5-2018

Evaluating the Effectiveness of Incorporating Nutrition Education and Counseling Services into a Diverse, Low-Income Community Health Center

Rebecca Marie King
Winthrop University, kingbecca11@gmail.com

EVALUATING THE EFFECTIVENESS OF INCORPORATING NUTRITION EDUCATION AND COUNSELING SERVICES INTO A DIVERSE, LOW-INCOME COMMUNITY HEALTH CENTER

A Thesis

Presented to the Faculty

Of the

College of Arts and Sciences

In Partial Fulfillment

Of the Requirement for the Degree

Of

Master of Science

In Human Nutrition

Winthrop University

May, 2018

By

Rebecca Marie King

ABSTRACT

Suboptimal nutrition has been identified as the leading behavioral risk factor of morbidity and mortality from chronic diseases in the United States, yet approximately ten percent of all primary care visits included nutrition counseling by physicians in 2014 (Marczak, O'Rourke, & Shepard, 2016; GBD 2013 Risk Factor Collaborators, 2015; Rui, Hing, & Okeyode, 2015). The integration of registered dietitians into the primary care setting may serve as a potential solution to increasing the rates of delivery for nutrition counseling and improve patient outcomes. The objective of this study was to examine the incorporation and impact of a three-month nutrition education and counseling pilot program at a Community Health Center (CHC) in serving urban and rural populations in South Carolina. A retrospective chart review of the paper outpatient nutrition chart and electronic medical record (EMR) were conducted to assess the overall success of the 3-month pilot program and determine areas of improvement. Additionally, the medical providers at the CHC were surveyed to examine perceptions and satisfaction regarding the current practices related to nutrition counseling, perceived barriers to nutrition counseling, and the program and its delivery was conducted. A total of 93 patients were referred to the program with 53.8% (n=50) utilizing the services. Although there were no statistically significant changes for weight, body mass index (BMI), or hemoglobin A1c, downward trends were observed. Fisher's exact tests indicated a significant association between number of visits and dyslipidemia/hyperlipidemia referrals (P=0.002) and between number of visits and age (P=0.0012). Patients without a referral for dyslipidemia were more likely to attend a single visit. In contrast, patients with a referral for

dyslipidemia were more likely to attend multiple visits. Patients below the age of fifty years old were more likely to attend a single visit compared to adults above fifty years old (91.3% vs. 59.3%, respectively) (P=0.0012). Despite accounting for financial barriers to nutrition services, 46.2% of referred patients were never seen during the pilot program. Communication was the primary reasons these patients were never seen. Medical providers reported high satisfaction with the incorporation of nutrition services into their clinic. Future research is needed to determine intervention strategies that address both financial and nonfinancial barriers (e.g. cost, transportation, and communication) to integrating nutrition counseling and education into CHC and determine the influence of increased access to services on health outcomes. Interventions that integrate

ACKNOWLEDGEMENTS

Completion of this study would not have been possible without the support many people. The author would like to thank everyone who dedicated time to assist in conducting this research as well as the patients, administrators and staff at North Central Family Medical Center who allowed the author to conduct this research.

The author would like to thank committee members Dr. Duha Hamed and Dr. Danielle Nunnery for allocating their time and wealth of expertise. The author would also like to express wholehearted gratitude to Dr. Lauren R. Sastre, thesis advisor, for inspiring the author to pursue research, her unwavering support and guidance throughout this process, and for sharing the same passion for this project as the author.

Finally, the author would like to thank my family: Jim, Patty, and Allyson, for their endless support, encouragement, and love. This accomplishment would not have been possible without them.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Problem Statement

Health care in the United States (US) is the most expensive in the world with $2.7 trillion in annual costs (Jortberg & Fleming, 2014; CDC National Center for Chronic Disease Prevention and Health Promotion, 2016). Individuals with one or more chronic conditions account for eighty-six percent of health care spending (Gerteis et al., 2014, p.2). The annual cost of medical treatment, impaired quality of life, and increased risk of other morbidities for obese adults is approximately $147 billion (Slawson, Fitzgerald, & Morgan, 2013). Obesity and chronic disease not only create an economic burden, but also negatively impact an individual's health and longevity. For example, the Center for Disease Control and Prevention (CDC) reports 7 in 10 American deaths each year can be attributed to chronic diseases (CDC, 2015).

Although the current literature does not support a single uniform definition for chronic disease, the definitions used by peer-reviewed literature and other public information sources agree on their non-contagious nature, inability to cure, need for medical attention, duration or latency, effect on function, pathology, decline in well-being, and multiple risk factors (Goodman et al., 2013). Conditions commonly categorized as chronic disease states in the United States includes cardiovascular disease (CVD), type II diabetes, and certain types of cancer (CDC, 2017). Obesity has been strongly associated with chronic disease conditions and in 2012, approximately seventy percent of U.S. adults were overweight or obese and approximately half (117 million) have at least one chronic condition (Raynor & Champagne, 2016; Ward & Schiller,

2014). Obesity is defined by the Centers for Disease Control and Prevention as "weight that is higher than what is considered as a healthy weight for a given height" (Division of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion, 2016, para. 1).

To combat this public health crisis, efforts have been made on the policy level aimed at reducing the prevalence of obesity and weight-related chronic disease. The U.S. Preventive Task Force's (USPSTF) Published Recommendations for primary care includes three recommendations focusing on the screening and counseling of adult patients regarding weight, healthful diet, and physical activity (Published Recommendations, 2017). Additionally, Healthy People 2020 has established three objectives aimed at increasing the proportion of adult primary care visits that include: 1) assessment of patient's body mass index (BMI), 2) nutrition counseling or education for patients diagnosed with CVD, diabetes, or hyperlipidemia, and 3) weight reduction, nutrition, or physical activity counseling for patients who are obese (Healthy People 2020 Objectives).

Healthy People 2020 objectives and USPSTF recommendations suggest a need to improve the delivery and use of preventive services by primary care physicians. A primary care practice is defined by the American Academy of Family Physicians as "the patient's first point of entry into the health care system and as the continuing focal point for all needed health services" (American Academy of Family Physicians, 2018, para. 5). Therefore, interventions targeting the primary care setting are crucial to increase the rates of delivery for preventive services in order to reduce the prevalence of obesity and chronic disease.

Prevention strategies within primary care are the most affordable and effective method to prevent chronic diseases (Slawson, Fitzgerald, & Morgan, 2013). Prevention strategies are classified by level (primary, secondary, tertiary). Primary prevention strategies target the promotion of health and protection from exposure to risk factors that cause both infectious and chronic diseases (Owen, Splett, & Owen, 1999). This level of prevention has been shown to improve longevity and quality of life as well as delay health care costs (Slawson, Fitzgerald, Morgan, 2013). Nutrition education and counseling can assist in the promotion of healthy behaviors in order to prevent lifestyle risk factors (e.g. obesity, suboptimal dietary intake patterns) (Slawson, Fitzgerald, & Morgan, 2013). Secondary prevention focuses on "early detection and prompt intervention" of diseases (Slawson, Fitzgerald, & Morgan, 2013). Tertiary prevention is strategies that aim to assist in disease management to reduce complications, improve the quality of life, and extend years of productivity for people diagnosed with a disease (Owen, Splett, & Owen, 1999). Dietitian-led nutrition interventions at both the secondary and tertiary prevention levels have been shown to improve clinical outcomes and cost-effective for patients with obesity, diabetes, and dyslipidemia (Slawson, Fitzgerald, & Morgan, 2013). Registered dietitians (RDs) are the most qualified health professionals to provide nutrition education and counseling. RDs complete a Didactic Program in Dietetics (DPD), which awards at least a bachelor's degree, and an ACEND-accredited Dietetic Internship Program (DPD Graduates, 2018).

Suboptimal nutrition has been identified as the leading behavioral risk factor of morbidity and mortality from chronic diseases in the United States, yet approximately ten percent of all primary care visits included nutrition counseling by physicians in 2014

(Marczak, O'Rourke, & Shepard, 2016; GBD 2013 Risk Factor Collaborators, 2015; Rui, Hing, & Okeyode, 2015). There is a discrepancy between recommendations for primary care and chronic disease prevention. The incorporation of nutrition education and counseling services by a qualified health care professional (e.g. registered dietitian) may assist in supporting these recommendations for primary care and prevention of chronic disease while also addressing changes in the focus of health care in recent policy changes (e.g. Affordable Care Act). In 2009, the Affordable Care Act was passed. One of the main goals of the Affordable Care Act was to transform health care delivery models to achieve the triple aim of providing quality care, reducing costs, and improving the experience of care (Jortberg & Fleming, 2014). Transitioning from traditional primary health care delivery to a multidisciplinary, team-based approach has gained attention as a possible strategy to achieve the triple aim, but it is rarely implemented in U.S. primary care practices.

In summary, the costs of chronic disease in the US and the need to improve and expand preventive services strongly supports the examination of current incorporation of weight management practices and lifestyle counseling (e.g. nutrition, physical activity) within primary care by physicians as well as multi-disciplinary practices incorporating registered dietitians in primary care, and/or referral to a registered dietitian.

Purpose Statement

The purpose of this study was to evaluate the effectiveness of a 3-month pilot program that integrated nutrition counseling and education into a Community Health Center in South Carolina using a retrospective chart review.

CHAPTER II

LITERATURE REVIEW

Nutrition Education in Medical Schools

Despite the established role nutrition plays in health and disease, U.S. medical school curricula does not provide adequate nutrition instruction to prepare future physicians to effectively care for patients with nutrition-related health problems. In 1985, a landmark report by the National Academy of Science recommended that medical schools provide a minimum of twenty-five hours of nutrition education (Adams, Kohlmeier, Zeisel, 2010). Since the publishing of this report, efforts have been increased by medical schools to expand emphasis of nutrition instruction in the curricula.

A cross-sectional study of U.S. medical schools by Adams, Kohlmeier, & Zeisel (2010) evaluated their response to this 1985 report and the adequacy of nutrition instruction by medical schools. Out of the 105 medical schools surveyed only twenty-eight (27%) reported meeting the minimum 25 hours of nutrition education. While the majority (94%) of U.S. medical schools reported offering some form of nutrition instruction, only 25% of the U.S. medical schools required a course dedicated to nutrition. Most of the required nutrition instruction (80%) in medical school curricula is integrated into other courses or outside learning environments instead of a dedicated nutrition course. Integrating nutrition instruction into other courses or learning environments is problematic because detracts from its emphasis as a core component of medical practice. Researchers also found that from 2004 to 2009 the average number of contact hours of nutrition instruction medical students received actually declined from 22.3 hours to 19.6 hours. Not only is there not enough time devoted to nutrition training

and educating in medical school, but also much of this exposure occurs in the first two years of medical school before clinical rotations. Based on the results from this survey, researchers concluded that nutrition instruction by medical schools continues to be inadequate.

Other studies have assessed residents in primary care programs training to prepare them to provide nutrition counseling (Smith, Seeholzer, Gullert, Jackson, Antognoli, Krejci, Flocke, 2015; Han, Auer, Cornuz, & Marques-Vidal, 2016). Participants (n=216) were recruited from 25 Ohio family medicine, internal medicine, and obstetrics and gynecology (ob-gyn) residency programs to complete a survey assessing their knowledge, attitudes, and self-efficacy regarding obesity, nutrition, and physical activity (ONPA) counseling. Demographic and training information was also collected to examine associations with ONPA scores.

Respondents answered on average fifty percent of the knowledge items incorrectly. Residents who reported being U.S. citizens and graduates of U.S. medical schools scored significantly higher on the knowledge items, but also had significantly less positive attitude regarding ONPA counseling. A wide range of scores were observed for attitudes, self-efficacy, and professional norms, but on average remained low. The mean counseling self-efficacy scores differed by age, location of medical school, and specialty. Females and U.S.-trained residents had significantly lower self-efficacy. Compared to family medicine residents, internal medicine and ob-gyn residents reported significantly lower self-efficacy. Self-efficacy was significantly higher in residents who had ambulatory experience. Participating in an elective course in ONPA was associated with higher self-efficacy, more positive attitude and professional norms. These results

indicate primary care residents do not feel confident in their ability to do ONPA counseling and have limited knowledge on obesity counseling guidelines and techniques.

In a cross-sectional study, Han, Auer, Cornuz, and Marques-Vidal (2016) assessed the attitudes, self-perceived proficiency, knowledge, and previous training regarding clinical nutrition of resident physicians (n=44) from Switzerland. Lack of time and lack of training (84% and 71%, respectively) were the two most frequently cited barriers to nutrition counseling in primary care. Of the surveyed 44 surveyed residents, only fourteen (33%) stated they had prior exposure or education in clinical nutrition in medical school. Although this study used a small sample size and conducted in Switzerland, it denotes the lack of emphasis on nutrition in medical school curricula on a global scale.

Barriers to Nutrition Counseling by Primary Care Physicians

The overall lack of nutrition focused curriculum and training during medical school could possible lead to the reported limited provision of nutrition services in preventative (primary, secondary and/or tertiary) primary care by physicians. In 2014, nutrition counseling was reported to be provided by physicians approximately ten percent of all primary care visits and counseling on weight reduction was provided at only two percent of all primary care visits (Rui, Hing, & Okeyode, 2015). Several studies of primary care physicians have been conducted to identify the barriers limiting the delivery of nutrition counseling in primary care (Kushner, 1995; Smith et al., 2015; Steeves, Lui, Willis, Lee, and Smith, 2015).

A study by Kushner (1995) evaluated physicians' attitudes, practice behaviors and barriers to nutrition counseling. A nationally representative sample of U.S. primary care

physicians (n=1,030) completed a survey regarding: 1) demographic data, 2) previous nutrition education and current nutrition resources, 3) current provision of nutrition services by physician and staff, 4) perceived barriers and opinions regarding nutrition counseling, and 5) attitudes regarding interest and effectiveness of six strategies to improve nutrition counseling (Kushner, 1995). A five-point Likert scale was used to determine level of agreement for ten statements about perceived barriers and opinions. The National Opinion Research Center at Chicago University assisted in the development of the survey, which was pretested with a focus group of six physicians.

