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A Carbohydrate Counting Intervention for Hispanics with Type 2 Diabetes

Flavia Cattaneo
University of Rhode Island, flaviacattaneo77@gmail.com

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A CARBOHYDRATE COUNTING INTERVENTION FOR
HISPANICS WITH TYPE 2 DIABETES

BY
FLAVIA CATTANEO

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
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MASTER OF SCIENCE THESIS
OF
FLAVIA CATTANEO

APPROVED:

Thesis Committee:

Major Professor Geoffrey Greene

Linda Sebelia

Alison Tovar

Diane Martins

Nasser H. Zawia
DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND
2017

ABSTRACT

The purpose of this study is to determine if a culturally tailored carbohydrate (CHO) counting intervention for low-income Hispanics with Type 2 Diabetes (T2DM) will increase their knowledge and skills related to CHO counting.

This non-experimental, single group design assessed knowledge of CHO counting in adult Hispanics with T2DM with pre- and post-surveys. Recruitment and intervention delivery were in three community locations in the Providence RI area. The intervention consisted of 3-workshops, 1-hour each, conducted in Spanish. Each workshop covered information on portion sizes guides, nutrition facts label reading, CHO amounts in commonly consumed foods and CHO counting activities. The sample was described using means and standard deviations for continuous normally distributed variables, proportion for categorical variables. Paired t-tests assessed change in knowledge. Frequency analysis described the CHO counting skill score. It was hypothesized that knowledge would increase and the post skills assessment score would exceed 80% indicating the mastery of the carbohydrate counting skill activity. Data were analyzed using SPSS Version 23. A probability level of $p < .05$ was utilized.

Of the 42 participants that began the program, 33 finished the intervention. Average age was 62 years and 90% were female. Participants reported an average of 6.8 years since T2DM diagnosis. The average time living in the U.S. was 25 years and 52% were from Dominican Republic. Participants had a significant increase in knowledge from pre- to post- of 2.58 points ($p < .01$) and achieved 100% of the CHO counting skill score at post-assessment. The program was positively evaluated at post with an average score of 4.7 out of 5 for seven evaluation questions.

The study found that low-income Hispanics with T2DM increased knowledge of CHO counting and demonstrated skills in CHO counting. This program provided an educational opportunity for low-income Hispanics with T2DM.

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PREFACE

This thesis has been prepared in a manuscript format for *The Diabetes Educator* Journal. Manuscript format follows the magazine's manuscript guidelines for authors. The manuscript may be submitted for publications.

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MANUSCRIPT

A Carbohydrate Counting Intervention for Hispanics with Type 2 Diabetes

Flavia Cattaneo¹

Geoffrey Greene PhD, RD, LDN²

Linda Sebelia MA, MS, RD, LDN³

Alison Tovar PhD, MPH⁴

Diane Martins PhD, RN⁵

For submission to *The Diabetes Educator Journal*

¹ Department of Nutrition and Food Sciences, Fogarty Hall, University of Rhode Island, Kingston RI 02881 (flaviacattaneo@my.uri.edu)

² Department of Nutrition and Food Sciences, Fogarty Hall, University of Rhode Island, Kingston RI 02881 (gwg@uri.edu)

³ Department of Nutrition and Food Sciences, Fogarty Hall, University of Rhode Island, Kingston RI 02881 (sebelia@uri.edu)

⁴ Department of Nutrition and Food Sciences, Fogarty Hall, University of Rhode Island, Kingston RI 02881 (alison_tovar@uri.edu)

⁵ Department of Health and Human Services, White Hall, University of Rhode Island, Kingston RI 02881 (dcmartins@uri.edu)

ABSTRACT

Purpose: The purpose of this study was to determine if a culturally tailored carbohydrate (CHO) counting intervention for low-income Hispanics with Type 2 Diabetes (T2DM) increased their knowledge related to CHO counting.

Methods: This non-experimental, single group design assessed knowledge of CHO counting in adult Hispanics with T2DM with pre- and post-surveys. Recruitment and intervention delivery were in three community locations in the Providence RI area. The intervention consisted of three, 1 hour-workshops, conducted in Spanish. The workshops covered information on portion sizes guides, nutrition facts label reading, CHO amounts in commonly consumed foods and CHO counting activities. Paired t-tests assessed change in knowledge and post-skill assessment score was described, in addition the average of the program evaluation items was compared to the neutral response of 3.

Results: Of the 42 participants that began, 33 completed the program. Average age was 62 years and 90% were female. All participants self-identified as Hispanics, reported an average of 6.8 years since T2DM diagnosis, an average of 25 years living in the U.S. and 52% were from Dominican Republic. Participants increased in knowledge ($p < .01$) and 100% demonstrated CHO counting skill at post-assessment. The program was positively evaluated with an average score of 4.7 out of 5 which was significantly higher than 3.

Conclusion: The study found that low-income Hispanics with T2DM increased knowledge of CHO counting and demonstrated skills in CHO counting. This

program provided an educational opportunity for low-income Hispanics with T2DM.

INTRODUCTION

Diabetes mellitus (DM) is one of the oldest diseases of mankind. Type 2 Diabetes (T2DM) is a common form of DM characterized by hyperglycemia, insulin resistance and relative insulin deficiency (1). In addition to genetic factors, T2DM is caused by environmental factors such as obesity, overeating, lack of exercise, stress and aging (2).

Diabetes is the leading causes of kidney failure, lower limb amputations and blindness among adults (3). There are 1.4 million new cases of DM every year and currently, 1.7 million adults have T2DM, and at least one out of three individuals will develop T2DM in their lifetime (3).

As the United States (U.S.) population rises, racial and ethnic disparities in diagnosed DM have grown as well. In 2015 the Hispanic population was the nation's largest ethnic or racial minority constituting 55 million or 17.6% of the total population (4). The Centers for Disease Control and Prevention (CDC) reported that 12.8% of Hispanics have DM, compared to 9.3% of non-Hispanics whites (5). Hispanics are 66% more likely to develop DM than non-Hispanics, and suffer disproportionately from the long-term DM related complications, including hypertension, heart disease, stroke, kidney disease, blindness, nervous system disease and lower limb amputation (6). The National Health Interview Survey and the Third National Health and Nutrition Examination Survey found that Hispanics were 50% less likely to self-monitor blood glucose, had lower levels of leisure-time activities, consumed more carbohydrate (CHO) and fewer vegetables, and were more likely to be overweight compared to non-Hispanics whites (7). In addition, Hispanics with DM

encounter additional challenges to accessing health care services, including barriers of language, literacy and culture, as well as lack of transportation (8).

The Diabetes Control and Complications Trial (DCCT) found that Hemoglobin A1C (A1C) levels lower than 7% and maintaining blood glucose levels at 80 mg/dL before meals slows the onset and progression long-term complications (9,10). Diabetes self-management is key to achieve glycemic control and improving health outcomes. There is strong evidence that following a healthy diet and exercise program, taking DM medications and monitoring blood glucose improves DM outcomes (6).

Research has supported the role of CHO counting in the management of blood glucose (11). Proficiency in CHO counting allows increased flexibility in meal planning and increasing dietary freedom, which is an important consideration for quality of life of individuals with DM (11). Successful CHO counting depends on accurately assessing serving sizes, knowing CHO content of foods eaten and fitting CHO choices into meal plans (12). CHO counting has been associated with a significant reduction in A1C levels (13,14) without an increase in hypoglycemic events (13). However, there are limited studies that explore CHO counting educational programs for Hispanics with T2DM that address the needs of this population such as language, low-literacy, limited income and culture (15).

Diabetes education plays an essential role in the self-care management of individuals. Educational programs that teach participants monitoring blood glucose, diet and CHO counting are important (16). Hispanics have a higher prevalence of developing T2DM than non-Hispanics, thus DM education for Hispanics are needed to

assist this disadvantaged population (17). Fifty to 80% of the Hispanic population with DM has a significant knowledge and skill deficit related to management of DM (17). Culturally tailored DM interventions for Hispanics designed to increase knowledge of CHO counting are needed that address barriers such as language, low-literacy and culture (16).

The objective of this study was to assess whether low-income Hispanics would increase knowledge of CHO counting through a community-based CHO counting education program culturally tailored for Hispanics.

METHODOLOGY

This study assessed carbohydrate (CHO) counting knowledge in low-income Hispanics with T2DM after 3, one-hour educational sessions. The intervention used a non-experimental, single group design with a pre- and post-surveys to assess knowledge of CHO counting and a post- CHO counting skill assessment activity as primary outcomes.

Sample and Locations

The population of interest for this study was low-income Hispanics with T2DM. Inclusion criteria were self-identification as Hispanic, diagnosis of T2DM by a medical doctor, Spanish and/or English speaking with a reading comprehension level of fifth grade based on the Flesch-Kincaid Grade Level (18). Exclusion criteria included any life-threatening illness and the inability to attend all 3-sessions. Inclusion criteria were assessed by use of a sign-up form that was completed by the participants before the study began.

Participants were recruited from the RI Free Clinic, Progreso Latino and Elmwood Community Center. The Rhode Island Free Clinic, located in Providence, provides free medical care and preventive health services to low-income uninsured adults that cannot afford health services. Progreso Latino is a non-profit, community based organization in Central Falls. It provides programming to help empower Rhode Island's Latino and immigrant communities to achieve self-sufficiency and socio-economic progress. The Elmwood Community Center supports the development of human service programs to help improve the lives of low to moderate income individuals and families in Providence. The Center provides culturally supportive

services and programs which promote economic self-sufficiency such as a weekly food pantry.

A sign-up/assessment form was used in all three facilities for recruitment. This form facilitated the collection of demographic and disease related data for all participants. Baseline knowledge of DM was assessed by the questions, “Do you know what carbohydrates are?” and “Do you know what carbohydrate counting is?”, with response categories of “Yes”, “No” or “I don’t Know”. A consent form was also included for participants to review and sign. Recruitment was conducted as follows: At the RI Free Clinic, the researcher recruited 18 eligible participants during clinic appointment times. At Progreso Latino, the researcher recruited 14 eligible participants from existing wellness programs for Hispanics with T2DM. At Elmwood Community Center, the researcher recruited 26 eligible participants from existing programs for Hispanics as well as during food pantry hours. Promotional flyers were posted around the facilities to help with recruitment. The researcher contacted individuals to confirm participation prior to the intervention start date.

The study was approved by the University of Rhode Island Institutional Review Board.

Intervention

Prior to delivery of the three workshops, the materials and content were pilot tested with five participants at the Rhode Island Free Clinic. Pilot participants positively evaluated all aspects of the program, thus no changes were made to the lessons or materials except for one question in the pre- post-surveys. Pilot participants were not included in the study.

The intervention was delivered at each of the community settings. The 3-one hour workshops were conducted in Spanish. All materials, sign-up and consent forms, pre- and post-surveys, CHO counting skill assessment as well as all handouts were provided in Spanish and English.

Each workshop included visuals with pictures of common Hispanic foods and portion sizes, Nutrition Facts Label of a variety of foods, and CHO amounts from the food labels. There were also hands-on activities focusing on building a meal using the USDA ChooseMyPlate, reading the Nutrition Facts Labels, and CHO counting for participants to engage in. At the end of each workshop, participants practiced the skills learned and reviewed the lesson to assure comprehension. All topics in the workshops were based on SNAP-Ed's current evidence based curriculum including the Reading the Nutrition Facts Label lesson and the USDA ChooseMyPlate. The CHO counting portion of the workshops contained basic material from the American Diabetes Association (19) and Joslin Diabetes Center (20).

Educational program extenders (incentives) were provided at the end of each workshop. Examples of program extenders including measuring cups and a plastic USDA ChooseMyPlate to help with portion control. A healthy snack was provided at each workshop. The snacks were offered for the purpose of educating participants on portions sizes and to help recognize CHO in recipes.

Instruments

The researcher created the pre- and post-knowledge surveys consisting of ten multiple choice questions. Answers were scored as correct or incorrect and the sum of correct items was computed. Items were developed based on topics from each

workshop because there was no validated CHO counting knowledge survey to use for this study. The survey was reviewed for face validity and relevance by registered dietitians, nurses and DM educators. Besides the expert review, the pilot assessed the appropriateness of the content of the questions. Participants had difficulty with the question: “Where do you find the word sugar on the Nutrition Facts Label?” That question was replaced with: “How many grams of carbohydrates do you need per snack?”, with response options: 10g, 30g, 45g, 15-20g, 15g.

Participants completed the pre-survey at the start of the first workshop to assess CHO knowledge. The post-survey was completed during the third workshop. The researcher was present during assessments and read the ten questions and response categories aloud in Spanish, to assure comprehension before the participants chose their answers. By reading the questions and the answers one at a time aloud to participants, the researcher assured that the wording of each question was clearly understood. The researcher moved on to the next question once all participants had answered the current question. The survey had a literacy level of fifth grade according to the Flesch-Kincaid Grade Level (18).

Skill of CHO counting was assessed by having participants assemble a meal using the USDA ChooseMyPlate handout. Pictures of common Hispanic foods were provided including the total grams of CHO and portion sizes on each picture. The pictures represented three different breakfasts, three different lunches and three different dinners, and were placed into labeled plastic bags: breakfast 1, 2, 3, lunch 1, 2, 3, dinner 1, 2, 3. Participants were given a meal (a plastic bag) and asked to assemble a meal, by attaching pictures on the USDA ChooseMyPlate handout on the

proper five food groups with 45-60g of CHO for the meal. Participants received calculators to assist on adding the total amount of CHO and recorded their answers on a ChooseMyPlate recording form. CHO counting skill assessment calculations on the form were confirmed by the researcher before disassembling each plate. A total of 100 points were given to participants who assembled the meal between 45-60g of CHO, and 10 points was deducted for every 10g above or below this range. All pilot program participants scored 100 points.

Overall program evaluation included seven questions adapted from previous SNAP-Ed evaluations: length of the program, recommend the program to a friend with DM, program met expectations, program lessons/content, presenter, handouts, overall with standard Likert-type anchored response categories ranging from strongly disagree (1) to strongly agree (5). The average of the items was calculated and compared to the neutral response (neither agree nor disagree; 3).

Analysis

All continuous variables were normally distributed. The sample was described by mean and standard deviation for continuous variables and proportion for categorical variables. Chi-square and t-tests compared the baseline values between program completers and non-completers. The first hypotheses, change in knowledge, was analyzed by a paired t-test. The second hypotheses, competency in CHO counting, was assessed by the post-assessment activity and the proportion meeting the criterion was calculated. The third hypothesis, overall program was assessed by comparing the average of the evaluation items to the neutral (3) response by paired t-test.

Data were analyzed using SPSS Version 23 (IBM SPSS Statistics V23.0; SPSS, Inc., Chicago, IL). A probability level of $p < .05$ was utilized.

