Tackling Diabetes through Nutrition Education

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Abstract

Nearly 26 million Americans have diabetes and over twice that amount have prediabetes (79 million) (1). This is a prominent health concern and many efforts are made to prevent and treat it. The proposed intervention was a booklet that gave tips on healthy lifestyles along with sample nutritious diet plans, recipes, and exercises. The effectiveness of the nutrition booklet was measured by pre and post surveys. The post survey was conducted by phone two weeks after the pre survey and booklet was given to the patient. My findings were that participants increased their fruits, vegetables, and water intake. They also decreased their junk food and soda intake. I concluded that a nutrition booklet could be helpful in educating patients on how to live and eat healthy.

Keywords: diabetes, prediabetes, nutrition, healthy diet, exercise, intervention
Introduction

I have always envisioned myself working in family medicine. Primary care interests me because of the continuity of care and treating patients throughout their lives. Family medicine physicians continually see a lot of chronic diseases in the United States like diabetes, hypertension, hyperlipidemia, and cardiovascular disease. Since these are common ailments, the question is how do we prevent them and what do we do for the patients to manage the diseases the best way? I have family members with diabetes (type 1 and 2) on both sides of my family, so this disease has always intrigued me. Also, Matthew Walker Comprehensive Health Center’s medical director expressed the need for nutrition counseling for the patients at the clinic.

My proposal was to try to tackle the problem of malnutrition that leads to this disease and managing the disease through proper nutrition. The intervention was a booklet that gave tips on nutrition and had healthy diet plans that patients can easily follow. There were also tables showing the calories count and cost of the meals for those who have restricted incomes. I wanted to see if increasing the patient’s knowledge of nutrition and exercise would help them to live a healthier lifestyle and therefore assist them in managing their diabetes.

Background

Nearly 26 million Americans (8.3% of Americans) have diabetes (1). 35% of U.S. adults aged 20 years or older have prediabetes (1). Also, 85.2% of people with type II diabetes are overweight or obese (1). Nutrition is a main part of this health problem. A study done by the University of
North Carolina at Greensboro (2) revealed that participants encountered challenges when applying nutrition recommendations. These were linked to their prior eating practices, dietary self-efficacy, social support, and time management. The conclusion was that patients needed nutrition education in order to successfully navigate these challenges. Several studies have shown that diabetes nutrition education will have a positive impact on patients.

In one study, participants received four sessions of group education during four weeks (3). Nutrition education materials (booklets, leaflets) for older adults were provided. The results were that nutrition and diabetes knowledge increased significantly. Also, dietary behavior was improved. In another study (4), participants were given individual nutrition education for type 2 diabetes. Each person was given a diet prescription. The results showed significant decreases in body weight, body mass index, fasting blood sugar, and phloem protein 2. This meant that individual diabetes diet education is effective in increasing the patient’s understanding of their diet prescription and also in controlling body weight and blood sugar level. Also, awareness of calorie requirement could be used as an index of understanding of prescribed diet.

A study conducted in Oregon (5) found that nutrition education conducted over five weekly meetings would result in greater improvement in targeted goals like calorie intake and fat reduction. The meetings focused on reducing calorie intake, increasing dietary fiber, and decreasing fat consumption. Seeing that these past studies were effective in helping diabetics make a positive change, I decided to make a nutrition booklet as a form of individual diabetes education.
Methodology

Patient Surveys

A 19-question pre-survey (Appendix 1) was created to determine the patients’ diabetes (controlled or uncontrolled), exercise, and nutrition status. I conducted the surveys at the Nashville and Smyrna Matthew Walker Comprehensive Health Center sites. The survey was done orally before Dr. Semenya went in to see the patient. I then gave them my nutrition booklet after the survey and explained each page to the patient to make sure they understood the information. I also asked for their consent to call them in two weeks. After 2 weeks, a 16-question post-survey (Appendix 3) was conducted through phone call to see if a change occurred in exercise frequency and nutrition habits.

Nutrition booklet

A booklet was created for patients with type 2 diabetes. It contained subsections for healthy tips, a chart for estimated calorie needs per day, how to read a nutrition label, sample diet, and recipes. There was also another section for easy exercises (Appendix 2).

Results

Pre-Survey

16 surveys were completed, and 15 patients gave consent for a follow-up phone call. Therefore, I only analyzed the results for the patients who gave follow up consent. In the question for weight perception, 3 patients answered that they were underweight, 3 for normal, 4 for overweight, and
1 for obese. I then took their BMI and found out that 1 patient is actually underweight, 3 were normal, 4 were overweight, and 3 were obese. So, overall the patients underestimated their weight class.