From the sample (n=1,030), fifty-eight percent reported having previous nutrition training. Age was identified as a significant determinant for both previous nutrition training and where previous nutrition training occurred. More physicians under the age of forty-five reported having training (64%) and receiving training during residency (57%) compared to older physicians (49%, 43%, respectively). Sixty-nine percent of physicians reported providing nutrition counseling to forty percent or less of patients in a month and sixty-eight percent reported spending five or less minutes discussing dietary changes. The amount of time spent counseling patients and the percent of patients counseled was significantly associated with source of nutrition information. Nutrition journals and nutrition texts were more likely to be used when physicians spent more than eight minutes counseling patients or more than sixty percent of patients were provided counseling in a month. Lack of time (75%) was identified as the most common barrier to providing nutrition counseling, followed by lack of patient compliance (71%), inadequate material (69%), lack of training in counseling skills (67%), deficit in knowledge of nutrition (62%), lack of adequate reimbursement (61%), and confidence in ability to

counsel patients about diets (50%). Despite these barriers and low levels of nutrition counseling (both time spent counseling and percentage of patients being counseled) observed, seventy-nine percent of the physicians surveyed place a high priority on nutrition counseling and seventy-two percent of respondents believe nutrition counseling is the responsibility of the physician. Additionally, physicians indicated support for more time to provide nutrition counseling and referring more patients to registered dietitians. In sum, this study suggests that even though physicians highly value nutrition counseling there are multiple barriers that need to be addressed in order to increase the rate of delivery for nutrition counseling in the primary care setting.

As the prevalence of chronic diseases continues to increase, primary care physicians are tasked with creating more time to provide preventive services. A study by Yarnall, Pollack, Ostbye, Krause, & Michener (2003), sought to determine the number of hours needed to provide all services recommended by the USPSTF using a 2,500 patient panel representative of the U.S. population. Researchers used published and estimated times for each recommended service to determine how much time would be needed to provide them at the recommended frequency and compared the results to annual number of hours available for patient care. The results found that physicians would need to devote 1773 work hours per year or 7.4 hours per working day to meet the USPSTF recommendations. Physicians would need to spend 22.1 hours per year in order to meet the recommendations regarding counseling to limit fat and cholesterol and general diet for adult patients (≥25 years). Since physicians spend 2055 hours annually providing patient care, it is unrealistic to expect eighty-six percent be devoted to preventive services. Although this study used conservative estimates, it demonstrates that time

constraints are a significant barrier for primary care physicians in the provision of preventive services recommended by the USPSTF.

Another study by Yarnell, Ostbye, Krause, Pollak, Gradison, and Michener (2009) evaluated time allocation for different types of services (preventive, acute, chronic care) by primary care physicians. The results were compared to published estimates of the time required to fulfill the recommendations for both preventive service delivery and chronic care management, while still meeting acute care needs. Data from the National Ambulatory Medical Care Survey for 2003 were used to calculate family physicians' time distribution for each type of service (acute, chronic, preventive care).

The results found that nearly half of all visits were for acute care and took the shortest amount of time to complete with more than one-third of visits were for chronic care and almost fifteen percent of visits were for preventive services. Family physicians' spent an average of 3.7 hours per day in acute care, 3.0 hours per day in chronic care, and 1.3 hours per day performing preventive services. The amount of time necessary each day to meet the national guidelines for acute care, chronic care, and preventive services are 3.7, 10.6, and 7.4 hours per day, respectively. The total time needed to fulfill the recommendations all three types of services is 21.7 hours per day. In sum, physicians need approximately three times the amount of clinical time available each day to provide all the recommended services. Since it would be unrealistic to expect primary care physicians to work nearly twenty-two hour workdays, researchers support the development of primary care teams to ensure the delivery of preventive services. These teams could include other health professionals such nurse practitioners, registered dietitians, and health educators to ensure patients are receiving these services.

Physicians' Attitudes and Current Practices Regarding Nutrition Counseling

Primary care physicians are an important and trusted resource for patients. In a study by Litaker, Flocke, Frolkis, & Stange (2005), the association between physicians' attitudes regarding preventive services and their efficacy in delivering them were evaluated and compared to factors that might influence the delivery of preventive services. Five preventive services, including diet advice, were selected to evaluate the proportion of eligible patients being screened by physicians based on USPSTF recommendation. Researchers found that even though the majority of physicians (84%) rated counseling on diet to maintain caloric balance as 'important/very important', only thirty-four percent of physicians perceived having high self-efficacy in delivering this service. Additionally, only ten percent of the eligible patients (n=2708) were up to date on preventative services for counseling on diet. In sum, the findings from this study show that despite physicians having positive attitudes toward preventive services, it may not be sufficient to ensure the delivery of these services.

A study by Wynn, Trudeau, Taunton, Gowans, and Scott (2010), examined the attitudes and perceived barriers to nutrition counseling and current practices using a sample of family physicians (n=451) from British Columbia. Nutrition and questionnaire design experts reviewed the 18-item mail survey before it was pilot-tested on a group of family physicians. A ten-point Likert scale was used to indicate comfort discussing three areas of nutrition with patients: 1) general nutrition, 2) nutrition for chronic diseases, and 3) special topics. A five-point Likert scale was also used for four statements to determine attitudes and current practices as well as for items regarding barriers to nutrition

counseling. Demographic data (age, sex, and practice location), training and the extent of training were also collected.

Fifty-eight percent of respondents believe that nutrition counseling would be beneficial for more than sixty percent of their patients (Wynn, Trudeau, Taunton, Gowans, Scott, 2010). In contrast, only nineteen percent of respondents reported actually providing nutrition counseling to more than sixty percent of patients. Over ninety-five percent of respondents report referring patients to dietitians, but no associations were found between the frequency of referrals and the proportion of patients physicians believe would benefit from nutrition counseling (P=.460) or the frequency of referrals and the proportion of patients participating in nutrition counseling (P=.494). Attitude scores were significantly associated with age, but not with sex or practice location. Physicians under fifty years old reported more positive attitudes toward nutrition (P=.009). Most respondents agreed that it should be the physician's responsibility to counsel patients about nutrition, nutrition is a significant factor in the prevention and progression of many chronic diseases, and nutrition counseling in primary care can be effective at changing patients' behavior. Yet, seventy-two percent of physicians also agreed with the statement 'I feel that patients want more information on nutrition than I am able to provide' and approximately eighty-two percent of respondents felt their training in medical school was inadequate. Two strong predictors of a physician's' nutrition counseling practices identified were comfort level with nutrition and physicians' attitudes. Out of the all the barriers evaluated, the two barriers to nutrition counseling most frequently selected were lack of time and compensation (Wynn, Trudeau, Taunton, Gowans, & Scott, 2010). Although this study was conducted with a sample of Canadian physicians, it

demonstrates primary care physicians perceive nutrition counseling as an effective prevention tool but barriers impede their ability to deliver nutrition counseling in the primary care setting.

A survey of U.S. primary care physicians (n=500) evaluated physicians' perspectives about: 1) the causes of obesity, 2) competency in providing treatment for obesity, 3) the most qualified health professional to assist obese patient lose or maintain weight and 4) ways to improve obesity care (Bleich, Bennett, Gudzune, Cooper, 2012). Researchers also assessed if such perspectives differed based on the number of years since the completion of medical school by stratifying the sample using a twenty-year threshold.

Respondents (n=498) most frequently identified individual behavioral factors as causes of obesity. The majority of the physicians surveyed identified lack of physical activity (99%), overeating (99%), restaurant and fast-food eating (95%), consumption of sugar sweetened beverages (SSBs) (94%), and lack of willpower (89%) as important causes of obesity. Social determinants such as restaurant or fast-food eating (99% vs 90%; $p<0.01$), lack of information on good eating habits (80% vs 69%; $p=0.03$), and lack of access to health foods (64% vs 52%; $p=0.03$) were more likely to chosen as important causes of obesity by respondents who completed medical school greater than twenty years ago. Despite most of the primary care physicians' reporting they feel competent in providing obese patients diet-related (90%) and exercise-related (92%) counseling, less than half report (44%) being 'usually successful in helping obese patients lose weight' and thirty-nine percent believe the most qualified professionals to assist obese patients are primary care physicians. Dietitians were perceived to be the most qualified health

professional to aid patients in weight loss or maintenance by forty-three percent of respondents. Respondents also indicated the need for more training and practice-based changes in order to improve obesity care. Practice-based changes to improve obesity care included: 1) adding (BMI) as the fifth vital sign (93%), 2) appropriate medical equipment in offices (92%), 3) specific diet and exercise tips on patient charts (89%), 4) scales that report BMI (85%). In sum, the results from this survey reveal that primary care physicians perceive dietitians as the most qualified professional to assist obese patients, report having limited success in assisting obese patients with weight loss or maintenance, and believe additional physician training is necessary to improve obesity care.

A study by Smith et al. (2011) evaluated the use of energy balance clinical practices in a nationally representative sample of primary care physicians to determine the characteristics of primary care physicians who regularly integrate these practices into care of adult patients with and without chronic conditions. Researchers defined energy balance clinical practice patterns as risk assessment, counseling, follow-up, and referrals (Smith et al., 2011). The AMA Masterfile was used to generate a systematic stratified sample of PCPs from three specialties (family practice, internal medicine, and obstetrics/gynecology). Participants who completed mail-survey were under the age of seventy-five, had an active medical license, and work a minimum of twenty hours a week. The *National Survey of Energy Balance Related Care among Primary Care Physicians* (EB-PCP) was used in this study and developed by the National Cancer Institute of the National Institute of Health with cosponsorship from the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, National Institute on Diabetes and Digestive and Kidney Diseases, the NIH Office of Behavioral and Social

Sciences Research, and the CDC. The survey contained three questionnaires: two versions of a physician questionnaire (one version adult, one for pediatrics) and one questionnaire regarding physician's practice environment. The main outcomes from this survey included PCPs' assessment, counseling, referrals, tracking, and follow-up of diet, physical activity, or weight control and use of referrals for pharmacological and surgical treatments for overweight and obesity in adult patients with and without chronic conditions. The AMA Masterfile also provided PCPs background characteristics such as specialty, years since completing medical school, census region, and board certification.

The sample (n=1211) had a mean age of forty-nine years and the most respondents were non-Hispanic males (Smith et al., 2011). Female physicians were found to be more likely than male physicians to provide all patients general counseling or specific guidance on diet and to refer patients with chronic disease for further evaluation and management. Less than half of the respondents reported regularly recording BMI and always providing specific guidance on diet, physical activity and weight to patients. Additionally, twenty-two percent of primary care physicians reported always systematically tracking their patients' weight and weight-related behaviors over time. Despite PCPs rarely using standardized questionnaires to provide a detailed measurement of physical activity or diet or regularly conducting assessment of waist or hip circumferences, the prevalence of ever using pharmacological treatments for weight control (71.2%) and ever-referring patients for weight loss surgery (86.0%) was high. In sum, this study was one of the first to collect nationally representative data detailing energy balance clinical practices of U.S. physicians. The results from this study indicate

that despite the high prevalence of overweight and obesity in U.S. adults PCPs are not frequently implementing energy balance clinical practices to address the problem.

In a study by Steeves, Lui, Willis, Lee, Wilder, and Smith (2015), U.S. physicians' personal beliefs about weight-related care and their influence on care delivery were assessed using the previously described EB-PCP survey. A five-point Likert scale was used to assess personal beliefs regarding: 1) responsibility to promote weight management, 2) impact of PCP counseling, 3) effectiveness of strategies aid patients, 4) self-efficacy to counsel patients, 5) effectiveness in weight management, 6) need to be a role model, and 7) whether personal weight-related behaviors influenced credibility. Weight-related clinical care practice items were used to examine associations with care delivery. Unlike the previous study, this study also included physicians who deliver pediatric care.

From sample (n=2022), ninety-seven percent reported the promotion of weight-related care a responsibility of primary care physicians (Steeves, Lui, Willis, Lee, Wilder, & Smith, 2015). Yet, over half of respondents reported concerns about their effectiveness to aid patients, sixty-three percent reported lacking effective strategies for weight-related care and less than eighty percent reported self-efficacy in counseling. Physicians who were female or Asian American, located in the Midwest or South, and practiced internal medicine were all more likely to have report stronger positive beliefs about weight-related care. Physicians personal beliefs were associated with the delivery of weight-related care, but assessment of BMI and referrals for further evaluation and management were not significantly associated with PCP beliefs. Stronger personal beliefs were found to be positively associated with clinical practices. In sum, the findings from this study

add to the body of research that primary care physicians' personal beliefs about weight-related care influence its delivery and may be a major barrier to adopting these practices.

Integrating Registered Dietitians into Primary Care

Dietetic Interventions in Primary Care

A fundamental transformation in health care delivery is needed to address 21.7 hours per day a physician would need to comply with the national clinical care guidelines for preventive services and chronic disease management (Yarnell, Ostbye, Krause, Pollak, Gradison, & Michener, 2009). Shifting some of these responsibilities to other qualified health care professionals such as nurse practitioners, registered dietitians, and health educators to create primary care teams could be a potential solution. Medical nutrition therapy, or nutrition education and counseling provided by an RD, has been shown to lead to improved clinical outcomes, enhanced quality of life, reduced health care spending by patients with obesity, type II diabetes, and dyslipidemia, but it is not widely accessible in the primary care setting (Slawson, Fitzgerald, & Morgan, 2013).