RESULTS

Demographics

A total of 42 participants began and 33 participants completed the study and nine participants did not complete the study. The overall attrition rate was 22%. The characteristics of the sample are shown in Table 1. Overall, participants were predominantly female (90%). The average participant had lived in the U.S. for 25 years. All participants spoke Spanish and were of Hispanic origin. The majority of the participants (52%) were from Dominican Republic. The average time since DM diagnosis was 6.8 years. A total of 42 participants attended to the first workshop, 36 attended to the second workshop, and 33 attended to the third workshop.

There were no statistically significant differences between the completers and non-completers for disease related variables except age and knowledge of CHO ($p=0.03$) and CHO counting ($p=0.04$) based on questions completed on the sign-up/assessment form during recruitment. Completers were older ($p=0.01$) than non-completers.

Pre- and Post-Survey Scores

Thirty-three participants completed both the pre- and post-knowledge surveys. There was an increase in knowledge between the pre- and post-surveys (3.30 ± 1.72 to 5.88 ± 2.08 , $p=0.001$) (Table 2).

Carbohydrate Skill Test

A total of 33 participants completed the CHO skill test (Table 3) on the last day of the intervention. The test consisted of building a meal between 45-60g of CHO, using food pictures with total amount of CHO and the USDA ChooseMyPlate. All 33

participants (100%) successfully built a meal within target between 45 and 60g of CHO exceeding hypothesized criterion of 80%.

Program Evaluation

Thirty-three participants completed the 7-item program evaluation (Table 4). Participants evaluated the program positively with the average 4.68 ± 0.42 which was significantly higher than neutral (3.0) ($p=0.001$). The highest score was 4.73 on the “program overall” as well as the “length of the program”. The lowest score was 4.64 on the “recommend of the program to a friend with T2DM”.

DISCUSSION

This study provided a brief nutrition intervention for low-income Hispanics with T2DM to improve knowledge and skills related to CHO counting. Results indicated that participants increased knowledge of CHO counting. At the conclusion of the study, 100% of participants demonstrated the ability to competently assemble a meal using the CHO counting method. In addition, participants rated the program positively. To the authors knowledge, this was the first brief intervention solely on CHO counting among low-income Hispanics delivered in Spanish at community-based locations.

This study is similar to several studies targeting Hispanics with T2DM (6,16,17,21–25). Five of these studies included educational methods designed to decrease barriers such as language, low-literacy, limited income and cultural aspects such as beliefs and mistrust as well as low socioeconomic status. However, these studies were comprehensive, in-depth, DM education programs in contrast to the current study which was a brief intervention that focused solely on CHO counting (6,17,21,23,25). Although another study found that DM education improved blood glucose values and self-management (22); however, it did not target CHO counting. The two studies that included CHO counting with Hispanics did not show increase in knowledge of CHO counting (16,24).

The sample consisted of Spanish speaking Hispanics with slightly over half from the Dominican Republic. The majority of the study sample was older adults with an average age of 62 years. The Hispanic population that attends programs at Progreso Latino and Elmwood Center programs are older adults (>50 years). The age range in

the study was similar to other studies of T2DM (26–29).

Based on the baseline knowledge questions on CHO and CHO counting, completed on the recruitment sign-up/assessment form, 37% percent of study participants reported not knowing what CHO was and 60% reported not knowing what CHO counting was. Bishop et al. assessed CHO counting knowledge by an interviewer-administered questionnaire and found that 30% of participants with DM were not aware of the CHO counting method (30). The results of this study's baseline knowledge questions on CHO and CHO counting were supported by the pre-post-knowledge surveys used in this study which included three items on CHO knowledge in general and six related to CHO counting knowledge. Among study completers (n=33), on the pre-survey a total of 44% selected the correct answers on the CHO knowledge questions and 27% selected the correct answers for CHO counting. On the post-survey 62% selected the correct answers on the CHO knowledge and 68% selected the correct answers on the CHO counting knowledge. Although there was an increase in knowledge of 2.58 points, participants averaged 59% on the post-survey indicating continued knowledge deficits. Reasons expressed by participants for wrong answers included not having DM education before, not being seen by a DM educator such as a dietitian, nurse or pharmacist, or not fully understanding the topic since the majority never heard the term CHO counting before. Although two studies involving Hispanics with DM, included CHO counting as part of the educational program, they did not assess CHO counting knowledge. However these studies assessed dietary intake and found was participants showed improvements in diet adherence, including reduction of high CHO meals from baseline (16,24).

The CHO counting skill assessment was built using the USDA SNAP-Ed's ChooseMyPlate (31). Calculators were provided to assist with calculations and the total amount of CHO was printed on each picture to aid participants complete the activity. Results indicated that all participants were able to apply the material, perhaps because it was tailored to Hispanics and included familiar food pictures and visuals in Spanish. This indicates improvement in skill, as described above, most participants did not know how to count CHO before the intervention. Other studies included CHO counting skill training as part of the education, but focused on implement flexible eating and medication regimens rather than assessing knowledge of CHO counting skills (12,32,33). To the author's knowledge, there are no studies on CHO counting skill assessment done for the Hispanic population with limited literacy.

Although eighteen participants were recruited from the Rhode Island Free Clinic, only six attended the first workshop and four finished the study. At Progreso Latino, thirteen attended the first workshop eleven finished the study. At Elmwood Center, twenty-three attended the first workshop and eighteen finished the study. The researcher called all recruited participants (58) prior to the beginning of the intervention to confirm participation, as well as followed up with participants that did not attend the first workshop. Barriers such as transportation, work hours and illness were the primary reasons for not attending. It is likely that the higher attendance at the Progreso Latino and Elmwood Center was because participants were already at the locations for prior commitments, such as all day senior care or food distribution. At the RI Free Clinic, participants had to find transportation in order to get to the location just for the DM workshops. Results are similar to other community-based studies on

DM for Hispanics which showed low attendance at group sessions due to program length, scheduling conflicts, transportation and lack of time to commit to the study (26,34).

Overall, the participants rated the program positively and reported it to be engaging and motivating. They had a positive opinion of the materials and stated they would recommend the program to a friend with DM. Positive program evaluations directly correlate to increase retention of the presented material (35).

Limitations

This study has some limitations. First, this was a non-experimental single-group study without comparison group and participants' biochemical values were not assessed due to limited resources. Another limitation was the small sample size; however, it was designed as a preliminary study to provide direction for future research in T2DM education and behavior change. The non-validated instruments were also a limitation. Even though the instruments were reviewed by experts in the DM field and assessed during the pilot, they were designed for this study and not validated. Additionally, there was a lack of hard outcomes measures, such as the A1C levels. However, previous research has found that the CHO counting method decreased A1C levels as well as reduced the long-term complication of DM (22,25,36). Although participants showed an increase in knowledge of CHO counting, additional research is required to determine the long-range effects of this study on outcomes such as A1C levels.

Strengths

One of the strengths of this study is that it was culturally tailored to low-income,

medically underserved, low-literate Hispanics with T2DM and it was delivered in Spanish by Hispanic educators. To the authors knowledge, no study has been published using the CHO counting method as a sole educational intervention for this population.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

There is a need for studies on CHO counting interventions among low-income Hispanics with T2DM. The current study was one of the few that addressed this medically underserved population. Future studies are needed to develop and evaluate interventions and develop programs in the community that address the issues faced by Hispanics. The sample had minimal knowledge of the CHO counting method prior to the study. This study provided basic knowledge of foods containing CHO and the CHO counting method which could help improve DM self-care management. This study provided strong evidence that nutrition education intervention in the community may contribute to the DM self-care management for the limited income Hispanic population.

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TABLES

Table 1. Demographic Data of Study Participants

Continuous Variables	Completer <i>n</i> =33	Non-completer <i>n</i> =9	Total <i>n</i> =42	<i>t</i>	<i>p</i>
	Mean ± SD	Mean ± SD	Mean ± SD		
Age (Years)	64.7 ± 11.0	52.3 ± 17.7	62.1 ± 13.5	2.62	0.01
How long live in the US (Years)	26.1 ± 14.1	20.9 ± 15.8	24.9 ± 14.5	0.96	0.34
How long have DM (Years)	6.9 ± 5.5	6.5 ± 4.1	6.8 ± 5.1	0.18	0.86
Pre-Test knowledge score ¹	3.3 ± 1.7	3.3 ± 1.8	3.3 ± 1.7	-0.09	0.92
Categorical Variables	Completer <i>n</i> (%)	Non-completer <i>n</i> (%)	Total <i>n</i> =42 (%)	χ^2	<i>p</i>
Gender				0.03	0.86
Male	3 (75.0%)	1 (25.0%)	4 (10%)		
Female	30 (78.9%)	8 (21.1%)	38 (90%)		
Total	33 (78.6%)	9 (21.4%)	42 (100%)		
Language					
Spanish	33 (78.6%)	9 (21.4%)	42 (100%)		
Total	33 (78.6%)	9 (21.4%)	42 (100%)		
Origin					
Hispanic	33 (78.6%)	9 (21.4%)	42 (100%)		
Total	33 (78.6%)	9 (21.4%)	42 (100%)		
Country				1.85	0.17
Dominican Republic	18 (85.7%)	3 (14.3%)	21 (52%)		
Puerto Rico	2 (100%)	0 (0.0%)	2 (5%)		
Guatemala	2 (50.0%)	2 (50.0%)	4 (10%)		
Colombia	9 (69.2%)	4 (30.8%)	13 (33%)		
Total	31 ² (77.5%)	9 (22.5%)	40 (100%)		
Had DM education				0.75	0.39
Yes	13 (72.2%)	5 (27.8%)	18 (47%)		
No	13 (76.5%)	4 (23.5%)	17 (45%)		
Don't know	3 (100%)	0 (0.0%)	3 (8%)		
Total	29 ³ (76.3%)	9 (23.7%)	38 (100%)		
Follow DM meal				0.17	0.68
Yes	13 (76.5%)	4 (23.5%)	17 (45%)		
No	13 (72.2%)	5 (27.8%)	18 (47%)		
Don't know	3 (100%)	0 (0.0%)	3 (8%)		
Total	29 ³ (76.3%)	9 (23.7%)	38 (100%)		
Know what CHO is				4.86	0.03
Yes	13 (61.9%)	8 (38.1%)	21 (55%)		
No	13 (92.9%)	1 (7.1%)	14 (37%)		
Don't know	3 (100%)	0 (0.0%)	3 (8%)		
Total	29 ³ (76.3%)	9 (23.7%)	38 (100%)		
Know what CHO count is				0.04	0.83
Yes	8 (72.7%)	3 (27.3%)	11 (29%)		
No	18 (78.3%)	5 (21.7%)	23 (60%)		
Don't know	3 (75.0%)	1 (25.0%)	4 (11%)		
Total	29 ³ (76.3%)	9 (23.7%)	38 (100%)		

Control portions				0.00	0.99
Yes	15 (75.0%)	5 (25.0%)	20 (53%)		
No	12 (80.0%)	3 (20.0%)	15 (39%)		
Don't know	2 (66.7%)	1 (33.3%)	3 (8%)		
Total	29 ³ (76.3%)	9 (23.7%)	38 (100%)		
Read Nutrition Facts Label				0.04	0.84
Yes	15 (75.0%)	5 (25.0%)	20 (53%)		
No	14 (77.8%)	4 (22.2%)	18 (47%)		
Total	29 ³ (76.3%)	9 (23.7%)	38 (100%)		
Most difficult to control DM				0.18	0.67
Blood Sugar	13 (81.3%)	3 (18.8%)	16 (50%)		
Diet	12 (75.0%)	4 (25.0%)	16 (50%)		
Total	25 ⁴ (78.1%)	7 ⁵ (21.9%)	32 (100%)		

p<0.05

¹ Pre-test knowledge score (10 items, each correct answer worth 1 point, minimum 0, maximum 10)

² Two completers did not provide country of origin

³ Four completers did not provide answer

⁴ Eight completers did not provide answer

⁵ Two non-completers did not provide answer

Table 2. Comparison of the Pre- and Post-Test Knowledge Scores Among Study Completers⁶ (n=33)

	Mean ± SD	<i>t</i>	<i>p</i> value
Pre-Test	3.30 ± 1.72		
Post-Test	5.88 ± 2.08		
Pre- & Post-Test	2.58 ± 2.41	6.13	0.001

p<0.05

⁶ Pre-test knowledge score (10 items, each correct answer worth 1 point, minimum 0, maximum 10)

Table 3. Carbohydrate Counting Skill Test Result Among Study Completers⁷ (n=33)

Grams of CHO	Frequency (%)
45	8 (24.3%)
46	2 (6.0%)
47	2 (6.0%)
48	4 (12.2%)
49	1 (3.1%)
50	6 (18.2%)
51	3 (9.1%)
52	2 (6.0%)
56	2 (6.0%)
58	1 (3.1%)
60	2 (6.0%)
Total	33⁸ (100%)

⁷ CHO counting skill test between 45-60g of CHO

⁸ All participants met criterion

Table 4. Program Evaluation Among Study Completers⁹ (n=33)

Questions	Mean ± SD
The program met my expectations	4.70 ± 0.46
The program had useful information content	4.67 ± 0.48
The presenter was able to easily share the information	4.67 ± 0.65
The handouts given were useful and important	4.67 ± 0.48
Overall, how would you rate this program	4.73 ± 0.45
I would recommend this program to a friend with type 2 diabetes	4.64 ± 0.49
The length of the program was appropriate	4.73 ± 0.45
Average	4.68 ± 0.42

⁹ Participants rated the program between strongly disagree (1) and strongly agree (5)

APPENDICES

APPENDIX A – REVIEW OF LITERATURE

Introduction

Type 2 diabetes (T2DM) is one of the most common leading chronic medical conditions affecting millions of individuals in the United States (U.S.) (3). Diabetes (DM) has a significant impact on the health care system and is the leading cause of kidney failure, non-traumatic lower limb amputations, blindness, stroke, kidney and heart disease (3). It is estimated that 12.8% of the Hispanic population in the U.S. has been diagnosed with DM compared to 9.3% of the non-Hispanic population (37). Each year, Hispanics diagnosed with DM grows at an alarming rate of 3% becoming an economic and social concern (37,38).

It is known that the long-term complications of DM may be delayed or prevented by optimal maintenance of blood glucose control with carbohydrate (CHO) counting (14). Controlled blood glucose levels lead to decreased A1C levels reducing the chances of developing stroke, kidney and heart disease, blindness and peripheral vascular disease leading to amputations (39). CHO counting is a meal-planning tool for individuals with DM that involves keeping track of the amount of CHO in the foods consumed each day (39).

Diabetes education plays an essential role in the self-care management of individuals. Educational programs that teach participants monitoring blood glucose, diet and CHO counting are fundamental (16). Hispanics have higher prevalence of developing T2DM than non-Hispanics, thus DM education is a key element to assist this disadvantaged population (17). In addition, the Hispanic population in the U.S.

encounters many barriers, such as language, low literacy and cultural factors, therefore culturally tailored DM programs for this population are essential to improve quality of life (40).