14 of the 15 patients had type 2 diabetes and 1 patient had type 1 diabetes. One patient reported that his diabetes was not controlled. Four patients reported that they never check their blood sugar at home and two reported that they check it when it feels high. The other patients checked their blood sugar on a regular basis. When it comes to exercise, 33% reported that they never exercise, 7% said once or twice a week, 13% said three or four times a week, and 47% said that they exercise every day. 33% of patients said that they have never been given a diet or nutrition plan by their doctor or a nutritionist.

For the nutrition portion of the survey, 6% of patients said that they never eat fruits, 20% said they rarely ate them, 7% said one or twice a week, 7% said 3 or 4 times a week, and 60% said every day. For vegetables, 7% said they never ate them, 15% said rarely, 7% said once or twice a week, and 73% said every day. When asked about their meat intake 6% said they never eat it, 7% said rarely, 20% said once or twice a week, 7% said 3 or 4 times a week, and 60% said every day. For junk food intake, 13% said they never eat it, 20% said rarely, 20% said once or twice a week, 7% said 3 or 4 times a week, 40% said they eat it every day. All of the patients said that they drink water every day, the amount of water differed for most. Lastly, I asked the patients about the frequency of their soda consumption, 27% said they never drink soda, 20% said rarely, 20% said once or twice a week, 6% said 3 or 4 times a week, and 27% said they drink it every day.
Post-survey

I received 5 surveys by phone call. 4 out of 5 of the participants read my booklet and also found it helpful. None of them cooked one of the sample recipes. 2 out of the 5 patients were still not exercising and the other 3 exercised at the same frequency (every day). For fruit consumption, 20% of participants said they eat them 3 or 4 times a week and 80% said they eat them every day. For vegetables, 40% said they eat them 3 or 4 times a week and 60% said every day. For meat, 20% said they never eat it, 40% said 3 or 4 times a week, and 40% said every day. When asked about their water intake the amount was the same (every day). For soda intake, 40% said rarely, 40% said once or twice a week, and 20% said every day.

For fruit consumption, 4 out of the 5 patients increased their intake of fruits. One had the same intake amount which was every day. For vegetables, 2 out of 5 increased their intake, while 3 had the same amount of intake (everyday). 3 out of 5 said their meat consumption was the same, 1 increased it, and 1 decreased it. For junk food, 3 out of 5 decreased their intake. 2 had the same amount of intake, but one did say he decreased his amount of fast food eaten per week. For water consumption, 3 out of 5 drank more water per day and 2 drank the same amount (a lot). For soda, 3 out of 5 drank the same amount and 2 decreased their soda intake. (Select graphs are in Appendix 4)

Discussion

The main strength of my project was that I had a good project plan in terms of how I conducted it (pre and post survey form). Also, my nutrition booklet had good information and a nice design.
One of my project weaknesses was that I feel I did not have enough time. I think if I had been able to space out my follow up time I could have given the patients a chance to really implement change. I think it would have been better to conduct the post survey in person at the patient’s next appointment in 3 months. That way I could have avoided the phone call and the chance of my calls not being answered or returned. Lastly, another weakness was the amount of surveys I had. I do not think that 16 surveys adequately represented the population at Matthew Walker Comprehensive Health Center. This last weakness was also a limitation to my project. I was limited to 15 patients for follow up so my results were skewed. Even further, only 5 post surveys were conducted by phone, so I was unable to see if any change occurred in all the patients I interviewed.

Another limitation of my project was the amount of people who spoke to the patients before I came in to do my survey. Thursday mornings are Matthew Walker’s Diabetes Clinic. On these days the pharmacist and her students went into the see the patient, then the nutritionist and the MPH PCLP students, then another one of my fellow PCLP students, and lastly me. So, by the time I got to the patients they were tired of seeing everyone else but the doctor whom they came to see. So, I felt like my interviews were rushed and the patients may not have answered like they would have if they did not have to talk to everyone else before.

One of the questions that I had about my results was why didn’t every patient I followed up with have improvement? I think this was maybe because 2 weeks was not long enough for follow up time. Sometimes making lifestyle changes is hard so changes need to be made little by little. Another question that I had was why were the patients’ perceptions of their weight different from
reality? I think this may be because 67% of Americans are overweight or obese. So, being overweight may be viewed as normal. Also, the public view of someone who is obese may be someone is morbidly obese.