In a prospective randomized control trial, Huang, Hsu, Wang, & Shin (2010) assessed the effectiveness of diabetes self-management education (DSME) led by a dietitian in a primary care clinic in Taiwan on glycemic control and macronutrient intake. Researchers also investigated the association between changing macronutrient intake and glycemic measures. Adult patients with type II diabetes mellitus (n=154) were randomly assigned to two groups. Over the twelve-month period, the control group (n=75) received routine care and the intervention group (n=79) received on-site diabetes self-management education every three months. Anthropometric measurements, clinical laboratory measurements (hemoglobin A1c, lipid profile, fasting plasma glucose, uric acid,

creatinine, and high-sensitivity C-reactive protein), and a questionnaire about demographics and dietary habits were collected at baseline and at one year.

Researchers found that individuals in the intervention group (n=56) with poorly controlled hemoglobin A1c (≥7%) benefited from having dietitian-led DSME on-site at the primary care clinic (Huang, Hsu, Wang, & Shin, 2010). Participants with poorly controlled diabetes in intervention group showed significantly greater reductions in mean hemoglobin A1c (0.7%) compared to participants with the control group (0.2%) (*P*=0.034). At the end of the twelve-month intervention, the mean fasting glucose plasma was increased in the control group (16.9±63.6), while the intervention group's mean fasting glucose plasma was reduced (-13.4± 55.2) (*P*=0.007). The dietitian-led DSME resulted in a mean decrease of 229±309.16 kcal/day in overall energy intake, while the control had a mean increase of 56.10±309.41 kcal/day (*P*<0.001). Saturated fat intake in the intervention group was also significantly reduced compared to the control (-0.98± 3.40 vs. +0.60± 2.93, *P*=0.01). After adjusting for confounding variables, researchers found an independent association between changes to carbohydrate intake and improvements in hemoglobin A1c. This finding reiterates the necessity of educating diabetic patients regarding carbohydrate counting. Although this study was conducted in a country with different demographics than the U.S., it demonstrates that dietitian-led DSME programs in a primary care setting are effective for improving glycemic control and dietary habits of patients with uncontrolled type II diabetes.

One counseling approach dietitians are trained to use it motivational interviewing (MI). In a recent randomized control trial (RCT), Resnicow, McMaster, Bobian, et al. (2015) examined the efficacy of PCP and RDs using MI-based counseling with parents of

overweight children aged 2-8 years. Researchers measured child BMI percentile at baseline, and at the 1-year and 2-year follow-ups to determine the impact of MI counseling on adiposity. The 42 practices with 645 pediatric patients, who enrolled in the study, were randomly assigned to one of the three intervention groups. The results found that MI-based counseling interventions in pediatric primary care significantly affects adiposity. In comparison to the children of parents who received usual care (group 1), the children of parents who received MI-based counseling from a PCPs with additional RD counseling (group 3) had significantly reduced BMI percentile. Regardless of the MI dose (number of sessions attended), group 3 had significantly higher mean changes in BMI percentile than the usual care group. The net difference in BMI reduction between group 1 and group 3 was 3.1 BMI percentile units. This intervention demonstrated that the best strategy for reductions in BMI are achieved when physicians and RDs coordinate care within the primary care setting. The more MI-based counseling sessions participants attended had greater reductions in BMI percentile.

A study by Marincic et al. (2017) evaluated the clinical outcomes of patients who completed both a diabetes self-management and individualized MNT by a registered dietitian. The aim of collecting outcome data was to support the need reimbursement and policy initiatives that increase access to these services for patients with type II diabetes (Marinic et al., 2017). A retrospective chart review was conducted using a random sample (n=100) of charts from the EMR. Researchers assessed the data collected for changes in the following outcome measures: 1) body mass index, 2) weight, 3) hemoglobin A1c, 4) blood glucose, 5) and lipids. Demographic data was also collected.

From the sample (n=100), approximately sixty percent were diagnosed with type II diabetes within the previous year. Ninety percent of respondents were diagnosed with at least one comorbid condition in addition to type II diabetes. The most common comorbidities were hypertension, dyslipidemia, and obesity. Compared to the weight loss of patients who had type II diabetes for a longer duration (0.9±7.8; $P>0.05$), patients newly diagnosed (<1 year) had weight loss of 5.4±9.0kg ($P<0.001$) during the treatment period. Hemoglobin A1c was significantly lower following DSME and MNT. At baseline, twenty-seven percent of the sample had HbA1c at the target of ≤7.0%. After completing DSME and MNT, seventy-two percent of the sample met the target ≤7.0% ($P=0.008$). A significant reduction in the proportion of patients with HbA1c ≥9.0% was observed. Compared to thirty-three percent of patients with HbA1c ≥9.0% at baseline, five percent ($P=0.01$) and four percent ($P=0.008$) of patients had a HbA1c ≥9.0% after completion of DSME and MNT and at one-year follow-up, respectively. Triglycerides were significantly reduced from 181±75.5mg/dL to 115.8±48.1 mg/dL（$P=0.023$) and high-density lipoproteins were significantly increased compared to baseline (41.4±12.4 mg/dL, 47.3±12.4 mg/dL; $P=0.007$). In sum, this retrospective chart review demonstrates the effectiveness of registered dietitians in delivering interventions to improve clinical outcomes of patients with type II diabetes. The authors of this study suggest the results from this study support universal reimbursement and access to DSME with individualized MNT.

A systematic review by Mitchell et al. (2017) evaluated the effectiveness of individual counseling by dietitians to improve health outcomes and alter dietary intake of adult patients in the primary care setting. The main outcomes measures researchers used

to determine the effectiveness of dietitian-led adult interventions were anthropometrics, clinical indicators and dietary intake. Exclusion criteria included interventions targeting patients under eighteen years of age, in a hospital, via telephone, in a group or lecture setting, or by a multidisciplinary team (Mitchell et al. 2017). Studies were eligible if the following criteria were included: 1) adult (aged ≥18 years) patients (aged ≥18 years) who had at least one individual face-to-face session with a dietitian in primary care, 2) intervention delivered exclusively by a dietitian, with the aim evaluating dietetic care, 3) a control, usual care, or minimal care group as a comparator, 4) anthropometric measures (weight, BMI, waist circumference, waist-to-hip ratio, and skinfold thickness), clinical indicators, and dietary behavior change as outcome measures, and 5) systematic reviews of randomized control trials and randomized control trials using parallel study design (Mitchell et al., 2017). The Cochrane Risk Bias tool and the Academy of Nutrition and Dietetics Evidence Analysis Library were used to assess the quality of the methodology of each study.

A total of twenty-six randomized control trials were eligible to be included for analysis (Mitchell et al. 2017). These studies provided nutrition consultations to a total of 5,500 adult patients in a primary care setting with outpatient clinics attached to a hospital as the site for a majority of the studies. The studies varied in terms of duration, number of consultations received, and total time spent per consultation. Out of the studies evaluated (n=26), eighteen studies exhibited statistically significant differences between the intervention group and comparator group(s) in terms dietary, anthropometric, or clinical indicators. These results indicate a positive effect from dietetic interventions in the primary care setting. Of the studies (n=21) with at least one clinical indicator as the aim

the dietetic consultation, eleven were found to be effective. Of the studies (n=20) measuring anthropometrics as the outcome of the consultation, seven indicated effectiveness. The effectiveness of dietetic consultations in the primary care setting regarding dietary modification was observed in eight of the twelve studies. Studies that had interventions which focused on the following specific aims showed significant improvements compared to control: glycemic control (four out of four studies), dietary change (four out of four studies), anthropometry (four out of seven studies), cholesterol (two out of eight studies), triglycerides (one out of five), and blood pressure (zero out of three studies). Based on these results, this review found dietary counseling provided by a dietitian alone was not effective in improving two cardiovascular risk factors: lipids and blood pressure. In sum, this systematic review demonstrates the effectiveness dietitians to improve adult patient's diet quality, diabetes outcomes, weight loss outcomes, and to limit gestational weight gain in a primary care setting.

Multidisciplinary Primary Care Model

In the last decade, patient-centered medical homes (PCMH) have gained attention as a different health care delivery model with the potential to reduce medical costs and improve patient outcomes. PCMH embrace a multidisciplinary team-based approach that is led by a primary care physician.

The Hamilton Health Service Organization Nutrition Program (HHSONP) is a successful example of integrating nutrition services into 80 family physician offices in Hamilton, Ontario (Crustulo, Kates, Ackerman, & Schamehorn, 2005). Crustolo, Kates, Ackerman, & Schamehorn (2005) evaluated referrals, patient satisfaction, and provider satisfaction during the first two years of HHSONP. The four primary goals of the

program were: 1) to patient access to nutrition services in primary care, 2) to expand nutrition services into this setting, 3) to strengthen relationship between primary care and hospital and community nutrition programs and 4) to increase knowledge of dietary principles and comfort with handling nutrition problems in physicians. A questionnaire was developed to measure physician and patient satisfaction with dietetic services using a five-point Likert scale on a questionnaire developed for each group. The Group Health of America Benchmark criteria was used as a comparative standard for patient satisfaction. The program included fifty sites across Hamilton, Ontario and had eighty physicians and nine RDs. The nine dietitians filled six full-time positions and provided ten hours per month of nutrition services to each physician. Physicians referred patients to the dietitian by filling out a referral form containing demographic information and the main reason for the referral from a checklist of thirty common nutrition-related problems. The program was coordinated by a central management team who were responsible for hiring and assigning dietitians to family physicians' and the program development, implementation, and evaluation.

Annually, an average of 4280 nutrition referrals were received and an average of 4710 patients were seen by HHSONP. The age group most referred was forty-five to sixty-four year old age group (45%), and females (56%) were referred more frequently than males (44%). The three main referral reasons were: 1) dyslipidemia (44%), 2) type two diabetes mellitus (21%), and 3) weight (17%). The patients reported consistently high satisfaction with the services provided by the RD. In comparison to the Group Health of America benchmark criteria, the program's patient satisfaction average met or exceeded the benchmark for all measured items.

The physicians surveyed indicated 1) the integration of a dietitian into their practice was easy, 2) dietitians' services serves greatly benefited patients, and 3) collaboration with dietitians in their practice improved their skills and comfort with nutrition issues. Physicians also perceived dietitians as valued members of the health care team who played a role as both an educational resource and complementary to the practice. The dietitians, who were integrated into this setting, reported high satisfaction with the shared care model and would recommend it to colleagues. In sum, the integration of nutrition services into the primary care setting to deliver a multidisciplinary care model led to improved patient access to nutrition counseling, expanded the range of services available, and improved collaboration between family physicians and registered dietitians.

Summary and Research Gaps

In the US, the high rates of obesity and chronic disease creates a stress on the health care system that impedes quality care and raises health care costs. System level changes are imperative to reducing the prevalence and burden of obesity and weight-related chronic disease. Studies have identified lack of time, lack of nutrition counseling training, lack of nutrition knowledge, personal beliefs and low self-efficacy to counseling patients on nutrition as barriers which limit the delivery of these services by physicians working in the primary care setting. The additional skills training selected by primary care physicians to improve obesity care, such as nutrition and exercise counseling, care related to bariatric surgery, and motivational interviewing are extensively covered in all Didactic Programs in Dietetics (DPD) (Bleich, Bennett, Gudzune, Cooper, 2012). Physicians recognize the important role that nutrition plays in health and disease

progression, yet nutrition counseling occurred at only approximately ten percent of all adult primary care visits in 2014 (Rui, Hing, & Okeyode, 2015). Dietitians in primary care have been effective in improving adult patient's diet quality, diabetes outcomes, weight loss outcomes, and to limit gestational weight gain (Mitchell et al., 2017). In order to increase the delivery of nutrition-related services the incorporation of dietitians and nutrition education and counseling services in primary care should be further examined.

CHAPTER III.

PRELIMINARY STUDY DATA

Site Description

The Community Health Foundation was chartered in 1989 as a non-profit 501(c)(3) organization and does business as North Central Family Medical Center (NCFMC) (North Central Family Medical Center Profile, 2017). NCFMC has been a federally funded community health center serving a diverse low-income population since 1991. Annually, NCFMC provides comprehensive primary care to approximately 10,000 residents from York, Chester, and Lancaster Counties in South Carolina. The three locations include: NCFMC Main, NCFMC Pediatric & Adolescent, and NCFMC Chester. This pilot program was conducted at the NCFMC Main located in Rock Hill, South Carolina. NCFMC accepts most insurance plans but also utilizes a sliding fee scale to ensure all services can be provided regardless of ability to pay. The services offered include: adult medical care, pediatric medical care, prenatal care and women's health, behavioral health care, physicals for school, sports, and work, dietary and nutritional, health education, onsite laboratory, and onsite pharmacy.

Patient Preference Survey

A survey examining patient's interests and preferences for a nutrition education and counseling program was conducted between November 7, 2016 and December 2, 2016 at the main clinic for NCFMC. The two-page paper survey (See Appendix A), offered in English and Spanish, took approximately fifteen minutes to complete. Human Nutrition students administered the survey to adult patients upon arrival to the clinic on a

voluntary basis. This study was approved by the Internal Review Board at Winthrop University and written consent was obtained prior to any data collection.

Patient's program delivery preferences and nutrition/health topics of interest were assessed using a five-point Likert scale. Delivery preferences included: individual versus group sessions, frequency (weekly, biweekly, monthly), and duration of program (month, three months, six months). The nutrition and health topics of interest included: food labels, dining on budget, eating on the go, nutrition to manage blood pressure, nutrition for diabetes, nutrition for weight loss, and physical activity. The second page inquired about sociodemographics and self-reported health conditions. Sociodemographics included age, income, household size, sex, marital status, and race/ethnicity. Self-reported health conditions included renal disease, heart disease, hypertension, and diabetes. Statistical analysis included frequency and Fisher's exact tests using SPSS 22.0.

Of the adults surveyed (n=85), most preferred individual counseling (n=65) in face to face (n=39) sessions to be offered on a monthly basis (n=38) for six months (n=36). There was some interest in email and/or snail mail (n=34, n=32, respectively). Demographic characteristics can be found in table one. Respondents indicated interest in the majority of the nutrition-related topics listed, but the topics with the highest interests were in physical activity and weight loss (n=35, n=33, respectively) (See Appendix B for full survey results).