This literature review explores the current literature about T2DM in Hispanics, barriers this population encounters, knowledge of CHO counting and efficacy of interventions/education programs for this population in the U.S.

Overview of Type 2 Diabetes

Diabetes mellitus is a metabolic disorder characterized by high concentrations of blood glucose due to partial or total failure of the pancreas to produce and secrete the hormone insulin (41). T2DM is caused by insulin resistance, which occurs when insulin is not properly utilized by the cells, therefore increasing blood glucose (41). In addition to genetic factors, T2DM is caused by environmental factors such as obesity, overeating, lack of exercise and stress, as well as aging (2). Blood tests are used to diagnosis DM because many may have no symptoms. Lab analysis of blood is necessary to ensure test results are accurate. Testing enables health care providers to find and treat DM before complications occur. Blood test levels for diagnosis of DM are hemoglobin A1C > 6.5% or above, fasting plasma glucose 126 mg/dL or above and oral glucose tolerance test 200 mg/dL or above (42). The disease course is primarily characterized by a decline in beta-cell function and worsening insulin resistance. The process is manifested clinically by deteriorations in multiple parameters, including A1C, fasting plasma glucose (FPG), and postprandial glucose levels (43).

It is expected that by the year of 2025, 333 million individuals around the world will be affected by T2DM (44). The 2014 National Diabetes Statistics Report by the Centers for Disease Control and Prevention (CDC) reported that from 1980 through 2014 the number of individuals with T2DM has increased from 5.5 to 29.1 million or 9.3% of the population in the U.S. (5,45).

The long-term complications of DM are severe in all ages and races including retinopathy (microangiopathy affecting the capillaries of the eye), nephropathy (micro-angiopathy that affects the capillaries of the kidney), neuropathy (disease affecting nerves) and cardiovascular disease (disease of the heart and blood vessels) (9). When compared to a non-diabetic group, individuals with T2DM are 25 times more likely to become blind, 17 times more likely to develop kidney disease, 15 times more likely to require an amputation and twice as likely to experience a cerebrovascular accident (CVA) or myocardial infarction (MI) (46). Some of these complications can be monitored by recognition and response to the common symptoms of the disease. Acute and chronic symptoms that may be experienced include polydipsia (excessive thirst), hunger, polyuria (frequent urination), visual blurring, numbness and tingling in the extremities, calf pain on walking and fatigue (47).

Based on researched medical evidence by the Diabetes Control and Complications Trial (DCCT), a controlled Hemoglobin A1C (A1C) level decreases the chances of developing long-term complications of DM. The A1C blood test provides information about the individual's average levels of blood glucose over the past three months and is primarily used for DM diagnosis and management. The diagnostic

measure for DM is when A1C is higher than 6.5% (6). Tylee et al. studied glycemic control reflecting A1C levels and reported that when patients from different treatment groups with the same A1C levels were compared, those in the conventional group had higher rates of complications. This suggests that average blood glucose levels were contributing to the long-term complications of DM (48). As with many chronic conditions, DM patients are more concerned with physical and social function, emotional and mental health, and the burden of the illness than biomarkers such as A1C, blood pressure or lipid levels (36). Quality of life measures are therefore meaningful and pertinent outcomes from patients' perspective. Khanna et. al. evaluated the relationship between diabetes-specific quality of life and A1C before and after patients completes DM self-management programs (36). The study was conducted among 50-90 year-old T2DM patients within the VA healthcare system. Patients who had A1C >7.0% at baseline, completed two self-management programs, had A1C measurements at the VA clinic database at one-year follow-up and returned completed one-year follow-up questionnaires. Patients completed one of two DM self-management programs. Programs were conducted in group settings by a DM educator, focused on DM self-management education, the importance of integrating patient self-management into daily life, medications, meal preparation, portion size and control. The questionnaire assessed at one-year measured patients' quality of life including domains on DM control, anxiety and worry, social burden, sexual functioning, and energy and mobility. Out of 94 patients, a total of 75 completed the program. A1C at one-year follow-up was significantly associated with overall quality of life. Improvements in A1C among patients completing DM self-management interventions

were found significantly to be associated with increased quality of life on the domains described above. This study firmly established the relationship between improved A1C, a critical biomarker in DM, and the patient-centered diabetes-specific quality of life measure among patients completing the program (36).

Type 2 Diabetes in Hispanics

As the total population has risen in the U.S., the Hispanic population has grown as well, making it the nation's largest ethnic or racial minority constituting 55 million or 17% of the total population. (4). By 2060, the U.S. Census Bureau projects Hispanics will constitute 119 million or 28.6% of the nation's population (4). The CDC and the American Diabetes Association reported that 12.8% of Hispanics have been diagnosed with DM, compared to 9.3% of non-Hispanics (5,49). Researchers have found that Hispanic people have a higher prevalence of developing T2DM than non-Hispanic Caucasians. The risks vary considerably among this specific group and other factors, such as the length of time they have been living in the U.S., sedentary lifestyle leading to obesity, job stress independent of their lifestyle and income, low socioeconomic status including education and income (24,26). Major factors of T2DM self-management include glucose monitoring, good nutrition and regular physical activity; however, Hispanics have shown poor self-management of T2DM when compared to other races (6,7). The National Health Interview Survey and the Third National Health and Nutrition Examination Survey found that Hispanics were twice less likely to self-monitor blood glucose, had lower levels of leisure-time activities, consumed excessive amounts of CHOs and few vegetables, and were either

overweight or obese (7). In addition, Hispanics with DM encounter additional challenges to accessing health care services, including language, literacy and cultural barriers, lack of transportation and geographic inaccessibility among others (51). Hu et al. explored the perceptions of barriers of managing DM among the Hispanic population with T2DM. Seventy-three adult Hispanics with T2DM identified major barriers to DM self-management such as managing the disease, lack of resources, lack of knowledge and lack of support by family members. The study was conducted in a free health clinic in central North Carolina that provides health services to a large population of low-income Hispanics. Patients diagnosed with T2DM and family members attended focus groups held in Spanish which allowed participants and their families to express their beliefs and attitudes towards barriers to DM self-management. Open-ended questions were used to interview patients and their family members such as, “What is the bigger obstacle/barrier that you face in managing this disease?” and, “What is the most difficult for you?” The study revealed that Hispanics with T2DM and their family members have barriers particular to the cultural and family values of self-management of DM. Barriers perceived by both patients and family members require culturally specific understanding, clinical assessment and attentiveness by health providers, the Hispanic community and society at large. Efforts to remove barriers are important to assist this population and their families to improve their quality of life and health outcomes (6).

Osborn et al. investigated the racial and ethnic differences in self-reported DM complications among Hispanic, Black, African American, non-Hispanic, and mixed ethnicity. The study found that among 795 predominantly female participants with

T2DM whose average age was 55, 8% reported nephropathy, 35% reported retinopathy, and 16% reported cardiovascular disease. Hispanics were more likely to report having nephropathy and retinopathy, and more likely to report having cardiovascular disease than the other groups (53).

Diabetes self-management among Hispanics is inadequate, with over half of the diagnosed individuals having uncontrolled A1C levels higher than 7% (54). In Massachusetts, adult Hispanics were recruited and randomized in a T2DM self-management intervention. The study targeted 238 low-income Hispanics and consisted of a 12-week program followed by 8-monthly sessions. The interventions targeted diabetes-related knowledge, self-efficacy and self-management behaviors, including blood glucose monitoring, diet (decreased intake and portion sizes, CHO control) and physical activity. The positive one-year association between glycemic index and A1C levels decreased 3% suggesting the decrease of long-term complications of T2DM (54).

The projections report by CDC and National Health Interview Survey (NHIS) predict an increase in Hispanics with DM living in the U.S. by 111% by 2025 from five million to eleven million. The report also assume a steady, but conservative, reduction in the number of individuals with complications due to better awareness of the risks of DM, earlier screening and intervention (55).

Carbohydrate (CHO) Counting

The primary goal of DM management is to maintain blood glucose at normal levels. Many individuals with DM have A1C values that exceed the American

Diabetes Association's (ADA) goal of 7%, contributing to the failure to attain optimal glycemic control (56). The total amount of carbohydrates (CHOs) consumed strongly predicts glycemic response, thus, monitoring total CHOs by exchanges or CHO counting to appropriately dose rapid acting insulin is critical to lower average A1C levels and to reduce glucose variability (57). CHOs are one of the main nutrients found in food and drinks, and include sugars, starches, and fiber. CHO counting is a nutritional strategy that allows greater adherence to dietary management and consumption of a variety of foods for individuals with DM. Finding the right amount of carbohydrate depends on many things including how active the individual is and what, if any, medicines the individual takes. It is recommended by the American Diabetes Association that each meal contain about 45-60 grams of CHO (15 grams equals 1 serving of CHO). An individual may need more or less CHO at meals depending how the DM is managed (58). The DCCT recommends the CHO counting method to help individuals actively manage their disease and treatment (14). The success of this method, which provides flexible eating and increases quality of life in diabetics, is dependent on the quality of the information taught by the health staff and by the amount of the time spent with the patient. It also requires vigilance on the part of the patient to maintain adequate blood glucose monitoring and the ability to determine the amount of CHOs in their meals (12).

In New Jersey, Zipp et al. assessed the impact of a CHO counting educational intervention on patients with T2DM using the standard conversion of one CHO serving being equivalent to 15 grams of CHO (59). This experimental study was performed with ten adult participants recruited from a primary health care

establishment. Inclusion criteria consisted of T2DM diagnosis with either insulin or noninsulin dependent. Participants received CHO counting education including general DM nutrition and proper use of a glucometer for self-monitoring blood glucose levels. This was conducted by a registered dietitian and certified DM educator. During the 3-month period, participants kept a daily fasting log, preprandial and postprandial blood glucose levels, along with the number and types of CHOs consumed for breakfast, lunch, dinner and two snacks. The study reported that participants improved their A1C levels by 1% at a 12-month follow-up. It also revealed that participants felt empowered and motivated to take control of their DM. Thus, education on CHO counting impacts A1C levels and may influence long-term DM complications (59).

Son et al. investigated the effects of the CHO counting method on the quality of life as well as the success of the treatment in diabetic patients (14). A registered dietitian trained twenty-two patients in the CHO counting method; fifteen patients receiving a standard diabetic diet were the control group and all patients were monitored for six months. Patients in the CHO counting group learned about the amounts of CHO in foods, the effects of protein, fiber, and fat on CHO absorption. Patients were monitored by continuous communication with the doctor and the dietitian from whom they learned the CHO counting method and were asked to apply the method on their own. At six months of treatment, the frequency of hypoglycemia decreased in the CHO counting group while it increased in the control group. In the CHO counting group, the 6-month data revealed a favorable trend in all variables indicating an increased quality of life while there was no statistically significant

increase in the control group. Son et al. suggested that, when applied to motivated patients, the CHO counting method might prevent excessive food consumption via prevention of frequent hypoglycemic attacks, thus, also contributing to weight loss. The study also indicated that the quality of life was increased in the CHO counting group as compared to the control group (14).

The CHO counting method is not a new approach. There is data indicating that this method has been applied in the nutritional plan of the diabetic patients since 1921 when insulin was discovered. However, the interest in this method has increased along with the use of insulin pumps and insulin analogues. The CHO counting method that offers a flexible eating regimen to diabetic individuals is a functional method to render the patient more conscious and active about the disease and treatment (60). Clinical studies shown that CHOs are the main factor that affects the postprandial blood glucose level and determines the need of insulin. CHOs are transformed into glucose two hours after ingestion and enter into circulation in the first fifteen minutes; postprandial glycemic response and the need of insulin are determined by the total CHO amount that is ingested rather the type of CHO (14).

CHO counting is a suitable solution for many individuals with DM, making it easier to fit a wide variety of foods into the meal plan. It can also control blood glucose, decreasing A1C levels and overtime minimizing the long-term complications of DM.

Interventions and Educational Programs for Hispanics with T2DM

Nutrition education interventions promoting dietary change have shown to have positive effects on behavior, thus reducing the chronic disease burden (61). During the past decade, various interventions have been designed, implemented and replicated with varying degrees of success. In order to make interventions available to minority groups, researchers and program developers have adapted and tailored existing programs for use with low-income minority communities. Cultural adaptations ideally should involve modifications like language and ethnically matched providers, and also consider cultural characteristics, including acculturation levels, values, traditions and practices (62,63).

In the Cultural Adaptation of a Nutrition Education study in San Diego, Broyles et al. explained how an existing nutrition education program was adapted for Hispanic families, and reported indicators of its acceptability (63). Several components were considered including bilingual and bicultural educators, material translation of handouts and recipes, and structure characteristics of culture such as common values and cultural mealtime practices. During 27 months, 974 families participated in one or more group classes. Classes topics included the increased access to traditional foods like fruits and vegetables, the use of simple additions or affordable modifications that could improve nutritional value, and the reinforcement of the Hispanic cultural practice of preparing meals at home and eating together as a family. Classes were held over a 10-week period and 68% completed the entire program. Barriers to the participants' inability to attend the program included moving, new job, giving birth and family illness. The positive outcome of this study were changes in knowledge, behaviors and self-efficacy for parents and well as for their children. Examination of

pre- and post-survey data generated statistically significant positive changes in knowledge showing 71% of the questions on the post-survey compared to 28% on the pre-survey. However, this process required several months of piloting and refining materials and program delivery. It is believed that the program disparity was reduced because of input from the local community based program partners, assistance from family educators and professionals from Hispanic communities who guided the program design and delivery (63).

Lifestyle interventions can prevent T2DM in at risk populations by improving glycemic control (21). Interventions can be successful in one racial or ethnic group, but may not be generalized to others because of specific cultural or economic barriers. In Washington State, Hispanics aged 18 or older were recruited at health fairs and local community events held from 2008 to 2012. A total of 111 Hispanics with T2DM participated in 5-guided educational sessions once-per-week, led by bilingual Hispanic Community Health Workers trained in DM education. Each session involved DM education and awareness, and methods to increase self-management of the disease. Session topics were general DM, self-management, diet including CHO counting, physical activity and complications of DM. The curriculum was distributed by a set of flip charts developed by investigators with input from the community, revised and translated to Spanish. The study demonstrated a significant reduction in A1C of 0.64% from baseline to 3-month period. There was no significant change in fruit and vegetable consumption or on frequency of leisure time physical activity. Duggan et al. reported that the success of the study was due to the removal of barriers such as

language. With bilingual workers, participants showed high program satisfaction and interest, and made one positive behavior change as a result of the intervention (21).