In one study done on weight perception, “weight misperception among overweight and obese adults was associated with less likelihood of interest in or attempts at weight loss and less physical activity (6).” This showed the importance of knowing how the person perceived themselves in order to target weight loss efforts. Another study looked at weight perception in terms of diabetes prevention. They found that “weight misperception should be acknowledged as a factor to be addressed when screening and identifying individuals at risk for diabetes (7).” They concluded that if the difference between the perceived weight and actual weight was addressed, then individuals would be alarmed into losing more weight and would also understand the seriousness of diabetes risk.

I think that this could tie over into my project for diabetes management. I believe that if patients understood that they were underestimating their weight and BMI, then they would see the need to stick to a healthy diet and exercise plan. Most of the patients I interviewed who misperceived their weight were not exercising or eating healthy. The one patient who accurately stated her weight as obese was taking steps to lose the weight and get healthy.

**Recommendations**
My primary recommendation would be to have diabetes nutrition information available on hand to give to patients who may be struggling with keeping their blood glucose under control, whether it is because of noncompliance with medications or an unhealthy diet. The information will not just be given in pamphlet or booklet form, but will be explained so the patient can understand the information. This way there will be a discussion about what changes the patient needs to make to improve their health and how we can help them succeed with a good understanding of the challenges that they may have in their life that may make change difficult.

My second recommendation would be to extend the Diabetes Clinic hours to accommodate patients who may not be able to schedule an appointment for Thursday mornings. The Diabetes Clinic has extra education for the patients who come, like nutritionists, classes, and face-to-face discussions about their medications with the pharmacist. Many of the patients who frequent Matthew Walker Comprehensive Health Center have jobs and may not be able to take off work to come to the clinic at this specific time. I believe that this extra education is valuable for the patients who may be struggling with maintaining a healthy lifestyle.

Some of the patients I saw come exclusively to the Diabetes Clinic and are still struggling with keeping their blood sugar under control. Maybe for these types of patients a one-on-one session could be done in another part of the clinic at an allotted time to fully understand the challenges the person is facing and recognize some of the barriers that may be blocking them from making significant changes. Also, Matthew Walker could partner with the local Farmer’s Market to give their patients discounts or coupons on fresh fruits and vegetables. Some of the patients I
interviewed expressed concern about the cost of fresh foods. Maybe this solution could help them be able to afford these essential items.

**Conclusion**

Diabetes is a prevalent health issue in the United States. Nutrition education has been proven to be an effective way to help diabetics manage their disease. Diabetes nutrition booklets may be helpful in educating patients on following a healthy diet and exercise plan. This can be concluded from published studies and from my project when improvements were shown in the participants that did complete my post-survey.


Appendices

Appendix 1: Pre-Survey

Name______________________________

Phone #____________________________

Would you consider your weight normal ___, overweight ___, or obese___?

Do you have Diabetes? Yes___ or No___
    If so, are you type 1___ or type 2___?
    Is it under control? Yes___ or No___
    What was your last Hemoglobin A1C reading? _____
    When was your last blood sugar reading? _______________  
    What was it?________________
    How often do you check your blood sugar? _______________

Do you exercise? Yes___ or No____
    If so, how often? __________

Have you ever been given a nutrition (diet) plan by your doctor or a nutritionist? Yes___ or No___

How often do you eat:

    Fruits __________________
    Vegetables __________________
    Meats __________________
    Junk food __________________
    Drink water __________________ (how many glasses/bottles a day? ________)
    Drink sodas __________________ (regular or diet? ___________)


Appendix 2: Nutrition Booklet

Table of Contents

Living Healthy with Type 2 Diabetes

What is Type 2 Diabetes?

Type 2 Diabetes is the most common form of diabetes.

In type 2 diabetes, either the body does not produce enough insulin or the cells ignore the insulin. Insulin is necessary for the body to be able to store glucose for energy. When you eat food, the body breaks down all of the sugars and carbohydrates into glucose, which is the basic fuel for the cells in the body. Insulin helps the sugar from the blood into the cells.

When glucose builds up in the blood instead of going into cells, it can cause two problems:

- Right away, your cells may be starved for energy.
- Over time, high blood glucose levels may hurt your eyes, kidneys, nerves, or heart.

