, and an improved lipid profile⁵⁵.
- The sodium restrictions for the DASH eating plan recommend⁵⁵:
 - $\leq 2,300$ mg of sodium per day to reduce blood pressure and
 - 1,500 mg/day for the following populations:
 - People who already have high blood pressure
 - People who have diabetes or chronic kidney disease
 - African Americans
 - Adults aged 51 and older

DASH Diet, Proven Effective:

- A recent study looked at 116 subjects with metabolic syndrome, and randomized them into a weight-reduction diet, a DASH diet, or a control group with no diet change.
 - The weight-reducing diet consisted of 500 calories fewer than their calculated caloric needs, with a lower content of calcium, dairy, nuts, and legumes as well as more consumption of red meat, fat, saturated fat, cholesterol, and sweets than the DASH diet.
 - The DASH diet consisted of the same 500 calorie calculated deficit, but with increased fruit, vegetables, low-fat dairy, and whole grains, as well as lower saturated fat, cholesterol, refined grains, red meat, and sweets.
 - The subjects in the DASH diet resulted in an overall weight reduction, improved metabolic risks, improved blood lipids, blood pressure, and fasting blood glucose. Though the weight-reduction diet subjects also lost weight, they did not lose as much nor did they have as dramatic of reductions in their blood lipid profile or blood pressure.
 - This proves that the difference in reducing meat intake, while increasing low-fat dairy, vegetables, fruit, whole-grain cereal, and legumes in the DASH diet produces a more favorable outcome.
 - All from source²⁸

Improving Blood Pressure: No Medication Required:

- (Read the statistics provided)
- Source²⁹

Mediterranean Diet:

- The Mediterranean diet is similar to the DASH diet, focusing on high intakes of vegetables, whole grains, olive oil, legumes, and fruit. It includes moderate intake of fish high in omega-3 FAs, wine, and dairy in the form of yogurt and cheese, and de-emphasizes intake of red and processed meat.
- Studies show that the higher adherence to a Mediterranean diet is inversely related to metabolic syndrome complications, with a reported improved lipid profile, lower blood pressure, decreased adiposity, and an improved insulin resistance⁶⁹. The Mediterranean diet focuses more on consumption of high omega-3 FA fish (such as salmon, anchovies, mackerel), olive oil, and moderate wine consumption, while the DASH eating plan emphasizes more low-fat dairy and sets sodium limitations.
- Both eating plans are plentiful in vegetables, fruit, whole grains, legumes, fiber, and lean protein, so diet recommendation is at the discretion of the physician and patient.

Presenting Weight Loss Information:

- It has been proven that a physician's advice to lose weight causes an individual to be more proactive in reducing calories and increasing physical activity, than without any recommendations³⁸.
- Additionally, the US Preventive Services Task Force recommends an assessment of all patients before giving advice by screening adults for a dietary and physical activity history.
- Presenting weight loss information includes providing an overweight/obese patient with specific weight loss information such as:
 - Presence of overweight or obesity-inform the patient of their state of adiposity
 - Health benefits of weight loss
 - Even losing 5-10% of your body weight can improve blood pressure, cholesterol, and blood sugar [CDC]
 - Providing specific weight loss advice
 - Advising increased physical activity and providing guidelines
 - Referral to a Registered Dietitian
 - Bariatric surgery options

-We will discuss providing specific weight loss advice, advising increased physical activity and providing guidelines, and bariatric surgery more specifically in the next few slides. **(click each time you say one of these headings because they get bigger and change color)**

Specific Weight Loss Advice:

- Losing 1-2 pounds per week can be attained by reducing caloric intake by 500 calories a day, as well as incorporating physical activity. It is acceptable to recommend at least 1,200-calorie/day diets for women to lose weight safely, which will often be in the range of calculated calories using the Hamwi method

described in the Nutrition Assessment webinar. The NHLBI does not recommend very low calorie diets less than 1,000 calories/day⁷⁰, so be mindful of your calorie recommendations.

- For men, it is acceptable to recommend at least 1,200-1,600 calories/day for weight loss⁷¹, once again more specifically determined by the Hamwi equation.
- It would be beneficial to ask a patient what a “normal day” of food intake consists of in order to recommend the inclusion of more or less of the following foods:
 - Vegetables
 - Fruits
 - Whole grains
 - Low-fat dairy
 - Legumes, nuts, or seeds
 - Less fat, saturated fat, and trans fat
 - Less sugar and highly processed food

Advising Physical Activity for Children/Adolescents:

- According to the 2008 Physical Activity Guidelines for Americans, children and adolescents should:
 - Participate in at least 60 minutes of daily physical activity
 - This includes moderate-vigorous aerobic activity with at least 3 days of vigorous intensity exercises
 - Examples of moderate PA include: brisk walking
 - Examples of vigorous include: jogging or running
 - Participate in muscle-strengthening PA as a part of their daily 60 minutes at least 3 days per week.
 - These exercises include resistance training/weight lifting
 - Examples include playground equipment, tug-of-war, and climbing trees
 - Participate in bone-strengthening PA as a part of their daily 60 minutes at least 3 days per week
 - Weight-bearing exercising include: running, fast walking, jumping rope, hopscotch, and basketball/other sports

Advising Physical Activity for Adults:

- According to the 2008 Physical Activity Guidelines for Americans, adults should:
 - Participate in at least 150 minutes/week of moderate intensity aerobic PA or at least 75 minutes/week of vigorous PA
 - Examples of moderate-intensity physical activity include brisk walking, water aerobics, slow bicycling, and gardening.
 - Examples of high-intensity physical activity include fast walking, jogging, or running, swimming laps, singles tennis, fast bicycling, jumping rope, etc.