Pilot Program Assessment

Based on the preliminary data from the patient preferences survey a nutrition education and counseling pilot program was delivered with collaboration with the Department of Human Nutrition to provide face to face, individual sessions for three

months. This program was conducted from March 6, 2017 to May 25, 2017 at NCFMC clinic located in Rock Hill, South Carolina. The sessions on average lasted thirty to forty-five minutes in duration and the time between follow-up appointments was determined on patient by patient preference. Inclusion criteria included being a patient at the clinic and receiving a referral from his or her primary care provider. The nutrition education and counseling sessions were provided on voluntary basis as a free service to patients at the clinic. Counseling and education services to manage chronic disease conditions were provided by two licensed registered dietitians who were also faculty at Winthrop University and general health and nutrition education and counseling was provided by nutrition students (n=3 graduate students, n=1 undergraduate student) from Winthrop University. Students focused on general health and nutrition information (e.g. MyPlate, food label reading, tips for shopping/food preparation) while faculty (PhD/RDs) focused on disease management, medical nutrition therapy, and nutrition and health education and counseling.

Documentation and Incorporation of Nutrition Services

A paper record system was used to schedule patients and document each session because this program did not have access to patients' electronic medical records during the course of the pilot. The paper outpatient nutrition chart was developed for this program in order for providers to refer patients and to standardize the documentation each nutrition counseling session (Appendix C).

Primary care providers or their staff referred patients to nutrition services for weight management, general healthful diet, and/or specific chronic disease conditions.

Two Registered Dietitians and human nutrition students (n=3 graduate students, n=1 undergraduate student) from Winthrop University provided nutrition counseling to referred patients. Prior to the start of the program, students received two one-hour trainings regarding nutrition counseling, motivational interviewing (MI) techniques, and Health Insurance Portability Accountability Act (HIPAA). Students were also required to purchase student practice insurance. Complex MNT cases and chronic disease management (e.g. renal disease, diabetes, etc.) were seen exclusively by either RD. After each nutrition education and counseling session, a copy of the paper outpatient nutrition chart were placed in the 'to be scanned' box at the nurses station in order to for it to be added to the patient's electronic medical record (EMR) at the clinic.

Education materials available during nutrition education and counseling sessions included handouts, food models, sugar models, and sodium models. The handouts were selected from the Academy of Nutrition and Dietetics, the National Heart Association, and the U.S. Department of Agriculture (USDA) websites. Any handouts used during a session were offered to the patient as take-home resources.

CHAPTER IV

RESEARCH ARTICLE

Introduction

Health care in the United States (US) is the most expensive in the world with $2.7 trillion in annual costs (Jortberg & Fleming, 2014; CDC National Center for Chronic Disease Prevention and Health Promotion, 2016). Individuals with one or more chronic conditions account for eighty-six percent of health care spending (Gerteis et al., 2014, p.2). The annual cost of medical treatment, impaired quality of life, and increased risk of other morbidities for obese adults is approximately $147 billion (Slawson, Fitzgerald, & Morgan, 2013). Obesity and chronic disease not only create an economic burden, but also negatively impact an individual's health and longevity. For example, the Center for Disease Control and Prevention (CDC) reports 7 in 10 American deaths each year can be attributed to chronic diseases (CDC, 2015).

To combat this public health crisis, efforts have been made on the policy level aimed at reducing the prevalence of obesity and weight-related chronic disease. The U.S. Preventive Task Force's (USPSTF) Published Recommendations for primary care includes three recommendations focusing on the screening and counseling of adult patients regarding weight, healthful diet, and physical activity (Published Recommendations, 2017). Additionally, Healthy People 2020 has established three objectives aimed at increasing the proportion of adult primary care visits that include: 1) assessment of patient's body mass index (BMI), 2) nutrition counseling or education for patients diagnosed with CVD, diabetes, or hyperlipidemia, and 3) weight reduction,

nutrition, or physical activity counseling for patients who are obese (Healthy People 2020 Objectives).

Healthy People 2020 objectives and USPSTF recommendations suggest a need to improve the delivery and use of preventive services by primary care physicians. A primary care practice is defined by the American Academy of Family Physicians as "the patient's first point of entry into the health care system and as the continuing focal point for all needed health services" (American Academy of Family Physicians, 2018, para. 5). Therefore, interventions targeting the primary care setting are crucial to increase the rates of delivery for preventive services in order to reduce the prevalence of obesity and chronic disease.

Prevention strategies within primary care are the most affordable and effective method to prevent chronic diseases (Slawson, Fitzgerald, & Morgan, 2013). Prevention strategies are classified by level (primary, secondary, tertiary). Primary prevention strategies target the promotion of health and protection from exposure to risk factors that cause both infectious and chronic diseases (Owen, Splett, & Owen, 1999). This level of prevention has been shown to improve longevity and quality of life as well as delay health care costs (Slawson, Fitzgerald, Morgan, 2013). Nutrition education and counseling can assist in the promotion of healthy behaviors in order to prevent lifestyle risk factors (e.g. obesity, suboptimal dietary intake patterns) (Slawson, Fitzgerald, & Morgan, 2013). Secondary prevention focuses on "early detection and prompt intervention" of diseases (Slawson, Fitzgerald, & Morgan, 2013). Tertiary prevention is strategies that aim to assist in disease management to reduce complications, improve the quality of life, and extend years of productivity for people diagnosed with a disease

(Owen, Splett, & Owen, 1999). Dietitian-led nutrition interventions at both the secondary and tertiary prevention levels have been shown to improve clinical outcomes and cost-effective for patients with obesity, diabetes, and dyslipidemia (Slawson, Fitzgerald, & Morgan, 2013).

Suboptimal nutrition has been identified as the leading behavioral risk factor of morbidity and mortality from chronic diseases in the United States, yet approximately ten percent of all primary care visits included nutrition counseling by physicians in 2014 (Marczak, O'Rourke, & Shepard, 2016; GBD 2013 Risk Factor Collaborators, 2015; Rui, Hing, & Okeyode, 2015). A discrepancy exists between recommendations for primary care and chronic disease prevention. Incorporation of nutrition education and counseling services by a qualified health care professional (e.g. registered dietitian) may assist in supporting these recommendations for primary care and prevention of chronic disease while also addressing changes in the focus of health care in recent policy changes (e.g. Affordable Care Act). In 2009, the Affordable Care Act (ACA) was passed. Two of the main goals of the Affordable Care Act was to expand access to health insurance and to transform health care delivery models to achieve the triple aim of providing quality care, reducing costs, and improving the experience of care (Jortberg & Fleming, 2014). Transitioning from traditional primary health care delivery to a multidisciplinary, team-based approach has gained attention as a possible strategy to achieve the triple aim, but it is rarely implemented in U.S. primary care practices.

Community Health Centers (CHCs), or Federally Qualified Health Centers (FQHC), are a successful example of a health care model that provides affordable, comprehensive, coordinate, patient-centered care (Adashi, Geiger, & Fine, 2010). CHCs

are a network of 8000 safety nets clinics that provide primary and preventive health services to uninsured and medically underserved populations (Adashi, Geiger, & Fine, 2010). Of the approximately twenty-six million Americans who use CHCs, 70.02% are at or below the 100% federal poverty level, 62.27% are racial or ethnic minorities, and 23.43% are uninsured (Adashi, Geiger, & Fine, 2010; Health Resources and Services Administration, 2016). This patient population experiences disproportionate rates of obesity and chronic disease making CHCs an important target of interventions that reduces these health disparities (Woodruff, Schauer, Addison, Gehlot, & Kegler, 2016).

In summary, the costs of chronic disease in the US and the need to improve and expand preventive services strongly supports the examination of current incorporation of weight management practices and lifestyle counseling (e.g. nutrition, physical activity) within primary care by physicians as well as multi-disciplinary practices incorporating registered dietitians in primary care, and/or referral to a registered dietitian.

Objective

The objective of this study was to examine the incorporation and impact of a three-month nutrition education and counseling pilot program at a Community Health Center (CHC) serving both urban and rural populations in South Carolina.

Methods

Pilot Program Overview and Assessment

A patient preference survey was administered on a voluntary basis to patients at the Community Health Center in collaboration with the Department of Human Nutrition. The paper survey, offered in English and Spanish, inquired about sociodemographics and self-reported health conditions. Program delivery preferences and nutrition/health topics

of interest were also assessed using a five-point Likert scale. Data analysis included frequency and bivariate analysis utilizing SPSS 22.0.

Survey participants (n=85; Spanish, n=2; English, n=83) preferred individual (56.2%), face-to-face (59.1%), offered monthly (49.35%) for six months (49.32%). Interest was expressed for all topics listed with the highest interest in nutrition education/counseling for blood pressure management (74.1%), physical activity (69.3%), and weight loss (70.7%).

Based on the results from the patient preference survey, this pilot program offered individual, face-to-face for three-month. This pilot program was conducted from March 6, 2017 to May 25, 2017 at NCFMC clinic located in Rock Hill, South Carolina. The sessions on average lasted thirty to forty-five minutes in duration and the time between follow-up appointments was determined on patient by patient preference. Inclusion criteria included being a patient at the clinic and receiving a referral from his or her primary care provider. The nutrition education and counseling sessions were provided on voluntary basis as a free service to patients at the clinic.

Counseling and education services to manage chronic disease conditions were provided by two licensed registered dietitians who were also faculty at Winthrop University and general health and nutrition education and counseling was provided by nutrition students (n=3 graduate students, n=1 undergraduate student) from Winthrop University. Students received training on charting, nutrition education and counseling techniques and focused on general health and nutrition information (e.g. MyPlate, food label reading, tips for shopping/food preparation). Faculty (PhD/RDs) provided nutrition

education and counseling focused on disease management, medical nutrition therapy, and nutrition and health education and counseling.

Documentation and Incorporation of Nutrition Services

Prior to the start of the program, students received two one-hour trainings regarding nutrition counseling, motivational interviewing (MI) techniques, and Health Insurance Portability Accountability Act (HIPAA). Students were also required to purchase student practice insurance. Complex MNT cases and chronic disease management (e.g. renal disease, diabetes, etc.) were seen exclusively by either RD. NCFMC made office accommodations by provided nutrition services a furnished office in order for nutrition services to be provided within the clinic.

During the course of the pilot program, a paper record system was used to schedule patients and document each session because this program did not have access to patients' electronic medical records. The paper outpatient nutrition chart was developed for this program in order for providers to refer patients and to standardize the documentation each nutrition counseling session (Appendix C).

Primary care providers or their staff referred patients to nutrition services by filling out the top portion of the nutrition outpatient chart. Patients were referred for weight management, general healthful diet, and/or specific chronic disease conditions (diabetes, hypertension, hyperlipidemia/dyslipidemia, and kidney disease). Referred patients were scheduled when the referral was given to nutrition services or by phone. After three attempts to schedule patients by phone, patients' referrals were placed in a communication barrier folder.

Two Registered Dietitians and human nutrition students (n=3 graduate students, n=1 undergraduate student) from Winthrop University provided nutrition education and counseling to referred patients. The duration of nutrition education and counseling sessions was thirty to forty-five minutes. After the session, patients were asked if they would like to schedule a follow-up. After each nutrition education and counseling session, a copy of the paper outpatient nutrition chart was placed in the 'to be scanned' box at the nurses' station in order to for it to be added to the patient's electronic medical record (EMR) at the clinic. This was done to allow medical providers access to the charts.

Education materials available during nutrition education and counseling sessions included handouts, food models, sugar models, and sodium models. The handouts were selected from the Academy of Nutrition and Dietetics, the National Heart Association, and the U.S. Department of Agriculture (USDA) websites. Any handouts used during a session were offered to the patient as take-home resources.

Study Design

A retrospective chart review of the paper outpatient nutrition chart and electronic medical record (EMR) were conducted to assess the overall success of the 3-month pilot program and to determine areas of improvement. A convenience sample was used due to the fact patients were not recruited to participate in the pilot program. The outpatient nutrition charts were reviewed to determine: 1) number of patients referred, 2) number of patients scheduled, 3) number of patient no-shows, 4) number of patients never seen, 5) referral reason(s), 6) nutrition diagnosis, 7) intervention strategies utilized, and 8) barriers to program delivery. The aim of the EMR chart review was to determine improvements

to clinical outcomes such as weight, blood pressure, blood glucose, hemoglobin A1c (HbA1c).

In addition, a paper survey examining medical provider's perceptions and satisfaction regarding the current practices related to nutrition counseling, perceived barriers to nutrition counseling, and the program and its delivery was conducted. The survey was developed and adapted from surveys of primary care physicians regarding nutrition in the primary care setting (Wynn, Trudeau, Taunton, Gowans, & Scott, 2010; Paquette-Warren, Vingilis, Greenslade, & Newnam, 2006). The survey was content validated (n=4) and face validated (n=1) by a primary care physician (Appendix D). The surveys were distributed to the medical providers at their monthly meeting on June 13th, 2017 and completed on a voluntary basis. Medical providers had a two-week period to complete the survey, which took approximately twenty to thirty minutes to complete. This study was approved by the Institutional Review Board (IRB) at Winthrop University.

Data Analysis

Data were analyzed using SPSS 25.0. Frequencies were calculated for the following: 1) gender, 2) BMI class, 3) patient referrals, 4) patients scheduled, 5) patients never-seen, 6) patient no-shows, 7) referral reason(s), 8) hypertension class, 9) nutrition diagnosis, 10) nutrition intervention strategies utilized, 11) barriers to program delivery (e.g. reason(s) for attending one session, reason(s) for patient no-show and reason(s) for patients never-seen). Additionally, medical providers' survey responses were analyzed using descriptive frequencies. Means were calculated for age, weight, BMI, HbA1c, blood glucose and blood pressure at baseline and post-program for patients seen by the

program. Percent change was calculated for weight and BMI using the following formula: [(Baseline-During Pilot)/Baseline*100%] or [(Baseline-Post-Pilot)/Baseline*100%].