Efforts are needed to improve the effectiveness and accessibility of DM education programs that would reduce or eliminate the barriers for ethnic low-income groups. Health behavior change interventions are more effective when the content is specific to a health behavior and relevant to the appropriate population (64). Osborn et al. described the importance of integrating health behavior change theory and culturally tailored content in the design of DM self-management education, as well as improving the availability in clinical and community-based settings (64). Diabetes education programs need to address the variations in cultural values underlying motivations, preferences and behaviors of individuals from ethnic groups by using approaches that are adapted to the targeted group. Such approaches have shown promise in increasing physical activity and improving eating habits among ethnic minority low-income groups and may translate into similar advantages for DM self-management education programs (64). The extent to which these programs are effective or not among ethnic low-income minority groups outside these settings has received less attention, making it particularly difficult to address population-specific barriers to behavior change. Researchers are beginning to fill in these gaps in the literature. This is essential for designing more effective DM self-management education programs that address population-specific determinants of behavior change, therefore removing barriers for ethnic low-income groups (64).

The Hispanic communities in the U.S. have the poorest access to care and the lowest use of health services. An estimated 32% of Hispanics living the U.S. do not

have health insurance compared to 15% of the non-Hispanics groups. Besides economic limitations, they face additional barriers to accessing health services including language, literacy levels, lack of transportation and geographic inaccessibility (65). “Barriers to Care and Comorbidities Along the U.S.-Mexico Border” was conducted in El Paso, Texas at the U.S.-Mexico border where about 80% of residents are Hispanics. The primary goal was to compare barriers to health care of participants with and without comorbidities. A household survey was conducted from November 2009 to May 2010. Households were selected based on geography and population density. A total of 1,002 households were recruited, selected and interviewed. In all, 37.7% of households reported two or more comorbidities, hypertension and DM being the highest at 9.7% of the participants. Financial barriers to attaining health care were the most commonly reported barriers for those without comorbidities; 72.6% of participants reported that paying \$100 for medical care would be difficult. Transportation barriers were mentioned least frequently among people without comorbidities at 5.9%. Cognitive barriers were common ranging from confusion about the arrangements in medical settings or about medical information, difficulty understanding medical information instructions, and not always being treated with respect (65). Intervention studies to address chronic conditions among Hispanics require the consideration of the greater burden of medical care. When implementing cultural interventions by using community outreach strategies, it is essential to consider the high proportion of Hispanics who have high rates of comorbidities (65).

Language preference and English language proficiency have previously been associated with health-related behaviors, disease prevalence, and receipt of health care services among Hispanics (66). Barriers to the achievement of treatment goals include language, cost and access to proper health services. Hispanics patients with T2DM are less likely to receive appropriate T2DM quality of care. They are less likely to self-monitor their disease. In addition, they are less likely to have their feet and eyes examined by a health care professional. Evidence suggests that the use of culturally sensitive education programs can improve T2DM outcomes in the Hispanic population. With greater healthcare provider awareness and wider availability of programs tailored to Hispanics, the current treatment gap among ethnic minorities in the U.S. will progressively narrow, and hopefully vanish (67).

Several multidisciplinary approaches to treat T2DM, such as educational interventions, goal settings, blood glucose self-monitoring, and nutrition education have been well documented demonstrating improvements in glycemic control and other T2DM outcomes. However, minimal practice-based research exists that directly shows the benefit of intense nutrition education with a focus on CHO counting to improve T2DM outcomes (59,68). Osborn et al. conducted a study in Spanish for Hispanics with T2DM (16). Within the Hispanic population, language differences between individuals delivering the health information and those receiving it, has contributed to barriers and have been thought to promote misinformation about DM self-management. The lack of information has also been documented in this study, including the lack of knowledge of what foods are nutritionally appropriate or that CHO counting, as well as glycemic control, is a critical component to a healthy diet.

Participants were recruited from an outpatient primary care clinic in Connecticut. A total of 118 Hispanics participated in the study, completed a baseline assessment and were randomized into an intervention or control group. The intervention group completed baseline and follow-up assessments that took place within five days and the control group completed assessment including nutrition education, medical treatment, and optional DM support. All didactic education was delivered in Spanish by a Registered Dietitian and Certified Diabetes Educator (CDE) also of Hispanic heritage. The intervention was a 90-minute single session that allocated 60 minutes to diet content and 30 minutes to food label reading and diet adherence. Follow up occurred at three months post intervention. One of the most important measures was the CHO counting which participants exercised in how to read food labels, how to measure portion sizes of foods, how to select foods that were low or high in CHOs and how to count the CHOs in foods. Overall, the intervention incorporated the language, customs, attitudes, perceptions and behaviors of the target population. In addition, all educational materials were available in Spanish and English, and all recommendations incorporated culturally familiar foods. Findings suggested that A1C levels decreased from baseline (0.48%), and the participants showed improvement in knowledge in a short period of time. Yet, the notion that a 90-minute intervention maybe more effective when including follow-ups over an extended period of time is promising (16). Despite the lack of data on Hispanic populations and cultural appropriate nutrition education, it is clear that in addition to emphasizing nutrition, effective T2DM programs need to include a strong CHO counting component, and need to assure that these programs are culturally responsive by including program content that

is based on cultural preferences and addresses lower levels of English proficiency, especially if they involve recent immigrant Hispanics (22). The En Balance study was designed to assess the feasibility of culturally and language-sensitive T2DM education as a way to increase physical activity and to improve T2DM management in a group of Spanish-speaking Hispanics in the Southern California (25). This was a 3-month study to test the impact of Spanish language comprehensive DM education program in Hispanics with T2DM. Primary outcomes were changes in blood glucose values, A1C values, weight reduction and physical activity. Study phases included recruitment, baseline data collection, DM education and collection of data at the end of the three-month educational process. A total of 39 participants completed the three-month study. Participants attended evening DM education classes delivered by registered dietitians, nurses, physicians and Hispanic students from the School of Public Health. The En Balance DM education program demonstrated that culturally sensitive DM education that stresses nutrition and exercise can lead to improvements in glucose control and physical activity. Following the 3-month intervention, there was a statistically significant reduction in mean A1C. This finding is consistent with other programs deemed culturally competent for the Hispanic population in terms of language, diet, social emphasis and incorporation of cultural health beliefs. This study demonstrated the effectiveness of culturally sensitive DM education in the community as a method for gaining control of blood sugar control and increasing physical activity (25).

Nutrition education, as an essential aspect in the treatment of diabetic patients, has been on-going since 1975. Its importance has been shown in communities with

different socioeconomic and cultural levels. Diabetes education requires training, knowledge, education skills, communication, listening abilities, and understanding from the health care team. The need to develop health education practice activities for diabetic patients is associated with the prevention of complications of the disease through self-management, allowing patients to live better with the disease. Diabetes self-management is the process of teaching patients to take control of the disease. The goals in DM education consist of improving metabolic control, preventing acute and chronic complication and improving the quality of life of individuals at reasonable costs. Among the Hispanic population, there is a significant knowledge and skill deficit between 50 to 80% of this population. Less than half of the individuals are able to monitor blood glucose. Culturally tailored DM interventions are needed that are both grounded in behavior change theory and focus on other high risk racial/ethnic minorities with DM (69,70). There is clinical evidence supporting current DM treatment methods, but a set of studies designed to help minority Hispanics is not as strong. More research is needed to close the quality gap and reduce the impact of this pervasive health threat (71).

Nutrition Education in the Community

The U.S. Department of Health and Human Services Office on Minority Health reports the minority communities bear a disproportionately high burden of major nutrition-related chronic diseases (72). Obesity, T2DM, cardiovascular disease and some forms of cancer are costly and are associated with substantial morbidity, mortality and a reduced quality of life. Diet and nutrition are critical factors in the

prevention and control of these diseases, therefore having an important role in nutrition-related interventions (72). Remarkable progress has been made in managing DM and its complications. Because of public health efforts, a higher percentage of individuals with DM are monitoring blood glucose daily and receiving annual foot and eye exams. The incidence of treatment for diabetes-related end-stage renal disease declined 21% from 1997 to 2002 and the prevalence of visual impairment decreased from 24% in 1997 to 18% in 2005. Yet, DM diagnosis is increasing and if current trends continue, by 2050, one in three adults in the U.S. could develop DM during their lifetime (73). Evidence indicates that with education, social support and healthy policies, individuals can and will take charge of their health. Strategies are needed to facilitate and support individual responsibility and behavior change at schools, workplaces, community, and medical based settings. Doctors need more community based programs to refer patients to once a condition has been detected. Community-based programs such as those that prevent and educate individuals with DM, hypertension management and tobacco cessation are necessary and needed (73).

Traditional treatment strategies that focus on medication alone are not enough to achieve normal blood glucose levels among Hispanics (74). Limited English proficiency often leads to communication barriers between the healthcare providers and Hispanics patients. Lack of provider cross-cultural communication skills to address cultural values among Hispanics may result in dissatisfaction and delay some from seeking medical help. Medical education and support delivered in a community setting by well-trained and supervised, bilingual community health workers who

understand the community's social determinants of health are likely to improve T2DM among Hispanics (22,74).

The U.S. Department of Agriculture (USDA) promotes behavior that can reduce the impact of the obesity epidemic among low-income populations through its Supplemental Nutrition Assistance Program-Education (SNAP-Ed) program, which is designed to increase nutritious food choices through nutrition programs offered in community settings (75). Molitor et al. investigated the external validity of SNAP-Ed nutrition interventions as implemented by organizations in California. Surveys from eligible adults SNAP-Ed individuals reported that participants (59.6%) were Hispanics (75). Higher levels of intervention directly correlated to healthier eating habits than in the low- to no-reach census tracts. The greatest concentration of SNAP-Ed interventions was related increasing consumption of fruits and vegetables and reducing fast food intake. These interventions can play an important role in addressing the obesity and T2DM epidemic in the U.S. (75). SNAP-Ed programs, across the lifespan, have the potential to improve nutrition behaviors among low-income individuals (76).

Improving the delivery of nutrition education to patients in community settings is essential to improving population health in an era where increasing chronic diseases related to aging, obesity and lifestyle contribute dramatically to public health challenges and associated health care costs. There is an urgent need to better prepare health care professionals to address nutrition-related conditions using best practices. This will require dietitians and nutrition professionals to assume leadership roles in the training of health care professionals (77). Intensive lifestyle interventions are an

effective T2DM prevention strategy in patients at high risk for the disease. In addition to reducing the incidence of T2DM, these interventions can delay or prevent the development of complications of the disease (78). Studies aimed at interpreting research-based prevention programs into clinical and community-based practice, and examining cost-effective and original means of delivering prevention are also necessary. Due to the size and trajectory of DM, the potential benefits that could result from prevention strategies are massive. The ADA's support for research and programs extends beyond the clinical setting. There is the need to increase awareness, address behavioral and environmental barriers and disparities in the community where people work and live. Unlike clinical settings, where time, support, and access are often limited, community-based programs can provide culturally and age-appropriate education and tools designed to delay and/or prevent the onset of DM, or reduce risks of its complications (79).

Conclusion

The prevalence of DM in the U.S. is 29 million people or 9.3% of the population (37). Hispanics are at higher risk for T2DM than non-Hispanics (50). The U.S. Census Bureau estimates that by 2050, 1-in-3 adults living in the U.S. will be of the Hispanic origin, which may lead to an increase in the number of T2DM diagnoses (50).

Individuals with T2DM have a greater chance of developing a variety of complications and health problems, especially if blood glucose, blood pressure and cholesterol are not well managed. The long term complications of T2DM are eye complications, as cataracts and glaucoma result in vision loss; foot problems such as wounds that will not heal due to DM affecting blood flow to the feet; nerve problems

(peripheral neuropathies) reducing blood circulation to nerves that may damage and cause numbness; kidney disease which affects removed waste products, excess nutrients and fluid from the body via small vessels (46).

The A1C test is the primary test used for DM management and research. It measures the average levels of blood glucose over the past three months. Diagnosis of DM is when A1c is 6.5% or above. The higher the A1C (above 7%), the higher the chances for developing the long-term health problems caused by consistently high blood glucose levels. Studies have demonstrated substantial reductions in long-term complications with the lowering of A1C levels (80).

For most ethnic minority groups, discussion of cultural dynamics in health care cannot take place without consideration of the ways which culture interconnects with issues of poverty and equity, including access and utilization to health care and the lack of cultural competence on the part of health providers and programs. Hispanics face many barriers when it comes to assessing health care, including service availability, accessibility, acceptability, as well as culturally barriers, low literacy and language barriers, income and socioeconomic barriers. These barriers need to be addressed in order to properly educate Hispanics living with T2DM in the U.S. It is important to profile this population, who are limited in income and literacy living with T2DM and to investigate the many components of DM self-management (81).

CHO counting is a tool that helps patients to estimate the amount of CHOs of meals in order to minimize the glucose increase after a meal, and if necessary, to correct either high or low blood glucose levels. Research studies have demonstrated interventions involving CHO counting help to improve A1C levels thereby, decreasing

the risks of long-term DM complications. CHO counting is associated with reduction of A1C not accompanied by an increase of hypoglycemic events (82). However, there are limited studies that explore CHO counting educational programs for Hispanics with T2DM that address the needs of this population such as language, low-literacy, limited income and culture.

Diabetes education has been shown to improve behaviors and quality of life of individuals with T2DM. Educational components include nutritional management, physical activity, medications, glucose monitoring and psychosocial adjustment. Community nutrition DM education can help patients take control of DM by making necessary changes which improve lifestyle. Community DM education programs must offer accessible information and support throughout the community and must be delivered in a format in which low-income minority groups are able to understand and apply the information on a daily basis. Community programs lower barriers and clarify myths related to cultural beliefs in DM management and ultimately improve patient internal locus of control, which is defined as the patient's perception that the individual can make a difference in the outcome of his or her own health. Therefore, it is critical for community-based programs to be delivered in a format that is understood, accessible to all, regardless of literacy, cultural beliefs and socioeconomic status (26).

Diabetes self-management requires close teamwork between patients and health care providers. It raises particular challenges for limited English proficiency Hispanics who do not have culturally and linguistically concordant health care providers. This situation is not likely to improve anytime soon, since recent national medical student

and physician surveys show disproportionately low numbers of Hispanic health care providers compared to the increasing Hispanic population. There is a national priority for eliminating health care disparities through target and tailored translational research focused on priority populations (83).

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APPENDIX B – SIGN-UP FORM (DEMOGRAPHICS, RECRUITMENT,
ASSESSMENT)



The University of Rhode Island
Department of Nutrition and Food Sciences
Departamento de Nutrición y Ciencias de los Alimentos
125 Fogarty Hall Kingston, RI 02881
Nutrition Study/Estudio de la Nutrición

Recruitment Form / Formulario de Contratación

PLEASE PRINT / POR FAVOR IMPRIMIR

Date / Fecha: _____

Name / Nombre: _____

Home Phone number / Número de teléfono de casa: _____

Cell phone number / teléfono celular: _____

Email / Correo electrónico: _____

Gender / Género: Male / Masculino Female / Femenino Age / Años:

Which language do you prefer? / ¿En qué idioma prefiere?