Some groups have a higher risk for developing type 2 diabetes than others. Type 2 diabetes is more common in African Americans, Latinos, Native Americans, and Asian Americans. P.O. in cancers, as well as the elderly population.

Nutrition

How many calories should I eat per day?

Healthy tips:

- Make sure half your plate is fruits and vegetables.
- Switch to skim or 1% milk.
- Make at least half your grains whole.
- Choose foods and drinks with little or no added sugar.
- Drinking water is best.
- Limit your salt (sodium) intake.

ChooseMyPlate.gov
Sample Daily Meal Plans

Day 1

Breakfast
- 1 small (2-ounces) toasted whole wheat bagel
- 2 teaspoons reduced-fat cream cheese
- 2 slices tomato
- 1/2 cup sliced fresh strawberries
- 1/2 cup sugar-free, fat-free yogurt

Lunch
Roast Beef Roll-Up: 3 ounces lean roast beef rolled in a 10-inch whole wheat tortilla with 1/4 cup shredded carrots, 1 lettuce leaf and 1 tablespoon fat-free Ranch or Thousand Island dressing
- 1/2 cup red and yellow bell pepper strips
- 1 small peach

Dinner
Grilled Chicken with Grilled Vegetables (193 calories)
- 1/2 cup cooked whole wheat couscous
- 1/2 cup cooked zucchini and yellow squash (saute in 1 teaspoon olive oil, sprinkle with 1/4 teaspoon dried oregano)
- 1 small orange, sliced

Snacks
- 1 (1/2-cup) serving sugar-free vanilla pudding
- 2 cups air-popped popcorn

Day 2

Breakfast
- 1/2 cup cooked unsweetened oatmeal, sprinkled with cinnamon
- 2 tablespoons milk
- 1 cup fat-free milk

Lunch
- 1 ounce whole grain crackers
- 2 small plates

Dinner
- 1/2 grilled corn on the cob
- 1/2 cup cooked wild rice
- 1/2 cup stir-fried broccoli with red bell pepper (stir-fry in 1 teaspoon canola oil in a wok over high heat)
- 1/2 cup mixed honeydew and cantaloupe chunks

Snacks
- 3 whole wheat Graham crackers
- 1 frozen fruit bar (all fruit, no sugar added)
Recipes

Crockpot Italian Sausage and Vegetables

This recipe serves 4.

Ingredients
1 (14.5 oz) can no-salt added diced tomatoes
1 teaspoon dried oregano
1 teaspoon dried basil
1 clove garlic, minced
1 teaspoon olive oil
4 ready-to-cook Italian turkey sausage links (about 2 ounces each)
1 large green pepper, sliced
1 medium onion, sliced
16 ounces frozen Italian-style vegetables (broccoli, cauliflower, carrots, green beans, 8 oz)

Instructions
1. In a slow cooker, mix together the diced tomatoes, oregano, basil, and garlic. Set aside.
2. Heat the oil in a medium skillet over medium-high heat. Add the sausage and cook for 3-4 minutes on each side until brown. Remove from the pan.
3. Layer the green peppers and onions on the bottom of the slow cooker.
4. Place the Italian sausage links on top of the peppers and onion mixture. Pour frozen Italian vegetables on top of Italian sausage.
5. Pour the tomato mixture on top of the Italian sausage.
6. Place the slow cooker on high for 4 hours or until done (cooking time may vary based on the slow cooker).

Nutritional Facts

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Recipe Cost: $5.95

Herb Garlic Meatloaf

This recipe serves 6.

Ingredients
Cooking spray
2 cups all-purpose flour
1 egg

Instructions
1. Preheat oven to 375 degrees F. Coat a 9x13-inch pan with cooking spray. Set aside.
2. In a medium bowl, mix together the flour, egg, and salt. Add the garlic and mix well.
3. Add the egg mixture to the ground turkey and mix well.
4. Line a 9x13-inch pan with cooking spray. Place the turkey mixture in the pan and pat it down. Bake at 375 degrees F for 30 minutes.
5. After the meatloaf has baked for 20 minutes, pour the ketchup and hot sauce over the meatloaf. Return to the oven to bake for an additional 15 minutes or until the internal temperature of the meatloaf reaches 165 degrees F.
6. Serve the meatloaf with mashed potatoes.

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Budget-Friendly Chicken Chili

This recipe serves 4.