Due to the small sample size of patients seen (n=50), Fisher's exact test was conducted to determine if referral reasons, age (<50 years old, >50 years old), and gender differed between patients attending a single session and patients attending multiple nutrition counseling and education sessions. Three data points were collected for clinical outcomes: baseline, during pilot program, and post-pilot program. Due to the non-normally distribution of the clinical outcome data, Wilcoxon signed rank test was conducted to determine if patients seen by the pilot program had significant changes in BMI, weight, blood pressure, and HbA1c. The missing cases were separated listwise so that the results only included patients who had clinical outcome data for all three data points. Results were reported as statistically significant at a probability value (*P*-value) of ≤ 0.05 and marginally significant with a *P*-value between > 0.05 and ≤ 0.10.

Results

Outpatient Nutrition Chart

Medical providers referred a total of ninety-three patients to the three-month pilot program. Of the patients seen (n=50) during the program, 72.0% (n=36) attended one nutrition counseling and education session and 28.0% (n=14) attended two or more nutrition counseling and education sessions. Less than half (46.2%) of patients were never seen by the program. Over the course of the pilot program, the total number of patient no-shows was 101. This included no-shows by both seen patients and never seen patients.

Patients referred to the program were mostly female (71%) and had a mean age of 49.52 ± 7.59. Of the patients referred (n=93), 90.3% were either classified as overweight or obese with a mean BMI of 37.83 ± 10.48. Table 1 reports baseline characteristics of patients referred to the pilot program. The three most frequent referral reasons for all patients referred to the program were weight management, diabetes mellitus, and hypertension (50.5%, 49.5%, and 46.2%, respectively). These were also the three most frequent referral reasons for seen and never seen patients.

Table 1. Characteristics of Patients Referred to Pilot		
Characteristic	***n* (%)**	**Mean (SD)**
Gender		
Male	28 (30.1)	-
Female	65 (69.9)	-
Age		49.52 (7.59)
Male	-	51.68 (11.15)
Female	-	48.58 (12.18)
Weight (n=91)	-	235.85 (70.80)
Male (n=23)	-	232.86 (61.78)
Female (n=65)	-	237.05 (74.52)
BMI		37.95 (10.47)
Male	-	38.15 (10.66)
Female	-	37.87 (10.45)
BMI Class		
Underweight	1 (1.1)	-
Normal	7 (7.5)	-
Overweight	12 (12.9)	-
Obese	72 (77.4)	-
Pregnant	1 (1.1)	-
Blood Pressure (n=81)	-	135.45/83.09 (18.28,10.96)
Male (n=23)	-	137.74/85.04 (20.92, 11.78)
Female (n=58)	-	135.46/82.31 (18.28, 10.96)

Table 2 reports barriers to program delivery. Communication (ability to be reached by phone) was found to be the main reason patients never attended at least one nutrition counseling and education session. No-show to follow-up was most frequent

reason patients seen by the pilot program only attended one nutrition counseling and education session.

Table 2. Barriers to program delivery	
Barrier Category	***n* (%)**
Never Seen Reasons	
Communication	34 (79.1)
Did not schedule	5 (11.6)
Patient never called to reschedule	2 (4.7)
Schedule after pilot	2 (4.7)
Cancelled	2 (4.7)
Reasons for Attending One Visit (Seen)	
No show to follow-up	13 (26.0)
Patient never called to reschedule	9 (18.0)
Scheduled after pilot	9 (18.0)
Communication	7 (14.0)
Did not schedule follow-up	4 (8.0)
Cancelled	1 (2.0)
Reasons for Patient No-Shows (Seen)	
None	37 (74.0)
Unknown	8 (16.0)
Cancelled	2 (4.0)
Communication	2 (4.0)
Forgot	1 (2.0)
Sick	0 (0.0)

Of the patients seen (n=50) during the program, the mean age of was 50.56 ± 11.79 years and 72.0% (n=36) were female. The most frequent referral reasons for patients seen by the pilot program was weight management (54.0%) followed by diabetes mellitus (52.0%), and hypertension (48%). Patients' most frequent nutrition diagnosis included food & nutrition-related knowledge deficit (36%), physical inactivity (32%), overweight/obesity (26%), and undesirable food choices (26%). A variety of intervention strategies were utilized by nutrition services when providing nutrition counseling and education. The intervention strategies and nutrition diagnosis utilized are summarized in Table 3.

Table 3. Frequencies for Nutrition Diagnosis & Intervention Strategies	
Nutrition Diagnosis	***n* (%)**
Food & Nutrition-Related Knowledge Deficit	18 (36.0)
Physical Inactivity	16 (32.0)
Overweight/Obesity	13 (26.0)
Undesirable Food Choices	13 (26.0)
Predicted Suboptimal Nutrient Intake	6 (12.0)
Excessive Sodium Intake	4 (8.0)
Excessive CHO* Intake	4 (8.0)
Imbalance of Nutrients	4 (8.0)
Predicted Excessive Energy Intake	3 (6.0)
Inadequate Fiber	3 (6.0)
Inappropriate CHO Intake	2 (4.0)
Disordered Eating Pattern	2 (4.0)
Inadequate Fluid Intake	1 (2.0)
Inadequate Oral Intake	1 (2.0)
Inappropriate Protein Intake	1 (2.0)
Altered GI**Function	1 (2.0)
No Diagnosis	1 (2.0)
Impaired Ability to Prepare Foods	1 (2.0)
Self-Monitoring Deficit	1 (2.0)
Altered Nutrition-Related Lab Value(s)	1 (2.0)
Intervention Strategies	***n (%)***
Goal-setting	39 (78.0)
Purpose of Education	33 (66.0)
Recommended Modifications	31 (62.0)
Motivational Interviewing (MI)	28 (56.0)
Nutrition Relationship to Health/Disease	22 (44.0)
Self-monitoring	15 (30.0)
Transtheoretical Model (Stages of Change)	13 (26.0)
Priority Modification	12 (24.0)
Problem Solving	10 (20.0)
Social Support	8 (16.0)
Health Belief Model	7 (14.0)
Stimulus control	6 (12.0)
Result Interpretation	2 (4.0)
Survival info	2 (4.0)
Other	2 (4.0)
Relapse Prevention	2 (4.0)
Skill Development	1 (2.0)
Stress management	1 (2.0)
**CHO= carbohydrate, **GI=Gastrointestinal*	

Clinical Outcomes

Patients seen (n=50) by the program had a mean age of was 50.56 ± 11.79 years and 72.0% (n=36) were female. At baseline, the mean BMI was 37.77 ± 9.0 kg/m^2 and the percentage of patients classified as overweight or obese was 16% and 80%, respectively. After the pilot program, the average percent change decreased for BMI and weight by 1.03% and 1.36%, respectively. Approximately 72% of patients were classified as hypertensive (I & II) with a mean baseline blood pressure of 132.78 (±15.41)/81.22 (±10.14) mmHg.

A Wilcoxon signed-rank test indicated that patients weight had a marginal increase from baseline (Md=217.08) to post pilot program (Md=224.80) (Z= -1.728, p < 0.084). When this test was performed for male patients only, the results indicated male patients had a marginally significant increase from baseline (Md=234.05) to post program (Md= 235.9) in weight (Z= -1.069, p < 0.093). For the seventeen patients who had all three HbA1c measures, the median post-pilot program HbA1c, Mdn=6.30, were not statistically significantly lower than the median baseline HbA1c, Mdn=7.00, Z= -1.557, p < 0.119). The number of patients with glycemic control (HbA1c≤7.0) decreased from nineteen at baseline to fifteen after the pilot, despite the slight decrease in HbA1c. No statistically marginal or significant differences were found for the other clinical outcomes evaluated (Table 4).

Table 4. Changes in clinical outcomes using Wilcoxon-Signed Ranked Test

Clinical outcome	**Median**	**p-value (Z-score)**
HbA1c-baseline (n=17)	7.00	
HbA1c-during	6.50	0.176 (Z=-1.352)
HbA1c-post	6.30	0.119 (Z= -1.557)
Blood Glucose-baseline (n=11)	136.00	
Blood Glucose-during	148.00	0.328 (Z= -0.978)
Blood Glucose-post	182.00	0.213 (Z= -1.245)

Systolic BP-baseline (n=37)	132.00	
Systolic BP-during	130.00	0.868 (Z= -0.166)
Systolic BP-post	132.00	0.446 (Z= -0.762)
Diastolic BP-baseline (n=37)	81.00	
Diastolic BP-during	82.00	0.330 (Z= -0.975)
Diastolic BP-post	82.00	0.241 (Z= -1.171)
BMI-baseline (n=35)	37.00	
BMI-during	37.00	0.252 (Z= -1.444)
BMI-post	38.00	0.216 (Z= -1.238)
Weight-baseline (n=35)	217.08	
Weight-during	221.00	0.122 (Z= -1.548)
Weight-post	224.80	0.084* (Z= -1.728)
*Note. *p < 0.10, Outcome data separated listwise, HbA1c= hemoglobin A1c, BP= blood pressure*		

As seen in Table 5, Fisher's exact test indicated a significant association between number of visits and dyslipidemia/hyperlipidemia referrals (p=0.002). Patients without a referral for dyslipidemia were more likely to attend a single visit. In contrast, patients with a referral for dyslipidemia were more likely to attend multiple visits. Fisher's exact test also indicated a significant association between number of visits and age (p=0.012) was observed. Patients below the age of fifty years old were more likely to attend a single visit compared to adults above fifty years old (91.3% vs. 59.3%, respectively). A marginal association was observed between number of patient visits and diabetes referral (p=0.054).

Table 5. Factors associated with attending a follow-up (Seen Patients)				
Variable	**n**	**Single Visit *n* (%)**	**Multiple Visits *n* (%)**	**P-value**
Gender				
Female	35	27 (77.1)	8 (22.9)	0.493
Male	15	10 (66.7)	5 (33.3)	
Age				
<50 y/o	23	21 (91.3)	2 (8.7)	0.012**
>50 y/o	27	16 (59.3)	11 (40.7)	
Referral Reason: Weight Management				
Yes	27	22 (81.5)	5 (18.5)	0.215

No	23	15 (65.2)	8 (34.8)	
Referral Reason: Dyslipidemia				
Yes	13	5 (38.5)	8 (61.5)	0.002**
No	37	32 (86.5)	5 (13.5)	
Referral Reason: Hypertension				
Yes	24	15 (62.5)	9 (37.5)	0.109
No	26	22 (84.6)	4 (15.4)	
Referral Reason: Diabetes				
Yes	26	16 (61.5)	10 (38.5)	0.054*
No	24	21 (87.5)	3 (12.5)	
Note. *p <0.100, **p <0.05				

Medical Providers Perceptions and Practices

Four out of the five medical providers that NCFMC completed the survey for a response rate of 80%. Out of the four medical providers that completed the survey, three were physicians and one was a nurse practitioner. Medical providers current practices related to nutrition counseling can be found in Table 6. Prior to the start of the program, most (75%) medical providers reported rarely (2-3 times per month) referring patients to a registered dietitian. The common barrier identified by all providers that prevented them from referring patients to an RD prior to the program was the cost to patients. Other barriers to referring patients to an RD included patient not interested (50%), lack of perceived access (50%), and transportation (25%). Most providers either strongly agreed (50%) or agreed (25%) the overall number of patients referred for nutrition/lifestyle counseling increased as a result of the pilot program.

Perceived barriers to providers delivering nutrition/lifestyle counseling during patient visits were also identified. Most (75%) of providers strongly agreed that lack of time prevents nutrition/lifestyle counseling during a patient visit. Most (75%) of providers agreed lack of counseling training and lack of nutrition training prevented the provision of nutrition/lifestyle counseling during a patient visit. Patient noncompliance,

lack of nutrition resources and inadequate reimbursement received varying degrees of agreeance.

All of the providers surveyed either 'agreed' or 'strongly agreed' to the statement: 'the option to refer patients for nutrition counseling/education at the clinic reduced some of the burden to provide nutrition/lifestyle counseling by providers.'

Table 6. Medical Providers Nutrition-Related Practices & Barriers to Counseling

1. Prior to start of program…	**n**	**Percentage of Sample (%)**
What was the frequency you referred patients to a RD?		
Very Rarely	2	50
Rarely	2	50
What was the average time per visit spent discussing nutrition-related topics?		
1-2 minutes	1	25
3-5 minutes	1	25
5-10 minutes	2	50
2. Since the start of the program…		
The number of patients referred to nutrition services increased		
Neutral	1	25
Agree	1	25
Strongly Agree	2	50
The option to refer patient reduced some of the burden to providing nutrition/lifestyle counseling		
Agree	1	25
Strongly Agree	3	75
The amount of time discussing nutrition-related topics decreased overall		

Neutral	2	50
Agree	1	25
Strongly agree	1	25
3. During a patient visit, which of the following prevented you from providing nutrition/lifestyle counseling?		
Lack of time		
Agree	1	25
Strongly Agree	3	75
Inadequate reimbursement		
Strongly disagree	1	25
Neutral	1	25
Agree	1	25
No response	1	25
Lack of nutrition resources		
Disagree	1	25
Neutral	2	50
Agree	1	25
Lack of counseling training		
Agree	3	75
No response	1	25
Patient noncompliance		
Disagree	1	25
Neutral	1	25
Agree	1	25
Strongly Agree	1	25
Lack of nutrition training		
Agree	3	75

No Response	1	25

Three of the providers provided an explanation as to how this burden was reduced. These responses varied. The responses are as followed:

> MP1: Nutrition/lifestyle counseling is so vital to patient's overall health and their chronic diseases. Having a resource for our patients was priceless and very valuable.
>
> MP3: I spent more time assessing the need for counseling because I knew I had better access to counseling, if needed.
>
> MP4: Ability to refer for severe condition and time to provide detailed education…less pressure to address multiple issues in limited amount of time.