English / Inglés Spanish / Español

Choose all that apply: / Elija todo lo que corresponda:

Hispanic / Hispano White / Blanco

Black or African American / Negro o Africano Americano Other / Otro

Country of origin / País de origen: _____

How long have you lived in the U.S.? / ¿Cuánto tiempo ha vivido en los Estados Unidos?

How long have you had diabetes? / ¿Cuánto tiempo ha tenido diabetes?

Emergency contact person and phone number / Persona de contacto y número de teléfono de emergencia:

Check the best answer (☑): / Marque la mejor respuesta (☑):

1. Have you had diabetes education before? / ¿Ha tenido educación sobre diabetes antes?
 Yes / Sí No / No I don't know / No lo sé
 2. Do you follow a diabetic meal plan? / ¿Usted sigue un plan de alimentación para diabéticos?
 Yes / Sí No / No I don't know / No lo sé
 3. Do you know what carbohydrates are? / ¿Sabe qué son los carbohidratos?
 Yes / Sí No / No I don't know / No lo sé
 4. Do you know what carbohydrate counting is? / ¿Sabe qué es el conteo de carbohidratos?
 Yes / Sí No / No I don't know / No lo sé
 5. Do you control your portion sizes? / ¿Usted controla el tamaño de sus porciones?
 Yes / Sí No / No I don't know / No lo sé
 6. Do you read the Nutritional Facts Labels? / ¿Lee las etiquetas de los alimentos?
 Yes / Sí No / No I don't know / No lo sé
 7. What has been most difficult to control your diabetes? / ¿Qué ha sido lo más difícil de controlar su diabetes? Blood sugar / Azúcar en la sangre Diet / Dieta
 Other / Otro
describe / describir:
-

Thank you for your cooperation! / ¡Gracias por su cooperación!

APPENDIX C – CONSENT FORM

THE
UNIVERSITY
OF RHODE ISLAND

COLLEGE OF
HEALTH SCIENCES

DEPARTMENT OF NUTRITION AND FOOD SCIENCES

125 Fogarty Hall, Kingston, RI 02881 USA p: 401.874.2253 f: 401.874.5974 web.uri.edu/nfs

Nutrition Study

CONSENT FORM FOR RESEARCH

You have been invited to take part in a research project described below being conducted under the direction of Dr. Geoffrey Greene from the Department of Nutrition and Food Sciences of the University of Rhode Island. The researcher will explain the project to you in detail. You should feel free to ask questions. If you have more questions later, contact Flavia Cattaneo, the person primarily responsible for this study at 401-368-8807. You must be at least 18 years old to be in this research project.

Inclusion criteria: must be self-identified Hispanic, between 25-70 years old, diagnosed with diabetes.

Exclusion criteria: life-threatening condition and inability to attend to all 3 sessions.

Purpose of the project: the purpose of this study is to determine if Hispanics living with type 2 diabetes will increase knowledge and skills about carbohydrate counting through a nutrition education intervention.

If you decide to take part in this study here is what will happen: you will attend 3-one hour workshops on carbohydrate counting held once per week at the same time at the Rhode Island Free Clinic. You will be involved in hands-on activities during the workshops such as learning how to read food labels, measure portions sizes and counting carbohydrate in foods. You will take a knowledge survey on the first and third workshop. In the third workshop you will also complete a carbohydrate counting activity and a short evaluation of the workshops.

Risks or discomfort: there are minimal risks because the study is just providing you with information about healthy eating with diabetes. However, we recommend you follow the blood glucose monitoring recommendations provided by the Free Clinic and follow up with the Free Clinic if you blood glucose is too low or too high. Checking your blood glucose levels and counting carbohydrates are important in helping you manage your diabetes.

Benefit of this study: participating in this study will help you learn more about carbohydrates and how to control your diabetes. Your participation will also help us learn the best ways of teaching people like you with Type 2 diabetes how to control their blood sugar and improve their health.

Confidentiality: your part in this study is confidential. Although you will have your name on some forms, your name will never be recorded for data analysis and all reports based on the study will be confidential. The forms with your name will be maintained at the URI-Providence Campus at a locked cabinet file. The researchers and the University of Rhode Island will protect your privacy.

Decision to quit at any time: the decision to take part in this study is up to you. You do not have to participate. Whatever you decide will in no way affect your participation in the Rhode Island Free Clinic. If you wish to quit, simply inform Flavia Cattaneo (401-368-8807) of your decision.

Rights and Complaints: if you are not satisfied with the way this study is performed, you may discuss your complaints with Flavia Cattaneo 401-368-8807 or with Geoffrey Greene at 401-874-4028, anonymously if you choose. In addition, if you have questions about your rights as a research participant, you may contact the office of the Vice President for Research and Economic Development, 70 Lower College Road, Suite 2, University of Rhode Island, Kingston, Rhode Island, telephone: (401) 874-4328.

You have read the Consent Form. Your questions have been answered. Your signature on this form means that you understand the information and you agree to participate in this study.

Signature of Participant

Signature of Researcher

Typed/printed Name

Typed/printed name

Date

Date

Please sign both consent forms, keeping one for yourself.

Estudio de la Nutrición

CONSENTIMIENTO PARA LA INVESTIGACIÓN

Se le ha invitado a participar en un proyecto de investigación que se describe a continuación y se está llevando a cabo bajo la dirección del Dr. Geoffrey Greene, del Departamento de Nutrición y Ciencias de los Alimentos de la Universidad de Rhode Island. El investigador va a explicar el proyecto en detalle. Usted debe sentirse libre de hacer preguntas. Si usted tiene más preguntas después, póngase en contacto con Flavia Cattaneo, la principal responsable de este estudio, al 401-368-8807. Debe tener al menos 18 años de edad para estar en este proyecto de investigación.

Criterios de inclusión: debe ser auto-identificado Hispano, entre 25-70 años de edad, con diagnóstico de diabetes.

Criterios de exclusión: condiciones que amenazan la vida y la imposibilidad de asistir a todas las sesiones de 3.

Objetivo del proyecto: el propósito de este estudio es determinar si los hispanos que viven con diabetes tipo 2 incrementarán su conocimiento y habilidades sobre el conteo de carbohidratos a través de una intervención de educación nutricional.

Si decide participar en este estudio, esto es lo que sucederá: Asistirá a 3 talleres de una hora sobre el conteo de carbohidratos una vez por semana a la misma hora en el Rhode Island Free Clinic. Usted estará involucrado en actividades prácticas durante los talleres tales como aprender a leer las etiquetas de los alimentos, medir tamaños de las porciones y el conteo de carbohidratos en los alimentos. Tendrá que completar una encuesta de conocimientos en el primer y tercer taller. En el tercer taller también completará una actividad de conteo de carbohidratos y una breve evaluación de los talleres.

Riesgos o molestias: existen riesgos mínimos ya que el estudio sólo le está proporcionando información sobre la alimentación saludable con diabetes. Sin embargo, le recomendamos que siga las recomendaciones de monitorización de glucosa en sangre proporcionados por la clínica libre y el seguimiento con la clínica libre si la glucosa en sangre es demasiado bajo o demasiado alto. Comprobación de los niveles de glucosa en sangre y contar los carbohidratos son importantes para ayudar a controlar la diabetes.

Beneficio de este estudio: la participación en este estudio ayudará a aprender más acerca de los carbohidratos y cómo controlar su diabetes. Su participación también nos ayudará a aprender las mejores maneras de enseñar a la gente con diabetes tipo 2 como usted a controlar su azúcar en la sangre y mejorar su salud.

Confidencialidad: su participación en este estudio es confidencial. A pesar de que tendrá su nombre en algunas formas, su nombre nunca será grabado para el análisis de

datos y todos los informes basados en el estudio serán confidencial. Las formas con su nombre se mantendrán en el campus de URI-Providence en un archivo dentro de un armario cerrado con llave. Los investigadores y la Universidad de Rhode Island protegerán su privacidad.

Decisión de renunciar en cualquier momento: la decisión de participar en este estudio depende de usted. Usted no tiene que participar. Lo que decide de ninguna manera afectará su participación en el Rhode Island Free Clinic. si desea renunciar, simplemente informe a Flavia Cattaneo (401-368-8807) de su decisión.

Derechos y Quejas: si no está satisfecho con la forma en que se lleva a cabo este estudio, es posible hablar de sus quejas con Flavia Cattaneo 401-368-8807 o con Geoffrey Greene en el 401-874-4028, de forma anónima si lo desea. Además, si tiene alguna pregunta sobre sus derechos como participante en la investigación, puede comunicarse con la oficina del vicepresidente de Investigación y Desarrollo Económico, 70 Bajo College Road, Suite 2, Universidad de Rhode Island, Kingston, Rhode Island, teléfono: (401) 874-4328.

Ha leído el formulario de consentimiento. Sus preguntas han sido contestadas. Su firma en este formulario significa que usted entiende la información y acepta participar en este estudio.

Firma del Participante

Firma del Investigador

Nombre escrito/en letra de molde

Nombre escrito/en letra de molde

Fecha

Fecha

Por favor firme los dos formularios de consentimiento, manteniendo una para usted.

APPENDIX D – PRE- POST-SURVEY



For researcher use only: Pre Survey Post Survey Date _____ ID# _____
--

The University of Rhode Island
Department of Nutrition and Food Sciences
125 Fogarty Hall Kingston, RI 02881
Nutrition Study

Knowledge Assessment

Please check the best answer:

1. How many food groups are included in the USDA MyPlate?
 6
 3
 5
 2
 4
2. Which food groups from the USDA MyPlate contain carbohydrates?
 grains
 grains and vegetables
 fruits
 grains, starchy vegetables, fruits and dairy
 grains, vegetables and protein
3. How many grams of carbohydrates are equal to 1 serving of carbohydrate?
 10 g
 15 g
 5 g
 20 g
 25 g
4. How many grams of carbohydrates do you need per snack?
 10 g
 30 g
 45 g
 15-20 g
 15 g

5. How many grams of carbohydrates do you need per meal? (breakfast, lunch, dinner)
- 30 g
 - 45-60 g
 - 60 g
 - 15 g
 - 100 g
6. If the serving size on the Nutrition Facts Label is 1 cup and you eat 2 cups, how many total servings did you eat?
- 1 serving
 - 4 servings
 - 3 servings
 - 2 servings
 - 5 servings
7. How many servings of carbohydrates are in 45-60 g?
- 2 servings
 - 10 servings
 - 20 servings
 - 5 servings
 - 3-4 servings
8. According to USDA MyPlate half (1/2) of your plate should be?
- grains
 - fruits and vegetables
 - vegetables and protein
 - grains and vegetables
 - vegetables
9. Where can you find carbohydrates?
- regular soda
 - water
 - corn
 - regular soda and corn
 - regular soda, corn and tortilla
10. If you eat 30 g of yucca, how many serving(s) of carbohydrate(s) do you eat? (1 serving = 15 g)
- 30 servings
 - 10 servings
 - 1 serving
 - 2 servings
 - 15 servings

The University of Rhode Island
Departamento de Ciencias de la Nutrición y Alimentación
125 Fogarty Salón Kingston, RI 02881
Estudio de la Nutrición

For researcher use only: Pre Survey Post Survey Date _____ ID# _____
--

Evaluación de conocimientos

Por favor, marque la mejor respuesta:

- ¿Cuántos grupos de alimentos se incluyen en MiPlato del USDA?
 6
 3
 5
 2
 4
- ¿Qué grupos de alimentos en MiPlato del USDA contienen carbohidratos?
 granos
 granos y vegetales
 frutas
 granos, vegetales de almidón, frutas y productos lácteos
 granos, vegetales y proteínas
- ¿Cuántos gramos de carbohidratos son iguales a 1 porción de carbohidratos?
 10 g
 15 g
 5 g
 20 g
 25 g
- ¿Cuántos gramos de carbohidratos necesita en cada merienda?
 10 g
 30 g
 45 g
 15-20 g
 15 g
- ¿Cuántos gramos de carbohidratos necesita en cada comida? (desayuno, almuerzo, cena)
 30 g
 45-60 g
 60 g
 15 g
 100 g

6. Si el tamaño de la porción en la etiqueta de información nutricional es 1 taza y se come 2 tazas, ¿Cuántas porciones en total se comió?
- 1 porción
 - 4 porciones
 - 3 porciones
 - 2 porciones
 - 5 porciones
7. ¿Cuántas porciones de carbohidratos hay en 45-60 g?
- 2 porciones
 - 10 porciones
 - 20 porciones
 - 5-10 porciones
 - 3-4 porciones
8. ¿De acuerdo con el USDA MyPlate la mitad (1/2) de su plato debe ser?
- granos
 - frutas y vegetales
 - vegetales y proteínas
 - granos y vegetales
 - vegetales
9. ¿Dónde se pueden encontrar los carbohidratos?
- soda regular
 - agua
 - maíz
 - soda regular y maíz
 - soda regular, maíz y tortilla
10. Si usted come 30 gramos de yuca, cual es la cantidad de porción(es) de carbohidrato(s) que se comió? (1 porción = 15 g)
- 30 porciones
 - 10 porciones
 - 1 porción
 - 2 porciones
 - 15 porciones

APPENDIX E – CARBOHYDRATE COUNTING SKILL ASSESSMENT

THE
UNIVERSITY
OF RHODE ISLAND
COLLEGE OF
THE ENVIRONMENT
AND LIFE SCIENCES

For researcher use only:

Date _____

ID# _____

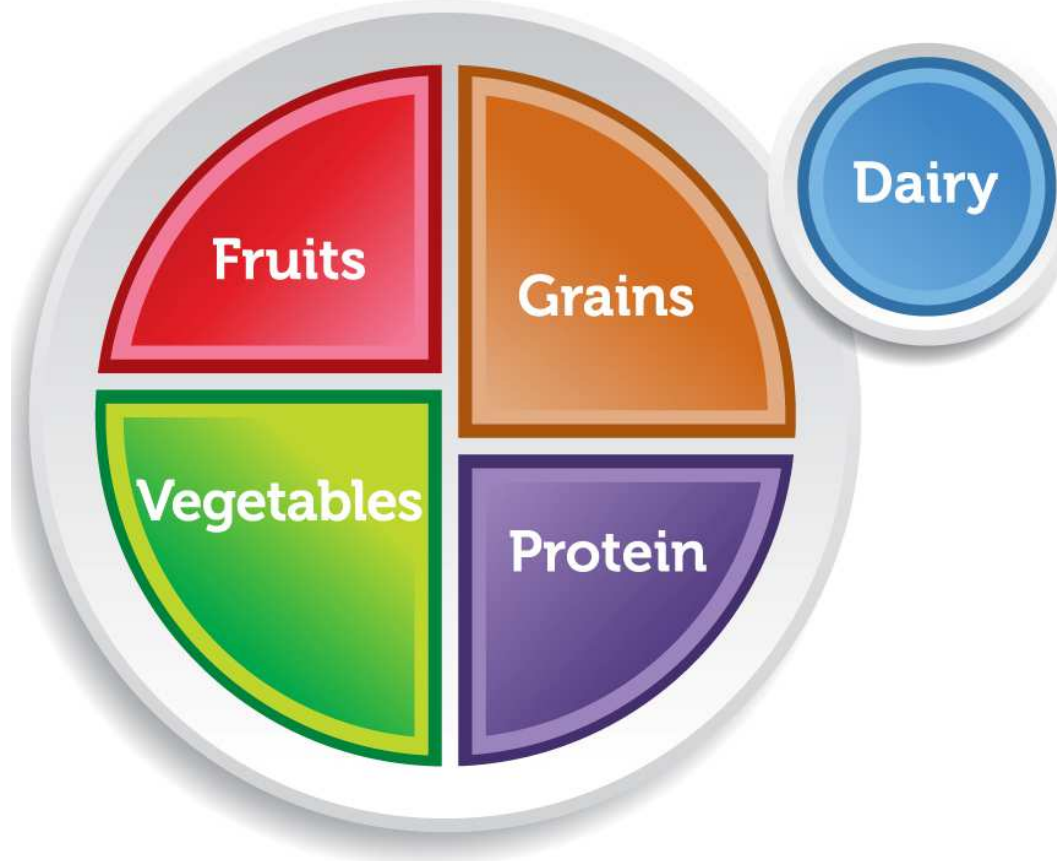
The University of Rhode Island
Department of Nutrition and Food Sciences
125 Fogarty Hall Kingston, RI 02881
Nutrition Study

Skill of Carbohydrate Counting Assessment

Follow directions below:

1. Take all food pictures out of the plastic bag
2. Build a meal containing between 45-60g of carbohydrate by attaching pictures on the proper food groups of the ChooseMyPlate
3. Count the total amount of carbohydrate and write it below:

The total carbohydrate is _____



La Universidad de Rhode Island
Departamento de Ciencias de la Nutrición y Alimentación
125 Fogarty Salón Kingston, RI 02881
Estudio de la Nutrición

Sólo para uso
investigador:

Date _____

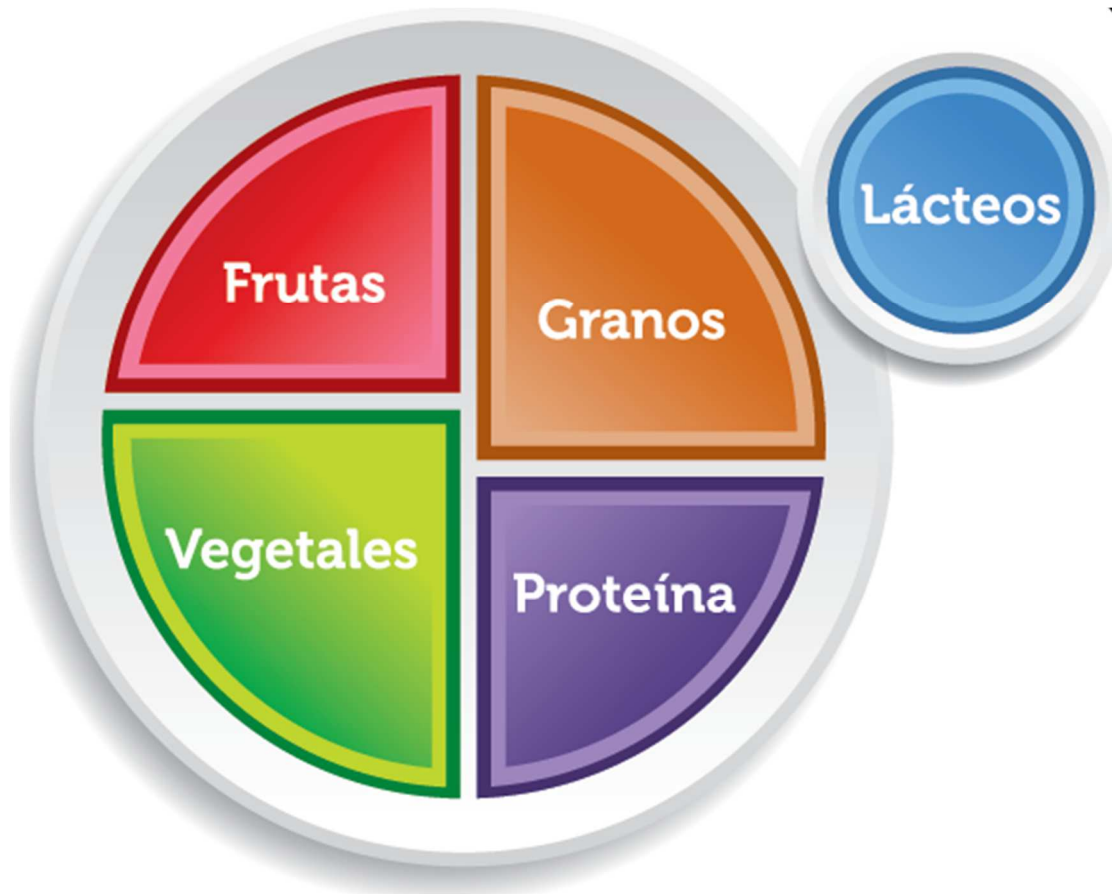
ID# _____

La Habilidad de Conteo de Carbohidratos

Siga las instrucciones a continuación:

1. Tome todas las imágenes de alimentos de la bolsa de plástico
2. Construir una comida que contiene entre 45-60 g de carbohidratos mediante la fijación de imágenes en el ChooseMyPlate
3. Contar la cantidad total de hidratos de carbono y escribir a continuación:

El total de carbohidratos es _____



APPENDIX F – PROGRAM EVALUATION
 THE
UNIVERSITY
 OF RHODE ISLAND
 COLLEGE OF
 THE ENVIRONMENT
 AND LIFE SCIENCES

The University of Rhode Island
 Department of Nutrition and Food Sciences
 125 Fogarty Hall Kingston, RI 02881
 Nutrition Study

Please indicate your level of satisfaction with each of the following (check one O):

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. The program met my expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. The program had useful information content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The presenter was able to easily share the information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The handouts given were useful and important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Overall, how would you rate this program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I would recommend this program to a friend with type 2 diabetes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. The length of the program was appropriate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Por favor, indique su nivel de satisfacción con cada uno de los siguientes (marque un O):

	Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo
1. El programa cumplió con mis expectativas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. El programa tuvo un contenido de información útil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. El presentador fue capaz de compartir fácilmente la información	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Los folletos fueron útiles e importantes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. En general, ¿cómo calificaría este programa?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Yo recomendaría este programa a un amigo con diabetes tipo 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. La duración del programa fue apropiado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

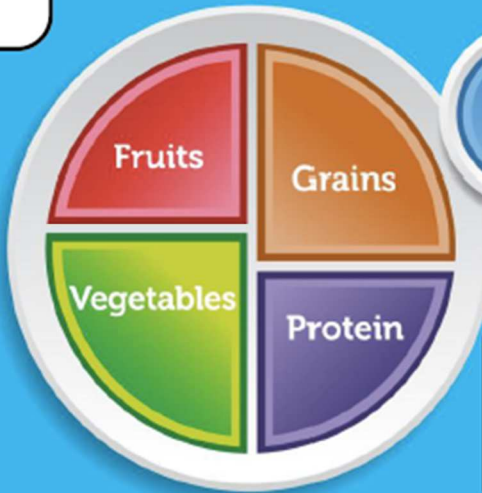
Make MyPlate Your Plate

- **MyPlate reminds you to include foods from all 5 food groups at dinner.**
- **Use a smaller plate, bowl or glass to eat a healthy amount of food.**
- **Limit foods high in fat, added sugars and salt.**

**Add color to your plate!
Make half of your plate vegetables and fruit.**

Make half of your grains whole grains. Try whole wheat bread, brown rice or whole grain cereal.

Fat-free or low fat milk with dinner will help keep your bones and teeth strong.



Choose lean protein. Bake, broil or grill fish or poultry. Eggs, nuts & beans are healthy choices.

Choose **MyPlate.gov**



Be physically active at least 30 to 60 minutes every day!

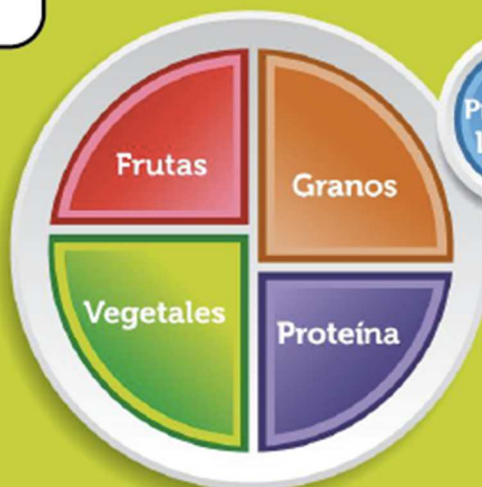
Haga MiPlato Su Plato

- **MiPlato le recuerda a incluir alimentos de los 5 grupos en la cena.**
- **Use un plato, cuenco o vaso más pequeño para comer una porción saludable de comida.**
- **Limite los alimentos con muchas grasas, azúcares agregadas y sal.**

¡Añada color a su plato! Llene la mitad de su plato con vegetales y frutas.

Coma la mitad de sus granos de forma integral. Pruebe pan de trigo integral, arroz integral o cereales integrales.

Leche sin o baja en grasa con la cena le ayuda a mantener sus huesos y dientes fuertes.



Productos Lácteos

Elija proteína sin grasa. Prepare el pescado y pollo al horno o a la parrilla. Los huevos, nueces y frijoles son opciones saludables.

MiPlato

Choose **MyPlate.gov**



Esté físicamente activo por al menos 30 minutos ;cada día!

THE
UNIVERSITY
OF RHODE ISLAND
web.uri.edu/snap/ed



Este material se desarrolló con fondos proporcionados por el Supplemental Nutrition Assistance Program (SNAP en inglés) del Departamento de Agricultura de los EE.UU. (USDA siglas en inglés). El Supplemental Nutrition Assistance Program (SNAP en inglés) ofrece asistencia relacionada con la nutrición para gente con recursos limitados. Estos beneficios le pueden ayudar a comprar comida nutritiva para una mejor dieta. Para obtener más información, comuníquese con la oficina DHS de su condado, o llame al programa nutricional de URI SNAP-Ed al 1-877-Food-URI (1-877-366-3874). USDA es un proveedor y empleador que ofrece oportunidad igual para todos.

Reading the Nutrition Facts Label



1. Serving Size: The amounts of nutrients are based on only ONE serving!

2. Calories measure the energy you get in your food. Fats, Protein, and Carbohydrates all contain calories.

3. Nutrients:
RED: Limit these nutrients. *Trans* fat does not have a % daily value because it should be consumed very rarely.
GREEN: Get enough of these healthy nutrients.
WHITE: Carbohydrates provide us with most of our energy. Sugars can be naturally occurring or added to foods. Added sugars should be limited. Protein does not have a % daily value because everyone needs different amounts.

Nutrition Facts		
Serving Size 1 cup (332 g)		
Servings Per Container 10		
Amount Per Serving		Calories from Fat 15
Calories 170		
	% Daily Value*	
Total Fat 2g		3%
Saturated Fat 0g		0%
Trans Fat 0g		
Cholesterol 15mg		5%
Sodium 580mg		24%
Total Carbohydrate 29g		10%
Dietary Fiber 5g		20%
Sugars 8g		
Protein 9g		
Vitamin A		20%
Vitamin C		40%
Calcium		4%
Iron		8%
*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.		
	Calories:	2,000 2,500
Total Fat	Less Than	65g 80g
Sat Fat	Less Than	20g 25g
Cholesterol	Less Than	300mg 300mg
Sodium	Less Than	2,400m 2,400mg
Total Carb.	At Least	300g 375g
Dietary Fiber	At Least	25g 30g

4. % Daily Value: are based on a 2,000 calorie diet. This may be higher or lower depending on your age, if you are male or female, and your activity level.
 5% or less is Low
 20% or more is High

5. Footnote: Is a standard chart on every label. It explains the amounts of nutrients that are recommended in an average diet. It is another way to figure out how much of each nutrient you should be getting daily.



This material was funded by USDA's Supplemental Nutrition Assistance Program – SNAP. The Supplemental Nutrition Assistance Program (SNAP) provides nutrition assistance to people with low income. It can help you buy nutritious foods for a better diet. To find out more, contact your local DHS office, or call the URI SNAP-Ed nutrition program at 1-877-Food-URI (1-877-366-3874). USDA is an equal opportunity provider and employer.

Como Leer la Etiqueta de Datos Nutricionales

1. Tamaño por ración:

Las cantidades de los nutrientes están basadas en sólo ¡UNA porción!

2. Las Calorías miden

la energía que obtiene de la comida. Proteína, Grasas y Carbohidratos contienen calorías.

3. Nutrientes:

ROJO: Limite estos nutrientes. La grasa trans no tiene un % valor diario porque lo debe consumir muy raramente.

VERDE: Consuma bastante de estos nutrientes saludables.

BLANCO: Los carbohidratos nos dan la mayoría de nuestra energía. Los azúcares pueden ocurrir naturalmente o ser agregados a la comida. Debe limitar los azúcares agregados. La proteína no tiene un % valor diario porque cada persona necesita una cantidad diferente.

Datos Nutricionales

Tamaño por Ración 1 taza (332 g)
Porciones en el Paquete 10

Cantidad por ración		Calorías de la Grasa 15	
Calorías 170		% Valor Diario*	
Grasa Total 2g			3%
Grasa Saturada 0g			0%
Grasa Trans 0g			
Colesterol 15mg			5%
Sodio 580mg			24%
Carbohidrato Total 29g			10%
Fibra Dietética 5g			20%
Azúcares 8g			
Proteína 9g			
Vitamina A			20%
Vitamina C			40%
Calcio			4%
Hierro			8%

*Los porcentajes de Valores Diarios están basados en una dieta de 2,000 calorías. Sus Valores Diarios pueden ser mayores o menores dependiendo de sus necesidades calóricas.

	Calorías:	2,000	2,500
Grasa Total	Menos que	65g	80g
Grasa Sat	Menos que	20g	25g
Colesterol	Menos que	300mg	300mg
Sodio	Menos que	2,400mg	2,400mg
Carb. Total	Al menos	300g	375g
Fibra Dietética	Al menos	25g	30g



4. % Valor Diario:

está basado en una dieta de 2,000 calorías. Pudiera necesitar más o menos, dependiendo en su edad, si es usted es masculino o femenino y su nivel de actividad.