Ingredients
Cooking spray
6 ounces chicken, boned and diced
2 green onions, diced
1 clove garlic, minced
2-1/2 cups chicken broth
1-1/2 cups cherry tomatoes
16 ounces navy beans, rinsed and drained
1 teaspoon ground cumin
1 teaspoon chili powder
1/4 teaspoon cumin

Instructions
1. Spray a large saucepan with cooking spray. Add chicken and saute over medium heat for 7 minutes or until done. Remove from pan.
2. Add onions and green peppers and saute over medium-high heat for 3 minutes or until done. Add garlic and saute 1 minute more.
3. Add remaining ingredients along with cooked chicken and bring to a boil. Reduce heat and simmer for 15 minutes.

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Blueberry Silken Smoothie

This recipe serves 2.

Ingredients
1 1/2 cups fresh blueberries (or use store-bought frozen blueberries)
2/3 cup organic cranberry juice, chilled
5 ounces silken tofu, drained and chilled (about 1/2 cup)
1/2 teaspoon pure vanilla extract (optional)

Instructions
1. Puree all ingredients in a blender on low speed for 20 seconds, then high speed for 10 seconds or until smooth. Serve chilled immediately.

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Caribbean Bean Dip

This recipe serves 6.

Ingredients
1 (24.5-ounce) can organic black beans, drained
1/2 cup avocado, pitted and sliced
1 tablespoon lime juice
1 tablespoon roughly chopped red pepper
1 teaspoon ground cumin
1 tablespoon sea salt, or to taste

Instructions
1. Puree all ingredients except the green onion in a blender until smooth. Top with green onion and serve with tortilla chips or fresh vegetables.

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Exercise

Aerobic Exercise

Aerobic exercise helps your body use insulin better. It makes your heart and bones strong, relieves stress, improves blood circulation, and reduces your risk for heart disease by lowering blood glucose and blood pressure and improving cholesterol levels.

We recommend: Aiming for 30 minutes of moderate-to-vigorous intensity aerobic exercise at least 5 days a week or a total of 150 minutes per week. Spread your activity out over at least 5 days during the week and try not to go more than 2 days in a row without exercising.

Note: Moderate intensity means that you are working hard enough that you can talk, but not sing, during this activity. Vigorous intensity means you cannot say more than a few words without pausing for a breath during the activity.

Examples:
- Brisk walking (outside or inside on a treadmill)
- Riding/stationary cycling indoors
- Dancing
- Low-impact aerobics
- Swimming or water aerobics
- Playing tennis
- Skiing
- Nordic/walking
- Hiking
- Moderate-to-heavy gardening

For more information visit:
www.diabetes.org
www.choosemyplate.gov

Strength Training

Strength training (also called resistance training) makes your body more sensitive to insulin and lowers blood glucose. It helps to maintain and build strong muscles and bones, reducing your risk for osteoporosis and broken fractures.

The more muscle you have, the more calories you burn—even when your body is at rest.

Preventing muscle loss by strength training is also the key to maintaining an independent lifestyle as you age.

We recommend: Doing some type of strength training at least 2 times per week in addition to aerobic activity.

Examples:
- Weight machines or free weights at the gym
- Using resistance bands
- Lifting light weights of objects like canned goods or water bottles at home
- Calisthenics or exercises that use your own body weight to work your muscles (examples are pushups, sit-ups, squats, lunges, wall sits and planks)
- Classes that involve strength training
- Other activities that build and keep muscle like heavy gardening

Image supplied by: Diabetes.org
Appendix 3: Post-Survey

Name ________________________________________________________________

Have you read the nutrition booklet? Yes___ or No___
Did you find it helpful? Yes___ or No___
Did you use any of the recipes? Yes ___ or No___
Is your diabetes under control? Yes ___ or No___
When was your last blood sugar reading? _________
What was it? _________
Do you exercise? Yes ___ or No___
    If so, how often? _________
How often do you eat:
    Fruits _______________
    Vegetables _______________
    Meats _______________
    Junk food _______________
    Drink water _______________ (how many glasses/bottles a day? _________)
    Drink sodas _______________ (Regular or Diet? ________)

Appendix 4: Results Graphs

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Frequency of Fruits Consumed
Pre Survey

- never: 60%
- rarely: 20%
- 1/2x a week: 7%
- 3/4x a week: 7%
- everyday: 6%

Frequency of Fruits Consumed
Post Survey

- never: 80%
- rarely: 20%
Frequency of Junk Food Consumed
Pre Survey

Frequency of Junk Food Consumed
Post Survey