Providers did not indicate that office adjustments to accommodate nutrition counseling/education were complicated. The ability to offer nutrition counseling/education within the clinic as opposed to referring patients to a different location was beneficial in terms of easier collaboration between the provider and nutrition services, patient satisfaction, and provider satisfaction (Table 7).

Table 7. Reasons offering nutrition counseling/education in the clinic were beneficial

Reason	*n* (%)
Easier collaboration (between provider and nutrition services)	2 (50)
Patient Satisfaction	3 (75)
Provider Satisfaction	3 (75)
Outcomes	0 (0)
Feedback	0 (0)

Most of the medical providers (75%) agreed to feeling satisfied with the overall nutrition counseling and education services provided by the pilot program. One provider reported frequently reviewing patients' nutrition charts and agreed that the charts were

legible, informative regarding counseling/education strategies, topics, and goals, and beneficial to the provider's patient care plans. Half of the providers indicated interest in nutrition services providing more condition specific services particularly for hypertension, diabetes, and hyperlipidemia. Most (75%) of providers reported not reviewing patients' nutrition charts and reported being neutral to the statement: 'nutrition charts received from referred patients were scanned and received in a timely manner.' Two providers offered improvements to the charting procedure as follows:

> MP3: I would have liked access to the documentation of the counseling session(s) but I never saw it.
>
> MP4: Difficult to search for nutrition chart. More a problem with current EMR organization. Would be more beneficial if chart was in the same area (electronically) as their medical visit notes.

When asked to give any other feedback regarding the pilot program, services, etc. one provider offered the following:

> MP3: Would be nice if counselors & providers were able to discuss patients referred after their sessions. This would give me specific areas I need to reinforce with patients during office visits.

Discussion & Conclusion

The purpose of this study was to evaluate the implementation of a three-month pilot program integrating nutrition counseling and education services into a CHC using retrospective chart reviews and a survey of the medical providers. A unique aspect of this study was that nutrition education and counseling sessions were offered at no-costs to patients. The results from this study show that integrating nutrition counseling and education into the primary care setting, specifically CHC, may help reduce health disparities by increasing access to preventive services and improving health outcomes in a low-income population.

In this study, none of the clinical outcomes measured showed significant changes from baseline to during the pilot program or baseline to post pilot program. Marginally statistically significant improvements in weight was observed for male patients from baseline to post-program delivery (P=0.093). Other studies of dietitian-led interventions in the primary care setting indicate significant reductions in HbA1c and improvements in weight loss outcomes (Huang, Hsu, Wang, & Shin, 2010; Marinic et al., 2017; Mitchell et al., 2017).

Despite no statistically significant changes in weight, BMI, HbA1c, blood glucose, and blood pressure, a downward trend was observed for weight, BMI, and HbA1c. These downward trends indicate positive improvements in clinical outcomes in an underserved patient population faced with more financial and nonfinancial barriers to accessing care and increased prevalence of multiple chronic conditions (Kullgren, McLaughlin, Mitra, & Armstrong, 2012; Kamimura, Panahi, Ahmmad, Pye, & Ashby, 2018; National Health Statistics, 2016).

Nutrition counseling and education provided by this pilot program was not effective in significantly improving blood pressure. This supports findings from a recent systematic review by Mitchell et al. (2017) found dietary counseling provided by a dietitian alone was not effective in improving blood pressure. The slight overall decline in HbA1c and reduced number of patients with glycemic control (HbA1c $\leq$7.0) are consistent with results from a similar two-year pilot program that offered free health care to uninsured patients with diabetes at a CHC (BeLue, Figaro, Peterson, Wilds, & William, 2014). The same study found patients were more likely to achieve or maintain glycemic control the more services were utilized (BeLue, Figaro, Peterson, Wilds, &

William, 2014). In this study, fourteen out of the fifty patients seen by the program attended at least one follow-up session. If more patients had utilized the service more frequently, then there may have been greater improvements in glycemic control.

Although CHCs provide care to patients regardless of their ability to pay, referring patients to services outside of the clinic can come at cost to the patients. The medical providers at NCFMC identified cost to patient as one of the main barriers to refer patients to an RD prior to the start of the program. In this study, the barrier of cost to access nutrition education and counseling was eliminated by offering this service free to patients. Even after accounting for this barrier, nearly half (46.2%) of the patients referred did not utilize this free service. This finding suggests additional barriers may exist to accessing care in an underserved population. Previous studies examining barriers to care among CHC patients report multiple nonfinancial barriers exist, outside of financial barriers, as reasons for delaying or foregoing treatment in this population (Allen, Call, Beebe, McAlpine, & Johnson, 2017; Kamimura, Panahi, Ahmmad, Pye, & Ashby, 2018; Kullgren, McLaughlin, Mitra, & Armstrong; 2012). For low-income and uninsured patients', transportation is a common nonfinancial barrier to accessing care which can delay interventions focusing on reducing or preventing disease complications and lead to worse health outcomes (Kamimura, Panahi, Ahmmad, Pye, & Ashby, 2018; Syed, Gerber, & Sharp, 2013).

This pilot program provided the ability to offer individualized nutrition counseling and education sessions to referred patients at no-cost within the same facility as their PCP. This reduced transportation issues and eliminated costs to patients as barriers preventing PCP from referring patients for nutrition counseling and education.

The survey of medical providers suggests that addressing these barriers did result in increased patient referrals for nutrition counseling and education. Despite accounting for these barriers to these services, 46.2% of referred patients were never seen during the pilot program. Communication was the primary reasons these patients were never seen. Often, the attempts to schedule these patients was hindered by disconnected phones, full voicemail boxes, outdated phone numbers, or failure to answer phone. A study investigating reasons for no-shows at a CHC reported only reaching thirty-seven percent of no-show patients by phone (Kaplan-Lewis & Percac-Lima, 2013). In order to improve communication with this patient population, CHC need to ensure patients contact information is updated and consider different forms of communicating with patients (e.g. text message to remind and confirm appointments). Additionally, aligning patients visits for nutrition counseling and education with visits with other providers may increase the utilization of referrals.

Previous studies have found that medical providers at CHC perceive limited economic resources to access health-promoting resources (i.e. visits with dietitians, gym memberships), limited healthy food options combined with the costs of healthy foods, lack of motivation, and social/cultural norms as barriers to weight loss in their patient population (Woodruff, Schauer, Addison, Gehlot, & Kegler, 2016). These barriers reported in similar settings may explain why patients in this study did not have significant reductions weight or BMI (Woodruff, Schauer, Addison, Gehlot, & Kegler, 2016). Patients' struggling with financial burdens are more likely alter their behaviors, such as limiting use of medication as well as sacrificing food and other essentials, which leads to poorer control of chronic conditions (Piette, Heisler, & Wagner, 2004; Ngo-Metzger,

Sorkin, Billimek, Greenfield, & Kaplan, 2011). Both financial and nonfinancial barriers create a challenging environment for the necessary behavior changes that improved health outcomes. For example, the cost disparity between healthy foods and processed foods prevented patients from implementing clinical advice on dietary modification (Woodruff, Schauer, Addison, Gehlot, & Kegler, 2016).

Medical providers at NCMFC identified lack of time, lack of counseling training, and lack of nutrition education as factors preventing the provision of nutrition counseling during a patient visit. Several studies have identified both lack of time and training related to nutrition counseling as barriers to delivering this service in primary care (Kushner, 1995; Yarnall, Pollak, Ostbye, Krause, & Michener, 2003; Yarnall et al., 2009). Medical providers at CHC experience these barriers as well as barriers related their patient population.

The survey of medical providers identified: 1) current practices related to nutrition/lifestyle counseling, 2) barriers to referring patients to RDs and providing nutrition/lifestyle counseling, 3) satisfaction with the program delivery and 4) areas of improvement. Overall, the feedback from the medical providers at NCFMC regarding the pilot program was positive. The survey results indicate 1) office adjustments to accommodate nutrition services within the clinic was not complicated, 2) ability to refer patients to nutrition services reduced some of the burden to provide nutrition/lifestyle counseling, 3) reduced amount of time spent per visit discussing nutrition-related topics, and 4) nutrition services were beneficial to both providers and patients. A similar survey of physicians who integrated RDs into their primary care practices indicated 1) the integration of a dietitian into their practice was easy, 2) dietitians' services serves greatly

benefited patients, and 3) collaboration with dietitians in their practice improved their skills and comfort with nutrition issues (Crustulo, Kates, Ackerman, & Schamehorn, 2005).

In summary, this study shows the integration of nutrition services into the primary care setting, specifically CHCs, shifts some of the burden to provide nutrition/lifestyle counseling from PCP to other health care professionals trained to provide this type of counseling. Despite this patient population experiencing more barriers to accessing and managing care, marginal improvements in weight, BMI, and HbA1c were observed. Future research is needed to determine intervention strategies that address both financial and nonfinancial barriers (e.g. cost, transportation, and communication) to integrating nutrition counseling and education into CHC and determine the influence of increased access to services on health outcomes.

Limitations

The inability to use the EMR is one limitation of this study. The ability to access to the EMR could have provided more up-to-date clinical and anthropometric data that may or may not have been included on patients' referral to nutrition services and allowed medical providers easier access to patients' nutrition charts. Although the outpatient nutrition charts were supposed to be scanned into patients EMR, the survey responses of the medical providers indicated that this may not have done by the nursing staff.

Another significant limitation to consider in this study was the missing data for several of clinical outcomes measured. Since the EMR review was retrospective, this study had to use the clinical data that was available. Blood pressure, weight, and BMI were consistently measured at patient visits, which explains why these clinical outcomes

had less missing values. Additionally, many patients did not have clinical data measured at all three points because they did not attend multiple visits throughout the year. Patients may have gone for their annual physical or due to illness. The missing data could have skewed the results. Capturing a larger sample size for the clinical outcomes measured could have changed the results.

Several improvements could be made to the delivery of services. For example, collecting clinical data ourselves could have reduced the amount of missing values. Reducing the amount of missing values could have significantly changed the results.

Future Research

CHC serve a population that faces additional barriers that make behavior change challenging. Therefore, future research is needed to develop intervention strategies that target both financial and nonfinancial barriers to integrating nutrition services into CHC. Additionally, if CHC expand their healthcare team to include nutrition services provided by registered dietitians, then studies will be needed to measure the impact of increased access to these services on clinical outcomes and health care spending.

CHAPTER V

REFERENCES

Adams, K.M., Kohlmeier, M., & Zeisel, S.H. (2010). Nutrition education in U.S. medical schools: latest update of a national survey. *Academy of Medicine, 85*(9), 1537-1542. doi:10.1097/ACM.0b013e3181eab71b.

Allen, E. M., Call, K. T., Beebe, T. J., McAlpine, D. D., & Johnson, P. J. (2017). Barriers to Care and Healthcare Utilization among the Publicly Insured. *Medical Care*, *55*(3), 207–214. http://doi.org/10.1097/MLR.0000000000000644

American Academy of Family Physicians. (2018). Primary care. Retrieved from https://www.aafp.org/about/policies/all/primary-care.html

BeLue, R., Figaro, K., Peterson, J., Wilds, C., & William, P. (2013). The diabetes healthy outcomes program: Results of free health care for uninsured at a federally qualified community health center. *Journal of Primary Care & Community Health, 5*(1): 4-8. https://doi.org/10.1177/2150131913481807

Bleich, S.N., Bennett, W.L., Gudzune, K.A., & Cooper, L.A. (2012). National survey of US primary care physicians' perspectives about causes of obesity and solutions to improve care. *British Medical Journal, 2*. doi: 10.1136/bmjopen-2012-001871.

Centers for Disease Control and Prevention. (2017). Chronic disease overview. Retrieved from https://www.cdc.gov/chronicdisease/overview/index.htm

Centers for Disease Control and Prevention. (2015). Leading causes of death and numbers of deaths, by sex, race, and Hispanic origin: United States, 1980 and 2014 (Table 19). *Health, United States*. Retrieved from https://www.cdc.gov/nchs/data/hus/hus15.pdf#019

Crustolo, A.M., Kates, N., Ackerman, S., & Schamehorn, S. (2005). Integrating nutrition services into primary care. *Canadian Family Physician, 51*, 1647-1653. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1479497/

Division of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion. (2016). Defining overweight and obesity. Retrieved from https://www.cdc.gov/obesity/adult/defining.html

DPD graduates. (2018). In *Eat Right Pro.* Retrieved April 10, 2018, https://www.eatrightpro.org/about-us/become-an-rdn-or-dtr/dpd-graduates

GBD 2013 Risk Factor Collaborators. Global, regional, national comparative risk assessment of 79 behavioral, environmental, and occupational, and metabolic risks or cluster risks in 188 countries, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. (2015). *Lancet, 386*(10010), 2287-2323. doi:10.1016/S0140-6736(15)00128-2

Gerteis, J., Izrael, D., Deitz, D., LeRoy, L., Ricciardi, R., Miller, T., & Basu, J. (2014). Multiple Chronic Conditions Chartbook. AHRQ Publication No, Q14-0038. Rockville, MD: Agency for Healthcare Research and Quality. Retrieved from https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/prevention-chronic-care/decision/mcc/mccchartbook.pdf

Goodman, R.A., Posner, S.F., Huang, E.S., Parekh, A.K., & Koh, H.K. (2013). Defining and measuring chronic conditions: Imperatives for research, policy, program, and practice. *Preventing Chronic Disease, 10,* 120239. http://dx.doi.org/10.5888/pcd10.120239

Healthy People 2020 [Internet]. Washington, DC: U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion [cited [June, 2018]]. Available from: [https://www.healthypeople.gov/2020/topics-objectives/topic/nutrition-and-weight-status/objectives].