- Participate in at least two days/week of moderate or high intensity muscle-strengthening PA
 - Muscle-strengthening activities include resistance bands, push-ups, sit-ups, carrying heavy loads and heavy gardening.

According to the National Health Interview Survey (NHIS 1998-2007), 40.7% of the U.S. reported no physical activity outside of their work.

Physical inactivity correlates to higher risks of depression, cancer, lower obesity, lower risk of developing T2DM and metabolic syndrome, and decreased HTN, to name a few. This statistic helps to explain the obesity epidemic we see today, so it is essential to prescribe physical activity to your patients²⁹.

There's an App for That:

- Discuss downloading an app on a smartphone, using a website to track calories, and or using a fitness device daily to help keep your patients accountable in the process of weight loss⁵².
- Examples include:
 - USDA Supertracker website
 - Myfitnesspal app
 - Fit bit wristband
 - Weightwatchers online
- Though they are not foolproof, these websites/apps/fitness trackers are great methods to bring daily caloric intake and energy expenditure to your patients' attention.

Bariatric Surgery: The Last Resort

- Sometimes the task of losing weight is so daunting to the morbidly obese patient that bariatric surgery can be considered. A surgical recommendation is only suggested for adults with the above requirements:
- (Read them from the slide)
- Note that bariatric surgery should only be considered as a last resort and not to a patient who has never tried to lose weight via exercise and proper nutrition. It also should not be suggested for a patient who has absolutely no will to lose weight, or for the emotionally unstable patient because this can lead to severe post-surgery emotions. Certain procedures can lead to various nutrient deficiencies due to lack of absorption, and there is always the possibility of weight re-gain post-surgery, so referral to a dietitian is a way to attempt weight loss via diet and physical activity before recommending surgery²⁶.

Main Bariatric Procedures:

- Adjustable Gastric Band
 - An inflatable band is inserted around the upper portion of the stomach, thus creating a small pouch above the band, with the remaining stomach

below the band. This satisfies hunger with eating small portions of food due to a reduction in size.

- Sleeve Gastrectomy
 - Removal of 80% of the stomach with the remaining stomach in a tubular pouch, thus holding a small volume at a time. Seems to be effective in improving T2DM independent of subsequent weight loss.
- Gastric Bypass (Roux-en-Y)
 - Most commonly performed: a small stomach pouch is created by division of the top of the stomach, which is then attached to the bottom end of the small intestine. The top portion of the small intestine is then attached to the small intestine further down to allow digestive enzymes and stomach acids from the bypassed stomach and first portion of the small intestine to eventually mix with the food.
- Biliopancreatic Diversion with Duodenal Switch (BPD/DS)
 - Removal of a portion of the stomach to create a smaller, tubular stomach pouch (similar to sleeve gastrectomy), as well as bypass of a large portion of the small intestine.
- American Society for Metabolic and Bariatric Surgery website to discuss each procedure in more detail:
- <https://asmbs.org/patients/bariatric-surgery-procedures>²⁶

Dietitian Referral:

- Medical Nutrition Therapy (MNT)
 - Provided by a Registered Dietitian
 - Covered by Medicare
 - Beneficiaries w/ T2DM, renal insufficiency/ESRD, or post-kidney transplant
 - Covered by many private insurance companies
 - [Academy of Nutrition and Dietetics]
- Registered Dietitians can:
 - Spend more time with the patient
 - Create a diet plan with the patient
 - Monitor the patient over time
 - Discuss nutritional recommendations
- Here is an example of a physician referral for MNT from a registered dietitian from the Academy of Nutrition and Dietetics. Overall, a RD is able to provide more detailed dietary suggestions to patients as well as provide specific foods to incorporate or remove from a patients' diet

Conclusion:

- ❖ MyPlate accessories for educational purposes
- ❖ DASH diet for reducing hypertension and weight loss
- ❖ Mediterranean diet for weight loss, improving blood lipid profile, and decreasing insulin resistance

- ❖ Presenting weight loss advice including strategies for 1-2 lbs. weight loss per week
- ❖ Physical activity recommendations for children and adults
- ❖ Bariatric surgery as a last resort
- ❖ When to refer a patient to a dietitian

Thank You!

Thank you for participating in the web-based workshop webinar series. We hope you learned new and useful information regarding the assessment, biology, and treatment of overweight/obese patients to assist you in any field of medicine. With the prevalence of obesity in current society, it is essential to have these nutrition skills in attempts to reduce obesity and its related diseases.