5% o menos es Bajo
20% o más es Alto

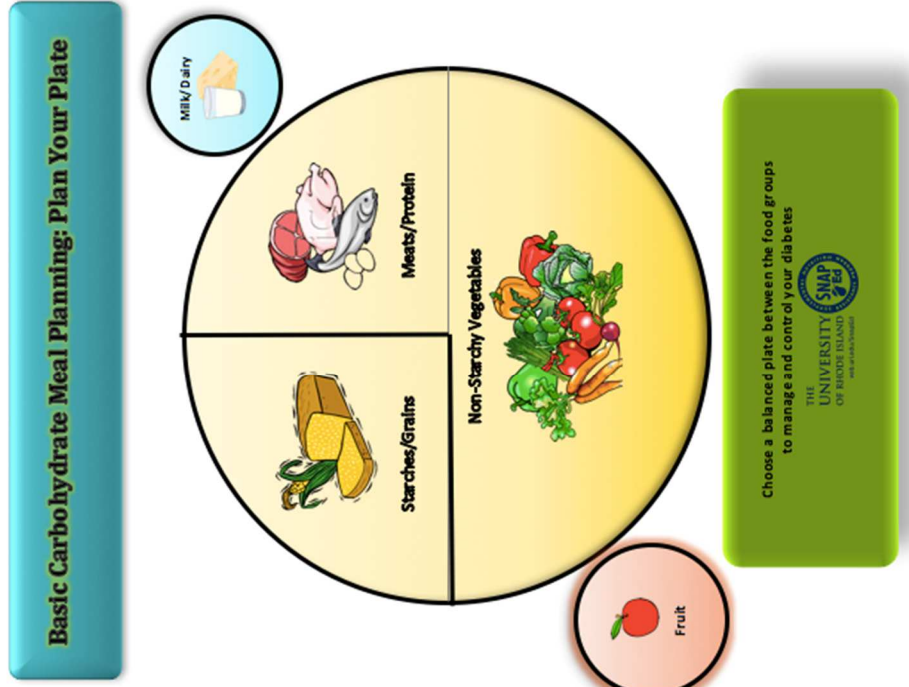
5. Nota a Pie:

es un gráfico estándar en todas las etiquetas. Explica las cantidades recomendadas de los nutrientes para una dieta promedio. Es otra manera de calcular cuánto de cada nutriente debe comer cada día.



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APPENDIX I – CARBOHYDRATE COUNTING FLYER



THE UNIVERSITY OF RHODE ISLAND SNAP logo
 The information is provided by USDA Supplemental Nutrition Assistance Programs (SNAP). The Supplemental Nutrition Assistance Program (SNAP) provides nutrition assistance to people with low incomes. SNAP helps you buy nutritious food for a better diet. To find out more, contact your local DSS office, or call the toll-free SNAP-Ed customer program at 1-877-834-3874. USDA is an equal opportunity provider and employer.

Breakfast		Lunch		Dinner	
Total carb grams:	_____	Total carb grams:	_____	Total carb grams:	_____
Time:	_____	Time:	_____	Time:	_____
oz. Protein	_____	oz. Protein	_____	oz. Protein	_____
Fruit serving(s)	_____	Fruit serving(s)	_____	Fruit serving(s)	_____
Starch serving(s)	_____	Starch serving(s)	_____	Starch serving(s)	_____
oz. Milk	_____	oz. Milk	_____	oz. Milk	_____
oz. Fat	_____	oz. Fat	_____	oz. Fat	_____
oz. Cooked veg	_____	oz. Cooked veg	_____	oz. Cooked veg	_____
Salad	_____	Salad	_____	Salad	_____
Free food	_____	Free food	_____	Free food	_____
Snack		Snack		Snack	
Total carb grams:	_____	Total carb grams:	_____	Total carb grams:	_____
Time:	_____	Time:	_____	Time:	_____
oz. Protein	_____	oz. Protein	_____	oz. Protein	_____
Fruit serving(s)	_____	Fruit serving(s)	_____	Fruit serving(s)	_____
Starch serving(s)	_____	Starch serving(s)	_____	Starch serving(s)	_____

1 carbohydrate serving = 1 fruit = 15 grams of carbohydrate (carb)
 1 carbohydrate serving = 1 starch = 15 grams of carbohydrate (carb)
 1 carbohydrate serving = 1 milk = 12 grams of carbohydrate (carb)

Manage and Take Control
 Aim for 3 meals per day: 4-5 hours apart
 Eat smaller portion
 Choose whole grains
 Avoid sugar-sweetened beverages
 On average, people eat:
 Total carbohydrate per meal: 3 – 4 servings (45 – 60 grams of carb)
 Total carbohydrate per snack: 1 – 3 servings (15 – 45 grams of carb)
 But your needs may be different. Discuss this with your registered dietitian.

Food List for Meal Planning

Starches & Grains	Fruits	Milk & Dairy	Meats & Protein	Non-Starchy Vegetables	Fats & Oils
<p>15 grams carbohydrate 0-3 grams protein/0-1 gram fat 80-100 calories p/serving Choose _____servings/day Cup = c</p> <p>¼ lg. baked potato (3 oz.) ½ c plain boiled sweet potato ½ c mashed w/low fat milk ½ c corn or green peas 1 c butternut/acorn squash ½ c large corn on cob ½ c ripe plantain ½ c pasta sauce ½ c cooked beans, split peas or lentils ½ c cooked rice, quinoa, pasta, barley or couscous ½ oz. low fat crackers 100 calorie microwave popcorn ½ of 6" pita bread 1 (6") corn or flour tortilla 1 fat free waffle 1 slice of bread 2 slices reduced calorie bread ½ regular English muffin ½ hot dog roll ½ large bagel</p> <p>½ c dry unsweetened cereal ½ c cooked cereal (oatmeal) ½ low fat granola 1 c broth soup type-vegetable, chicken, rice, noodle) 1 c bean or lentil soup <i>*Choose whole grains often</i></p>	<p>15 grams carbohydrate 0 grams protein/0 grams fat 60 calories p/serving Choose _____servings/day</p> <p>1 small apple (4 oz.) ½ c unsweetened applesauce 4 fresh apricots (5 ½ oz.) 1 small banana (4 oz.) 1 ¼ c strawberries (9 oz.) ¾ c berries (4 oz.) 1 c cubed cantaloupe (11 oz.) 12 fresh cherries (3 oz.) 2 clementine (4.5 oz.) ½ lg. grapefruit (11 oz.) 17 small grapes (3 oz.) ½ mango (5.5 oz. or ½ c) ½ papaya or 1 c cubed (8 oz.) 1 small orange (6 oz.) 1 kiwi (3 ½ oz.) 1 medium peach/nectarine (6 oz.) ½ c lg. pear (4 oz.) ¾ c fresh pineapple 2 small plums (5 oz.) 2 tangerines (9 oz.) 1 ¼ c watermelon (13 oz.) 1 ¼ c whole strawberries ½ c grapefruit juice ½ c 100% any canned fruits</p> <p>3 dried prunes, dates 1 ½ dried figs 2 Tbsp. raisins ½ c 100% fruit juice ½ c grape, prune, fruit juice blend <i>*Weigh fruits and vegetables w/ peel, core and seeds</i></p>	<p>12-15 grams carbohydrate 8 grams protein / 0-3 grams fat 100 calories p/ serving (skim) 120 calories p/ serving (2%) 160 calories p/ serving (whole) Choose _____servings/day 1 cup = 8 fluid oz.</p> <p>1 c skim or 1% milk 1 c lactaid milk, low fat 1 c nonfat plain Kefir ½ c nonfat flavored Kefir ½ c light yogurt (6 oz.) ½ c greek yogurt, plain or flavored (6 oz.) 1 c skim buttermilk ½ c evaporated skim milk 1 c light soy milk 1 c almond milk <i>*Almond milk: only 1 gram of protein</i></p>	<p>7 grams protein/0-3 grams fat 45 calories p/1 oz. (lean meat) 75 calories p/1 oz. (medium-fat meat) 100 calories p/1 oz. (high-fat meat) Choose _____oz./day</p> <p>Chicken, turkey, without skin: 93% lean ground turkey Fish: fresh, frozen, plain canned salmon or tuna in water, drained Shellfish: clams, crab, mussels, lobster, oysters, scallops, shrimp, imitation crab Pork lean cuts: tenderloin, loin chop/roast Lamb lean cuts Beef lean cuts: round, tenderloin, sirloin, flank, T-bone steak, 93-95% ground beef Lean cold cuts (3-5 g fat p/oz.) 1 egg 2 egg whites ¼ c egg substitute 1 oz. seitan 1 oz. hard cheese, reduced fat (3-5 g fat/oz.) ¼ c low fat cottage cheese 2 Tbsp. peanut butter or nut butters 1 oz. low fat cheese ½ c tofu (4 oz.) ¼ c mixed nuts/pumpkin, sunflower seeds ¼ c hummus</p>	<p>5 grams carbohydrate 2 grams protein/0 grams fat 25 calories p/serving Choose _____servings/day</p> <p>½ c plain cooked vegetables (drain and rinse canned) 1 c plain raw vegetables 5 oz. salad greens</p> <p>Artichoke hearts (3.5 oz.) Asparagus (4 oz.) Beans: green, wax, Italian cooked (2 oz.) Beets, cooked (2 oz.) Broccoli, cooked (3 oz.) Cabbage, raw or cooked (4 oz.) Brussels sprouts (2.5 oz.) Carrots, raw or cooked (2.5 oz.) Cauliflower, raw or cooked (4 oz.) Celery, raw (6 oz.) Cucumber, raw (7 oz.) Greens, cooked: spinach, collard, kale, mustard, escarole (5 oz.) Eggplant, raw (3 oz.) Fennel bulb or anise, raw (3 oz.) Lettuce, raw (20 oz.) Mushrooms, raw (5 oz.) Onion, raw (2.5 oz.) Pea pods, cooked (2 oz.) Peppers, all types, raw (5 oz.) Summer squash, cooked (3-4 oz.) Tomato, fresh or canned (5 oz.) Tomato sauce, salsa (1 ¼ c) Tomato juice or V8 (4 oz.) Turnips, cooked (4 oz.) Zucchini, raw (8 oz.) <i>*Corn, peas, potato, sweet potato, butternut and acorn squash are starchy vegetables</i></p>	<p>5 grams fat 45 calories p/serving Choose _____servings/day</p> <p>1 tsp. butter 1 tsp. tub margarine 1 Tbsp. diet tub margarine 1 tsp. mayonnaise 1 Tbsp. lite or low fat mayonnaise 2 tsp. miracle whip 2 Tbsp. nondairy creamer 2 Tbsp. low fat dressing 1 Tbsp. French dressing 1 Tbsp. Italian dressing 2 Tbsp. low fat cream cheese 3 Tbsp. low fat sour cream 2 tsp. tahini paste ½ avocado (2 Tbsp./1 oz.) 1 ½ tsp peanut or almond butter 6 almonds 6 cashews 10 peanuts 16 pistachios 5 hazelnuts 6 mixed nuts 8 large black olives 10 large green olives 1 tsp. olive, canola, peanut oil</p>



Food List for Meal Planning

Starches & Grains	Fruits	Milk & Dairy	Meats & Protein	Non-Starchy Vegetables	Fats & Oils
<p>15 grams carbohydrate 0-3 grams protein / 0-1 gram fat</p> <p>80-100 calories p/serving</p> <p>Choose _____ servings/day</p> <p>Cup = c</p> <ul style="list-style-type: none"> ¼ lg. baked potato (3 oz.) ½ c plain boiled sweet potato ½ c mashed w/low fat milk ½ c corn or green peas 1 c butternut/acorn squash ½ c large corn on cob ½ c ripe plantain ½ c pasta sauce ½ c cooked beans, split peas or lentils ½ c cooked rice, quinoa, pasta, barley or couscous ½ oz. low fat crackers 100 calorie microwave popcorn ½ of 6" pita bread 1 (6") corn or flour tortilla 1 fat free waffle 1 slice of bread 2 slices reduced calorie bread ¼ regular English muffin ½ hot dog roll ¼ large bagel ¾ c dry unsweetened cereal ¾ c cooked cereal (oatmeal) ¼ low fat granola 1 c broth soup type-vegetable, chicken, rice, noodle 1 c bean or lentil soup <p><i>*Choose whole grains often</i></p>	<p>15 grams carbohydrate 0 grams protein / 0 grams fat</p> <p>60 calories p/serving</p> <p>Choose _____ servings/day</p> <ul style="list-style-type: none"> 1 small apple (4 oz.) ¾ c unsweetened applesauce 4 fresh apricots (5 ½ oz.) 1 small banana (4 oz.) 1 ¼ c strawberries (8 oz.) ¾ c berries (4 oz.) 1 c cubed cantaloupe (11 oz.) 12 fresh cherries (3 oz.) 2 clementine (4.5 oz.) ½ lg. grapefruit (11 oz.) 17 small grapes (3 oz.) ½ mango (5.5 oz. or ½ c) ½ papaya or 1 c cubed (8 oz.) 1 small orange (6 oz.) 1 kiwi (3 ½ oz.) 1 medium peach/nectarine (6 oz.) ½ c lg. pear (4 oz.) ¾ c fresh pineapple 2 small plums (5 oz.) 2 tangerines (8 oz.) 1 ¼ c watermelon (13 oz.) 1 ¼ c whole strawberries ¾ c grapefruit juice ¾ c 100% any canned fruits 3 dried prunes, dates 1 ½ dried figs 2 Tbsp. raisins ¾ c 100% fruit juice ¼ c grape, prune, fruit juice blend <p><i>*Weigh fruits and vegetables w/ peel, core and seeds</i></p>	<p>12-15 grams carbohydrate 8 grams protein / 0-3 grams fat</p> <p>100 calories p/ serving (skim) 120 calories p/ serving (2%) 160 calories p/ serving (whole)</p> <p>Choose _____ servings/day</p> <p>1 cup = 8 fluid oz.</p> <ul style="list-style-type: none"> 1 c skim or 1% milk 1 c lactaid milk, low fat 1 c nonfat plain Kefir ½ c nonfat flavored Kefir ¾ c light yogurt (6 oz.) ¾ c greek yogurt, plain or flavored (6 oz.) 1 c skim buttermilk ¾ c evaporated skim milk 1 c light soy milk 1 c almond milk <p><i>*Almond milk: only 1 gram of protein</i></p>	<p>7 grams protein/0-3 grams fat 45 calories p/1 oz. (lean meat) 75 calories p/1 oz. (medium-fat meat) 100 calories p/1 oz. (high-fat meat)</p> <p>Choose _____ oz./day</p> <ul style="list-style-type: none"> Chicken, turkey, without skin: 93% lean ground turkey Fish: fresh, frozen, plain canned salmon or tuna in water, drained Shellfish: clams, crab, mussels, lobster, oysters, scallops, shrimp, imitation crab Pork lean cuts: tenderloin, loin chop/roast Lamb lean cuts Beef lean cuts: round, tenderloin, sirloin, flank, T-bone steak, 93-95% ground beef Lean cold cuts (3-5 g fat p/oz.) 1 egg 2 egg whites ¾ c egg substitute 1 oz. seitan 1 oz. hard cheese, reduced fat (3-5 g fat/oz.) ¼ c low fat cottage cheese 2 Tbsp. peanut butter or nut butters 1 oz. low fat cheese ¾ c tofu (4 oz.) ¾ c mixed nuts/pumpkin, sunflower seeds ¾ c hummus 	<p>5 grams carbohydrate 2 grams protein/0 grams fat 25 calories p/serving</p> <p>Choose _____ servings/day</p> <ul style="list-style-type: none"> ½ c plain cooked vegetables (drain and rinse canned) 1 c plain raw vegetables 5 oz. salad greens Artichoke hearts (3.5 oz.) Asparagus (4 oz.) Beans: green, wax, Italian cooked (2 oz.) Beets, cooked (2 oz.) Broccoli, cooked (3 oz.) Cabbage, raw or cooked (4 oz.) Brussels sprouts (2.5 oz.) Cauliflower, raw or cooked (2.5 oz.) Celery, raw (6 oz.) Cucumber, raw (7 oz.) Greens, cooked: spinach, collard, kale, mustard, escarole (5 oz.) Eggplant, raw (3 oz.) Fennel bulb or anise, raw (3 oz.) Lettuce, raw (20 oz.) Mushrooms, raw (5 oz.) Onion, raw (2.5 oz.) Pea pods, cooked (2 oz.) Peppers, all types, raw (5 oz.) Summer squash, cooked (3-4 oz.) Tomato, fresh or canned (5 oz.) Tomato sauce, salsa (1/4 c) Tomato juice or V8 (4 oz.) Turnips, cooked (4 oz.) Zucchini, raw (8 oz.) <p><i>*Corn, peas, potato, sweet potato, butternut and acorn squash are starchy vegetables</i></p>	<p>5 grams fat 45 calories p/serving</p> <p>Choose _____ servings/day</p> <ul style="list-style-type: none"> 1 tsp. butter 1 tsp. tub margarine 1 Tbsp. diet tub margarine 1 tsp. mayonnaise 1 Tbsp. lite or low fat mayonnaise 2 tsp. miracle whip 2 Tbsp. nondairy creamer 2 Tbsp. French dressing 1 Tbsp. Italian dressing 2 Tbsp. low fat cream cheese 3 Tbsp. low fat sour cream 2 tsp. tahini paste ¼ avocado (2 Tbsp./1 oz.) 1 ½ tsp peanut or almond butter 6 almonds 6 cashews 10 peanuts 16 pistachios 5 hazelnuts 6 mixed nuts 8 large black olives 10 large green olives 1 tsp. olive, canola, peanut oil