Han, S.L., Auer, R., Cornuz, J., & Marques-Vidal, P. (2016). Clinical nutrition in primary care: An evaluation of resident physicians' attitudes and self-perceived proficiency. *Clinical Nutrition ESPN, 15,* 69-74. http://dx.doi.org/10.1016/j.clnesp.2016.06.005

Huang, M.C., Hsu, C.C., Wang, H.S., & Shin, S.J. (2010). Prospective randomized controlled trial to evaluate effectiveness of registered dietitian-led diabetes management on glycemic and diet control in a primary care setting in Taiwan. *Diabetes Care, 33*(2), 233-239. doi: 10.2337/dc09-1092

Jortberg, B.T., & Fleming, M.O. (2014). Registered dietitian nutritionists bring value to emerging health care delivery models. *Journal of the Academy of Nutrition and Dietetics, 114* (12), 2017-2021. http://dx.doi.org/10.1016/j.jand.2014.08.025

Kamimura, A., Panahi, S., Ahmmad, Z., Pye, M., & Ashby, J. (2018). Transportation and Other Nonfinancial Barriers Among Uninsured Primary Care Patients. *Health Services Research and Managerial Epidemiology*, *5*, 2333392817749681. http://doi.org/10.1177/2333392817749681

Kaplan-Lewis, E. & Percac-Lima, S. (2013). No-show to primary care appointments: Why patients do not come. *Journal of Primary Care and Community Health, 4*(4):251-255. doi: 10.1177/2150131913498513.

Kullgren, J.T., McLauglin, C.G., Mitra, N., & Armstrong, K. (2012). Nonfinancial barriers and access to care for U.S. adults. *Health Services Research, 47*(1 pt 2), 462-485. doi: 10.1111/j.1475-6773.2011.01308.x

Kushner, R.F. (1995). Barriers to providing nutrition counseling by physicians: A survey of primary care physicians. *Preventive Medicine, 23*, 546-552. https://doi.org/10.1006/pmed.1995.1087

Laberge, M., Wodchis, W.P., Barnsley, J., & Laporte, A. Efficiency of Ontario primary care physicians across payment models: A stochastic frontier analysis. (2016). *Health Economics Review, 6,* 22. doi: 10.1186/s13561-016-0101-y

Lan, S.J., & Watkins, R.W. (2013). Helping primary care practices attain patient-centered medical home (PCMH) recognition through collaboration with a university. *Journal of the American Board of Family Medicine, 26*(6), 784-786. doi:10.3122/jabfm.2013.06.130088

Litaker, D., Flocke, S.A., Frolkis, J.P., & Stange, K.C. (2005). Physicians' attitudes and preventive care delivery: insights from the DOPC study. *Preventive Medicine, 40*, 556-563. doi:10.1016/j.ypmed.2004.07.015

Marczak, L., O'Rourke, K., Shepard, D., for the Institute for Health Metrics and Evaluation. (2016). When and Why People Die in the United States, 1990-2013. *Journal of the American Medical Association, 315*(3), 241. doi:10.1001/jama.2015.17599

Marincic, P.Z., Hardin, A., Salazar, M.V., Scott, S., Fan, S.X., & Gaillard, P.R. (2017). Diabetes self-management and medical nutrition therapy improve patient outcomes: A pilot study documenting the efficacy of registered dietitian

nutritionist interventions through retrospective chart review. *Journal of the Academy of Nutrition and Dietetics, 117*(8), 1254-1264. doi: 10.1016/j.jand.2017.01.023

Mitchell, L.J, Ball, L.E., Ross, L.J., Barnes, K.A., & Williams, L.T. (2017). Effectiveness of dietetic consultations in primary health care: A systematic review of randomized control trials. *Journal of the Academy of Nutrition and Dietetics,* [Epub ahead of print]. doi: 10.1016/j.jand.2017.06.364.

National Center for Health Statistics. Health, United States, 2016: With Chartbook on Long-term Trends in Health. Hyattsville, MD. 2017. Retrieved from https://www.cdc.gov/nchs/data/hus/hus16.pdf

Ngo-Metzger, Q., Sorkin, D.H., Billimek, J., Greenfield, S., & Kaplan, S.H. (2011). The effects of financial pressures on adherence and glucose control among racial/ethnically diverse patients with diabetes. *Journal of General Internal Medicine, 27*(4): 432-437. doi:10.1007/s11606-011-1910-7

North Central Family Medical Center Profile. (2017). In *North Central Family Medical Center.* Retrieved from https://ncfmc.net/about/

Owen, A.L., Splett, P.L., & Owen, G.M. (1999). *Nutrition in the community: The art and science of delivering services* (4th ed.). New York: McGraw Hill.

Paquette-Warren, J., Vingilis, E., Greenslade, J., & Newnam, S. (2006). What do practitioners think? A qualitative study of a shared care mental health and nutrition primary care program. *International Journal of Integrated Care, 6*(4). doi:http://doi.org/10.5334/ijic.164

Peikes D, Zutshi A, Genevro J, Smith K, Parchman M, Meyers D. Early Evidence on the Patient-Centered Medical Home. Final Report (Prepared by Mathematica Policy Research, under Contract Nos. HHSA290200900019I/HHSA29032002T and HHSA290200900019I/HHSA29032005T). AHRQ Publication No. 12-0020-EF. Rockville, MD: Agency for Healthcare Research and Quality. February 2012. Retrieved from https://pcmh.ahrq.gov/page/early-evidence-patient-centered-medical-home

Primary care. (2017). In *American Academy of Family Physicians*. Retrieved from http://www.aafp.org/about/policies/all/primary-care.html

Raynor, H.A., Champagne, C.M. (2016). Position of the Academy of Nutrition and Dietetics: Interventions for the Treatment of Overweight and Obesity in Adults. *Journal of the Academy of Nutrition and Dietetics, 116*(1): 129-147. doi: 10.1016/j.jand.2015.10.031

Resnicow, K., McMaster, F., Bocian, A., Harris, D., et al. (2015). Motivational interviewing and dietary counseling for obesity in primary care: An RCT. *Pediatrics, 135*(4), 647-653. doi: 10.1542/peds.2014-1880.

Rich E, Lipson D, Libersky J, Parchman M. Coordinating Care for Adults With Complex Care Needs in the Patient-Centered Medical Home: Challenges and Solutions. White Paper (Prepared by Mathematica Policy Research under Contract No. HHSA290200900019I/HHSA29032005T). AHRQ Publication No. 12-0010-EF.Rockville, MD: Agency for Healthcare Research and Quality. January 2012. Retrieved from https://www.pcmh.ahrq.gov/page/coordinating-care-adults-complex-care-needs-patient-centered-medical-home-challenges-and

Rosser, W.W., Colwill, J.M., Kasperski, J., & Wilson, L. (2011). Progress of Ontario's Family Health Team Model: A patient-centered medical home. *Annals of Family Medicine, 9*(2), 165-171. doi: 10.1370/afm.1228

Rui, P., Hing, E., & Okeyode, T. (2015). National Ambulatory Medical Care Survey: 2014 State and National Summary Tables. Retrieved from http://www.cdc.gov/nchs/ahcd/ahcd_products.htm.

Slawson, D.L., Fitzgerald, N., & Morgan, K.T. (2013). Position of the Academy of Nutrition and Dietetics: The role of nutrition in health promotion and chronic disease prevention. *Journal of the Academy of Nutrition and Dietetics, 113*(7), 972-979. doi: 10.1016/j.jand.2013.05.005

Smith, A.W., Borowski, L.A., Liu, B., et al. (2011). U.S. primary care physicians' diet-, physical activity-, and weight-related care of adult patients. *Journal of Preventive Medicine 41*(1): 33-42. doi: 10.1016/j.amepre.2011.03.017

Smith, S., Seeholzer, E. L., Gullett, H., et al. (2015). Primary care residents' knowledge, attitudes, self-efficacy, and perceived professional norms regarding obesity, nutrition, and physical activity. *Journal of Graduate Medical Education, 7*(3), 388-394. doi: 10.4300/JGME-D-14-00710.1

Steeves, J. A., Lui, B., Willis, G., Lee, R., & Smith, A.W. (2015). Physicians' personal beliefs about weight-related care and their associations with care delivery: The U.S. national survey of energy balance related care among primary care physicians. *Obesity Research & Clinical Practice 9*(3), 243-255. doi: 10.1016/j.orcp.2014.08.002

Syed, S. T., Gerber, B. S., & Sharp, L. K. (2013). Traveling Towards Disease: Transportation Barriers to Health Care Access. *Journal of Community Health*, *38*(5), 976–993. http://doi.org/10.1007/s10900-013-9681-1

U.S. Preventive Services Task Force. Recommended Services. (2017). Retrieved from https://www.uspreventiveservicestaskforce.org/BrowseRec/Index/browse-recommendations

Ward, B.W., Schiller, J.S., & Goodman, R.A. (2014). Multiple chronic conditions among US adults: A 2012 update. *Preventing Chronic Disease, 11,* 130389. http://dx.doi.org/10.5888/pcd11.130389

Woodruff, R. C., Schauer, G. L., Addison, A. R., Gehlot, A., & Kegler, M. C. (2016). Barriers to weight loss among community health center patients: qualitative insights from primary care providers. *BMC Obesity*, *3*, 43. http://doi.org/10.1186/s40608-016-0123-3

Wynn, K., Trudeau, J.D., Taunton, K., Gowans, M., & Scott, I. (2010). Nutrition in primary care, current practices, attitudes, and barriers. *Canadian Family Physician, 56*, e109-116.

Yarnall, K.S.H., Ostbye, T., Krause, K.M., et al. (2009). Family physicians as team leaders: "Time" to share the care. *Preventing Chronic Disease, 6*(2). http://www.cdc.gov/pcd/issues/2009/apr/08_0023.htm. Accessed 25 July 2017.

Yarnall, K.S.H., Pollack, K.I., Ostbye, T., Krause, K.M., & Michener, J.L. (2003). Primary care: Is there enough time for prevention. *American Journal of Public Health, 93*(4), 635-641.

APPENDICES

APPENDIX A.
PATIENT PREFERENCE SURVEY

Adult Survey for Interest for Free Nutrition/Health Promotion Program

I. **Topics Interest**:

Topic/Skills	Interest Level				
	Not interested	Somewhat	Neutral	Interested	Very Interested
Using/Reading Food Labels					
Healthy, tasty, quick dinners on a budget					
Healthy eating on the go/snacks					
Nutrition for Blood Pressure Management					
Nutrition for Diabetes Management					
Nutrition for Weight loss					
Physical Activity Tips/resources/programs					

II. **Type of program delivery**

Preference **(check preferred program, or both if equal interest)**	
Individual (family)	Group

How Often?	Weekly	Biweekly	Monthly	**For How Long?**	2 months	3 months	4 months	6 months

Program Preferences **(how you would like to receive information)**	**Level of Interest (1-5)** **5- very interested** **4- interested** **3- neutral 2- somewhat 1-not interested**
Face to face visits – individual or group	
Phone counseling	
Online counseling/skype	
Health/Nutrition Information: email	
Health/Nutrition Information: social media group (e.g. private Facebook page)	
Health/Nutrition Information: regular/snail mail	
Motivator/accountability partner in the program:	

III. Patient information

Age		Diagnosed with Hypertension? When?	
Birthdate		Diagnosed with Diabetes? When?	
Sex		Diagnosed with Kidney disease? When?	
Single/Married		Diagnosed with heart disease? When?	
Occupation		Primary health concern? Describe:	
Annual income		Primary nutrition concern? Describe:	
Household size Children? Ages?		Are you interested in being contacted to participate?	
Race/Ethnicity		Email address to contact for study:	

Weight concern? Describe:		Primary phone/cell to contact for study:	

Encuesta para Adultos Interesados en el Programa Gratuito de Nutrición/Promoción de la Salud

I. Temas de Interés

Tema/Habilidades	Nivel de Interés				
	No Interesado	Algo Interesado	Neutral	Interesado	Muy Interesado
Lectura y uso de las etiquetas en los alimentos					
Saludables, sabrosas, cenas rápidas de bajo presupuesto					
Alimentación saludable para llevar /aperitivos					
Nutrición para el Control de la Presión Arterial					
Nutrición para el Control de la Diabetes					
Nutrición para bajar de peso					
Consejos/Recursos/Programas de actividad física					

II. Ejecución del Programa

Preferencia (marque su programa preferido, o ambos si le producen el mismo interés)	
Individuo (familia)	Grupo

	Semanal	Quincenal	Mensual	**¿Por cuánto**	2 meses	3 meses	4 meses	6 meses

¿Con qué frecuencia?				**tiempo?**				

Preferencias del Programa **(¿Cómo le gustaría recibir información?)**	**Nivel de Interés (1-5)** **5- muy interesado** **4- interesado** **3- neutral** **2- algo interesado** **1- no interesado**
Visitas en persona - individual o grupal	
Consulta telefónica	
Consulta en línea/Skype	
Información nutricional/salud: correo electrónico	
Información nutricional/salud: grupo de redes sociales (por ejemplo, la página privada de Facebook)	
Información nutricional/salud: correo postal/regular	
Compañero motivador/rendición de cuentas en el programa	

III. Información del Paciente

Edad		¿Diagnosticado(a) con hipertensión? ¿Cuando?	
Fecha de Nacimiento		¿Diagnosticado(a) con diabetes? ¿Cuando?	
Sexo		¿Diagnosticado(a) con enfermedad renal? ¿Cuando?	
Soltero(a)/Casado(a)		¿Diagnosticado(a) con enfermedad del corazón? ¿Cuando?	
Ocupación		¿Cuál es su principal	

		preocupación de salud? Describir:	
Ingresos Anuales		¿Cuál es su principal preocupación de nutrición? Describir:	
Tamaño del Hogar ¿Niños? ¿Edades?		¿Está usted interesado en ser contactado para participar?	
Raza/Origen Étnica		Correo electrónico de contacto para el estudio:	
¿Preocupación por el peso? Describir:		Teléfono principal/celular de contacto para el estudio:	

APPENDIX B.

PATIENT PREFERENCE SURVEY RESULTS

Table 1. Participant Demographics			
Variable	**Mean (SD)**	**Frequency**	**Percent**
Age(y)	**45.83 (15.953)**	**-**	**-**
Income(dollars)	**11,069.29 (10,797.69)**	**-**	**-**
Household Size	**1.94 (1.13)**	**-**	**-**
Sex			
Female	**-**	**60**	**67.4**
Male	**-**	**11**	**12.4**
Marital Status			
Single	**-**	**46**	**51.7**
Married	**-**	**15**	**16.9**
Divorced	**-**	**3**	**3.4**
Widowed	**-**	**4**	**4.5**
Race/Ethnicity			
Caucasian	**-**	**32**	**36.0**
Hispanic	**-**	**2**	**2.2**
African American	**-**	**32**	**36.0**
Asian	**-**	**-**	**-**

Table 2. Counseling Session Style Preference					
Individual Counseling vs. Group Sessions					
Individual (family)		Group		Either	
Frequency	%	Frequency	%	Frequency	%
n=50	56.2	n=10	11.2	n=15	16.9

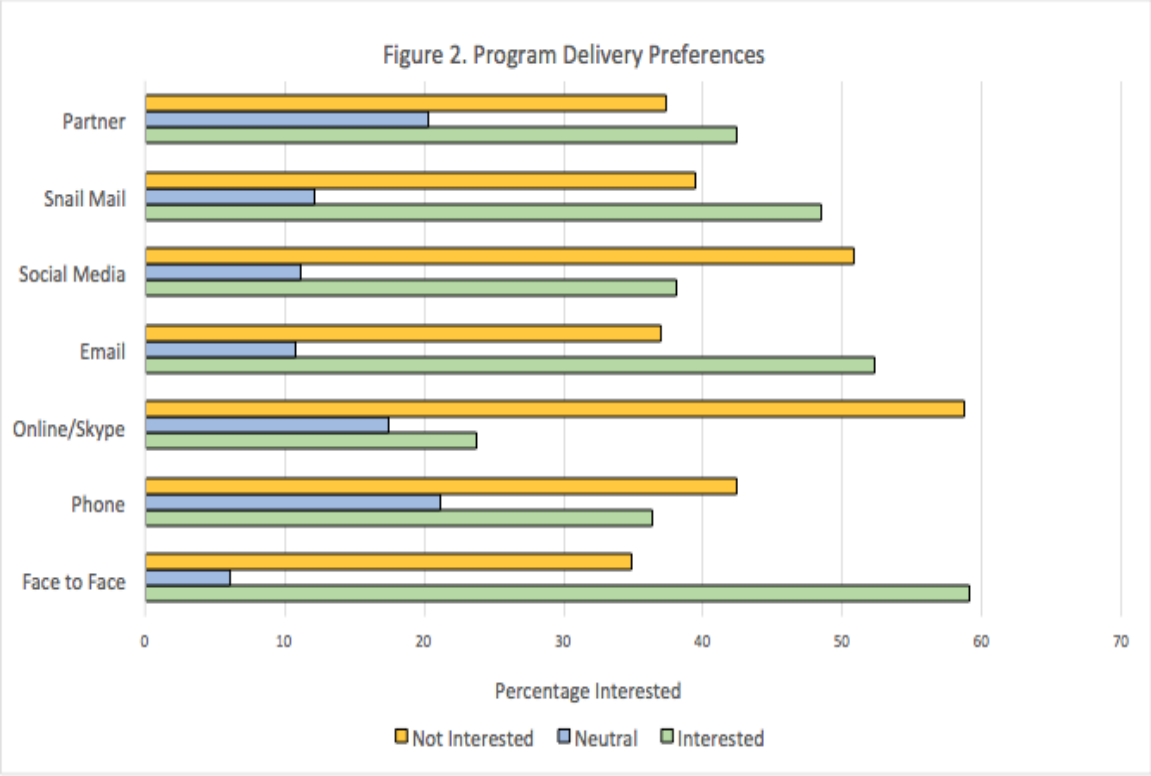
Table 3. Preference of frequency of sessions							
How Often?							
Weekly		Biweekly		Monthly		Either	
Frequency	%	Frequency	%	Frequency	%	Frequency	%
n=19	21.3	n=19	21.3	n=38	42.7	1	1.1

Table 4. Duration of Program Preference									
How Long?									
2 Months		3 Months		4 Months		6 Months		Either	
Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
n=16	18.0	n=14	15.7	n=5	5.6	n=36	40.0	n=2	2.2

Topics	Table 5. Self-reported Patient Diagnosis vs. Topic Interest (%)							
	Diabetes		Kidney Disease		Heart Disease		Hypertension	
Diabetes Management	Yes (n=19)	No (n=33)	Yes (n=4)	No (n=31)	Yes (n=4)	No (n-45)	Yes (n=22)	No (n=33)
Not Interested	1 (5.0)	8 (22.2)	1 (25.0)	6 (19.4)	2 (50.0)	7 (16.3)	3 (14.3)	6 (19.4)
Somewhat Interested	9 (45.0)	5 (13.9)	1 (25.0)	4 (12.9)	- -	3 (7.0) 5 (11.6)	3 (14.3) -	1 (3.2) 5 (16.1)
Neutral	8 (40)	12 (33.3)	- -	12 (38.7)	2 (50.0)	17 (39.5)	7 (33.3)	12 (38.7)
Very Interested	-	6 (16.7)	2 (50.0)	7 (22.6)		11 (25.6)	8 (38.1)	7 (21.2)

Blood Pressure Management	1 (5.3)	7 (20.0)	1 (25.0)	5 (15.2)	- -	8 (17.8)	2 (9.1) 2 (9.1)	6 (18.2)
Not Interested	1 (5.3)	1 (2.9)		1 (3.0)		2 (4.4)	-	1 (3.0)
Somewhat Interested	-	4 (11.4)	-	3 (9.1)	1 (25.0)	4 (8.9)	10 (45.5)	4 (12.1)
Neutral	11 (57.9)	13 (37.1)	- -	15 (45.5)	3 (75.0)	19 (42.2)	8 (36.4)	13 (39.4)
Interested	8 (40.0)	10 (28.6)	3 (75.0)	8 (24.2)		12 (26.7)		9 (27.3)
Very Interested								
Weight Loss								
Not Interested	1 (5.3)	2 (6.1)	-	2 (6.5)	1 (25.0)	2 (4.7)	3 (14.3)	-
Somewhat Interested	-	4 (12.1)	1 (25.0)	2 (6.5)		4 (9.3)		4 (12.9)
Neutral	2 (10.5)	4 (12.1) 10 (30.3)	1 (25.0)	4 (12.9)	- -	6 (14.0)	- 3 (14.3)	3 (9.7) 10 (32.3)
Interested	8 (4.21)		1 (25.0)	9 (29.0)		14 (32.6)		
Very Interested	8 (42.1)	13(39.4)	1 (25.0) 1 (25.0)	14 (45.2)	3 (75.0)	17 (39.5)	7 (33.3) 8 (38.1)	14 (45.2)

Physical Activity								
Not Interested	2 (10.5)	1 (2.9)	-	2 (6.3)	1 (25.0)	2 (4.5)	3 (14.3)	-
Somewhat Interested	1 (5.3)	4 (11.8)	-	4 (12.5)	-	5 (11.4)	2 (9.5)	3 (9.4)
Neutral	1 (5.3)	7 (20.6)	1 (25.0)	4 (12.5)	-	7 (15.9)	2 (9.5)	6 (18.8)
Interested	7 (36.8)	15 (44.1)	1 (25.)	8 (25.0)	3 (75.0)	11 (25.0)	6 (28.6)	7 (21.9)
Very Interested	8 (42.1)		2 (50.0)	14 (43.8)		19 (43.2)	8 (38.1)	16 (50)



APPENDIX C.

OUTPATIENT NUTRITION CHART

North Central Family Medical Clinic Outpatient Nutrition Chart

Referred by:

Medical Nutrition Therapy

Hyperlipidemia/Dyslipidemia	Hypertension	Diabetes	Renal Disease
Pertinent Labs:			

NUTRITION ASSESSMENT

Diet Hx/Assessment	

NUTRITION DIAGNOSIS

NUTRITION INTERVENTION

Nutrition Prescription	
Nutrition Education-Content: ○ Purpose of nutrition education E-1.1 ○ Priority modifications E-1.2 ○ Survival Information E-1.3 ○ Nutrition relationship to health/disease E-1.4 ○ Recommended Modiciations E-1.5 ○ Other or related topics E-1.6 ○ Other (specify):_____ E-1.7	Nutrition Counseling-Strategies: ○ Motivational Interviewing ○ Goal setting C-2.1 ○ Self-monitoring ○ Problem solving C-2.2 ○ Social support C-2.3 ○ Stress management C-2.4 ○ Stimulus control C-2.5 ○ Cognitive restructuring C-2.6 ○ Relapse prevention C-2.7 ○ Rewards/contingency management C-2.8 ○ Other (specify):_____ C-2.9 C-2.10

	C-2.11
Nutrition Counseling- Theoretical Basic/Approach: o Cognitive-Behavioral Theory C-1.1 o Health Belief Model o Social Learning Theory C-1.2 C-1.3 o Transtheoretical Model/ Stages of Change C-1.4 o Other (specify): _____ C-1.5	Nutrition Education- Application: E-2.1 E-2.2 E-2.3 o Result interpretation o Skill development o Other (specify):_____
Goal(s):	

NUTRITION MONITORING AND EVALUATION

Notes:_____ _____ _____ _____

Nutritionist _____
Date: _____

APPENDIX D.

PRIMARY CARE PROVIDER SURVEY

Three-Month Nutrition Counseling and Education Pilot Program Assessment
North Central Family Medical Center & The Department of Human Nutrition, Winthrop University

Please circle or "check" responses directly on the survey.

General Information

1. I am a
    a. Physician
    b. Physician Assistant
    c. Nurse Practitioner
    d. Other:_____

    I am a provider at the:

    ❑ Adult Clinic – Rock Hill

    ❑ Adult Clinic – Chester

    ❑ Pediatric Clinic

2. I have worked at NCFMC for:
    a. Less than a year
    b. 1-5 years
    c. 5-10 years
    d. 10+ years

General Feedback Regarding Nutrition Counseling/Education Services

3. Office adjustments to accommodate nutrition counseling/education services were complicated.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree

4. If so, please select all accommodations that were complicated:
    ❑ Providing space
    ❑ Scheduling
    ❑ Referral process
    ❑ Accessing patient nutrition charts
    ❑ Other:_____

5. Provision of nutrition counseling/education services within the clinic (as opposed to referring patients to a different location) was beneficial.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree

    If so, please select any of the following regarding how nutrition counseling/education services in the clinic were beneficial:
    - ❑ Outcomes
    - ❑ Feedback
    - ❑ Easier collaboration (between provider and nutrition services)
    - ❑ Patient satisfaction
    - ❑ Provider satisfaction
    - ❑ Other:_____

6. Prior to the start of this program, how frequently did you refer patients to a dietitian?
    a. Did not refer patients
    b. Very rarely (once a month or less)
    c. Rarely (2-3 times a month)
    d. Occasionally (2-3 times a week)
    e. Frequently (1-2 times a day)
    f. Very frequently (more than 2 times a day)

    If you previously made referrals please describe how outside referrals were made:

7. Since the start of this program, the number of patients you refer to nutrition counseling/education has increased overall.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree

8. Please select all barriers that may have prevented you from referring a patient to a dietitian prior to this program.
    - ❑ Cost to patient
    - ❑ Patient not interested
    - ❑ Long waiting list
    - ❑ Lack of perceived access
    - ❑ Availability to subsidize services
    - ❑ Lack of time to refer
    - ❑ Other:_____

9. The option to refer patients for nutrition counseling/education at the clinic reduced some of the burden to provide nutrition/lifestyle counseling by providers.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree

10. If so, please explain how this burden was reduced?

11. Prior to the start of the program, what was the average amount of time per visit spent discussing nutrition-related topics?
    a. No time
    b. 1-2 minutes
    c. 3-5 minutes
    d. 5-10 minutes
    e. 10+ minutes
    f. Other: _____

12. During a patient visit, which of the following has prevented you from providing nutrition/lifestyle counseling?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Lack of time					
Inadequate reimbursement					
Lack of nutrition education resources					
Lack of counseling training					
Patient noncompliance					
Lack of nutrition training					

13. Since the start of the program the amount of time you spend discussing nutrition-related topics has decreased overall.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree

14. General feedback/suggestions regarding patient referrals:

15. You are satisfied with the overall nutrition education/counseling services provided in collaboration with the Department of Human Nutrition/Winthrop University.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree

16. Current focus of nutrition education/counseling on promoting general healthful diet, physical activity and weight management for patients is:
    a. Sufficient
    b. Would like more condition specific services to be provided for management/prevention. (if so, what conditions: _____)
    c. Other:
       _____
       _____

17. Do you have any other feedback or suggestions regarding the pilot program, services, etc?

18. I am _____ in reviewing/receiving outcome data analysis and reports from the full program review (e.g. number of counseling visits, follow-ups, changes in labs and/or weight)
    a. Not interested
    b. Somewhat interested
    c. Very interested

Nutrition Charting Feedback (documentation of services)

19. Nutrition charts received from referred patients were scanned and received in timely manner.
    a. Strongly disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly agree
    f. Not applicable

20. After patient attended counseling, the nutrition charts were reviewed by you.
    a. Always
    b. Frequently
    c. Sometimes
    d. Not frequently
    e. Never
    f. Not applicable

21. Nutrition charts/documentation of counseling/education visits were: (Skip if response to Q.11 was not applicable)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Legible					
Informative/clear regarding education/counseling strategies, topics, and goals					
Beneficial for provider's patient care plans					

22. Are there any improvements/changes that could be made regarding document and/or on the nutrition chart itself (See back page for example)? If so, please elaborate (Please also feel free to make comments on the chart).

22. Do you have any other feedback or suggestions regarding the pilot program, services, etc?

Thank you for taking the time to complete this survey.