APPENDIX J – LESSONS 1, 2, 3

Lesson 1: USDA MyPlate/Five Food Groups/Introduction carbohydrate counting:
15g = 1 serving

Nutrition Objectives:

- Students will be able to name all five food groups shown on the MyPlate poster
- Students will learn which food groups contain carbohydrates
- Students will learn that 15g of carbohydrate (CHO) is equal to 1 CHO serving

Introduction:

- Introductions
- Purpose of the research study
- Complete Consent Form
- Complete Pre-Survey
- Begin asking students if they know about MyPlate and the name of the 5 food groups

USDA Myplate:

- Go over the USDA MyPlate board and the 5 food groups: grains, protein, vegetables (starchy vegetables), fruits and dairy
- Ask for example of foods for each food group: grains (tortilla, bread, pasta), starchy veggies (corn, peas), fruit (apple, banana) and dairy (yogurt and cheese)
- MyPlate is an example of what your dinner plate should look like
- Notice how each food group that we just mentioned is divided into sections of different sizes
- Why do you think some sections are bigger than others? (This shows how much of each food group should be at each meal)
- According to USDA MyPlate a healthy dinner plate should have half filled with fruits and vegetables. However, for diabetics we need to be aware that fruits have CHO as grains and dairy
- Put the board away and ask how many food groups are on the USDA Myplate: 5
- Ask according to USDA MyPlate half of the plate should be: fruits and vegetables
- Now that we know the 5 food groups, let's talk about carbohydrates

Intro to carbohydrate and which foods contain carbohydrates:

- What is carbohydrate (CHO): found in foods and is another word for sugars and the main source of energy for the body. CHOs get digested quickly and easily into glucose (sugar). CHOs are the foods that affect blood sugar the most
- Ask participants if they know which foods from the MyPlate contain CHOs.
- Foods that contain CHOs are: grains (rice, oatmeal, and barley), grain based (bread, cereal, pasta, crackers), starchy vegetables (potatoes, peas, corn) fruits and juices, milk and yogurt, dried beans (pinto beans, black beans), sweets and snacks (sodas, juice drinks, cake, cookies, candy, and chips), non-starchy vegetables like lettuce, cucumbers, broccoli, carrots, and cauliflower have a little CHO but in

general are very low. Note: foods with less than 5g of CHO per serving are considered free food

- Which food groups from the MyPlate contain CHO? Grains, starchy vegetables, fruits and dairy

Carbohydrate counting:

- Ask if they know what is CHO counting:
- CHO counting is a meal planning technique for managing the blood sugar levels. It helps to keep track of how much CHO you eat throughout the day. You set a limit for your maximum amount of carbohydrate to eat for a meal, and with the right balance of physical activity and medicine, if you need it, can help to keep your blood sugar levels in your target range
- How much carbohydrate you eat is very individual. Finding the right amount of carbohydrate depends on many things including how active you are and what, if any, medicines you take. Some people are active and can eat more carbohydrate. Others may need to have less carbohydrate to keep their blood glucose in control
- Say that 15 grams of CHO = 1 serving of CHO (show board)
- A place to start is at about 45-60 grams of carbohydrate at a meal that equals to 3 to 4 CHO servings and 15 to 20 grams of CHO that equals 1 to 1 1/2 CHO servings per snack (go over the board with meals)
- Ask: but how do we know the amount of CHO the foods have?
- Starting with food labels (Nutrition Facts Label) is a great way to know how much CHO is in a food
- For foods that do not have a label, you have to estimate how much CHO is in it
- Keeping general serving sizes in mind will help you estimate how much CHO you are eating
- Use a food scale, measuring cups and measuring spoon for foods without labels such as fruits and starchy vegetables
- Also use: fist = 1 cup, handful = 1-2 oz., thumb tip = 1 teaspoon, thumb = 1 oz. or 1 tablespoon, palm = 3 oz. for woman and 5 oz. for men
- For example there is about 15 grams of CHO (1 serving) in:
 - 1 small piece of fresh fruit (4 oz.)
 - 1/2 cup of canned or frozen fruit
 - 1 slice of bread (1 oz.) or 1 (6 inch) tortilla
 - 1/2 cup of oatmeal
 - 1/3 cup of pasta or rice
 - 4-6 crackers
 - 1/2 English muffin or hamburger bun
 - 1/2 cup of black beans or starchy vegetable
 - 1/4 of a large baked potato (3 oz)
 - 2/3 cup of plain fat-free yogurt or sweetened with sugar substitutes
 - 2 small cookies
 - 2-inch square brownie or cake without frosting
 - 1/2-cup ice cream or sherbet
 - 1 Tbsp. syrup, jams, jelly, sugar or honey
 - 2 Tbsp. light syrup

- 6 chicken nuggets
- 1/2 cup of casserole
- 1 cup of soup
- 1/4 serving of a medium French fry
- Ask how many grams of CHO equal 1 serving: 15g
- Ask how many grams of CHO you should have per meal: 45-60g
- Ask how many servings of CHO equals 45-60g of CHO? 3-4 servings
- Ask how many servings of CHO you should have per snack: 15-20g
- Ask how many serving of CHO equals 15-20g of CHO: 1-2 servings
- Ask do soda, tortilla and corn have CHOs? Yes, corn is a starchy vegetable with CHO
- If time: Let's find the total CHO on the Nutrition Facts Label? Hand out the bag with labels and let's find the total CHO in each label

Handouts:

- ChooseMyPlate (SNAP-Ed English and Spanish)
- Nutrition Facts Label (SNAP-Ed English and Spanish)
- List of foods that contain CHO (English and Spanish)

Activities:

- Identify what foods from the 5 food groups contain CHO

Program extender:

- USDA MyPlate (plastic)

Recipe:

- Yogurt parfait (pineapple tidbits/plain yogurt)

Materials to bring:

- Blue Folders with all handouts and forms
- Pens
- Pencils
- Markers
- Pre-surveys
- SNAP MyPlate board and food groups in English and Spanish
- SNAP MyPlate plastic plate
- Easel paper: 1 serving of CHO = 15 g of CHO, 3-4 servings = 45-60g of CHO
- Easel holders
- SNAP Nutrition Facts Label board
- Bag with Food Labels
- Blank papers
- Plastic USDA MyPlate for program extender
- Yogurt Parfait items and recipe: Spoons, cups, napkins, gloves, hair net, purel, plastic bag, paper towel

Lesson 2: Nutrition Facts Label/Build a meal

Nutrition Objectives:

- Students will be able to read the Nutrition Facts Label
- Students will be able to count 45-60g of CHO per meal and 15–20g of CHO per snack
- Students will be able to build a meal with 45–60g of CHO using MyPlate

Introduction:

- Take attendance
- Review what did we learn last week:
 - MyPlate containing the 5 food groups
 - Which food groups contain CHO: ask if grains, fruits, starchy vegetables like corn and peas, beans, yogurt, ice cream, regular soda, chicken and fish have CHOs
 - Show the board: how many CHO we should eat per meal and snacks
- Today we are going to talk about food labels

Nutrition Facts Label:

- The label is intended to make it easier for you to use to make quick, informed food choices that contribute to a healthy diet specially finding the CHO amounts in foods
- For foods that come in packages, the best place to find the CHO is looking at the total CHO on the labels. The grams of total CHO on the label are the key to CHO counting. Don't worry about counting the sugar and fiber grams, as they are included in the total carb number
- Let's start reading a label, going over the SNAP label board:
 - First check the serving size: the information on the label is based on the serving size; different foods have different serving sizes and the number of servings in the package. Serving sizes are consistent to make it easier to compare similar foods; they are provided in units, such as cups or pieces, followed by the metric amount, e.g., the number of grams.
 - Second check the serving per container: The size of the serving on the food package influences the number of all items on the label and all the nutrient amounts listed on the top part of the label. Pay attention to the serving size, especially how many servings there are in the food package. Say: "How many servings am I consuming"? (e.g., 1/2 serving, 1 serving, the whole thing).
 - Now let's look at the total CHO: indicates the total amount of CHO in a serving of the product.
 - If there are 2 servings in a box and you eat the 2 servings you have to multiply the CHO by 2
 - Sugar: occurs naturally in foods such as fruit or come from refined added sugars sources such as table sugar or corn syrup.
 - Lastly our friend fiber: found in fruits, vegetables, beans, nuts, seed and whole grains such as wheat bread. It is not digested in your intestines, which slows CHO digestion and glucose absorption, helping glucose not going up too fast.

- Ask if you eat 30 g of potato how many servings of CHO do you eat? 2; why? Because 1 serving is equal to 15g of CHO
- If time: hand out labels and discuss the serving size, serving per container and total CHOs
- From the food list from the handout, go over the food groups:
 - Starch: breads, cereals, grains, starchy veggies, crackers, snacks, beans, peas, lentils = 15 g CHO in 1 serving
 - Fruit: 15 g CHO = 1 serving. (it all depends on quantity, cups, amounts)
 - Dairy: milk, fat-free, low-fat, 1%, reduced fat, 2%, whole = 12 g CHO in 1 serving
 - Sweets, desserts, and other CHO = 15 g CHO in 1 serving
 - Non-starchy veggies = 5 g CHO in 1 serving (free food)
 - Meat and meat substitutes: 0 g CHO in 1 serving; plant based proteins such as beans, or tofu, or soy beans: varies
 - Fat: 0 g CHO
 - Alcohol: varies
- Portion sizes count! Example a small apple: 15 g CHO, large apple: 30 g CHO.
- The use of food scale or measuring cups can help for foods without the label like fruits
- Remind 45-60 grams = 3-4 servings per meal is the approximate amount you need per meal: Breakfast, Lunch, Dinner and 15-20 grams = 1-2 servings for snacks
- Activity:
 - Hand out MyPlate papers
 - Using the handout containing a list of food groups and their amounts of CHOs, participants will build a meal or a snack writing their chosen foods in proper food groups on MyPlate
 - Participants will count the total the amount of CHO
 - The meal should have between 45-60 g of CHO or 15-20 g of CHO for snack

Handouts:

- Nutrition Facts Label
- Food List
- Paper MyPlate

Activity:

- Build a meal and tally the CHO using food labels

Recipe:

- Cucumber and hummus

Incentive (program extender):

- Shopping list

Materials to bring:

- 3 easel stands: Total CHO amount in meals board, MyPlate board, NFL board

- Paper MyPlate to build a meal
- Extra handouts from lesson 1
- Attendance sheet
- Pencils, pens, markers, calculators
- Recipe: hummus and cucumber
 - 4 oz. cups, spoons, napkins, gloves, hair net, purel, paper towel, hummus, cucumber, cutting board, knife

Lesson 3: review/build one meal/post survey/skill test/program evaluation

Nutrition Objectives:

- Students will be able to score 80% on the post survey
- Students will be able to score 80% on the skill of CHO counting and build a meal between 45-60 g of CHO using the USDA MyPlate

Introduction:

- Take attendance
- Today is our last day and we are going to do a quick review, following the post survey, build a meal and evaluations
- Let's recap:
 - 5 food groups
 - 3-4 servings of CHO = 45-60 g of CHO per meal
 - 1-2 servings of CHO = 15-20 g of CHO per snack

CHO counting skill test: build a meal

- Hand out the USDA MyPlate
- Ask participants to pick a meal from breakfast, lunch or dinner (from plastic bags)
- Ask participants to build a meal placing the pictures containing total amount of CHO on the USA MyPlate
- Ask participants to count the total amount of CHO, between 45-60g of CHO and write on the bottom on the page

Post survey:

- Ask participants to fill out the post survey; researcher will read the questions aloud to make sure participants understand questions.

Program Evaluation:

- Ask participants to complete the program evaluation

Recipe:

- Carrots and ranch dressing

Incentive (program extender):

- Vegetable peeler

Materials to bring:

- Attendance
- CHO counting skill test
- Post survey
- Pens
- Pencils
- Incentives
- Salsa and whole grains tortillas