

1-1-2011

Nutrition Education Resources Used by Renal Dietitians for the Education of the Outpatient Dialysis Population in Michigan

Susan L. Leslie

Follow this and additional works at: <http://commons.emich.edu/theses>

Recommended Citation

Leslie, Susan L., "Nutrition Education Resources Used by Renal Dietitians for the Education of the Outpatient Dialysis Population in Michigan" (2011). *Master's Theses and Doctoral Dissertations*. Paper 317.

This Open Access Thesis is brought to you for free and open access by the Master's Theses, and Doctoral Dissertations, and Graduate Capstone Projects at DigitalCommons@EMU. It has been accepted for inclusion in Master's Theses and Doctoral Dissertations by an authorized administrator of DigitalCommons@EMU. For more information, please contact lib-ir@emich.edu.

Nutrition Education Resources Used by Renal Dietitians for the Education of the Outpatient

Dialysis Population in Michigan

by

Susan L Leslie, RD

Thesis

Submitted to the

School of Health Sciences

Eastern Michigan University

In partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

in

HUMAN NUTRITION

Thesis Committee:

Judith Brooks, PhD, R.D. Chair

Marie Whybark, M.S., R.D.

March 11, 2011

Ypsilanti, Michigan

Dedication

This project is dedicated to the memory of Donald G. Jennings. He strongly believed in the value of education and allowed not only his children, but many others, the opportunity to pursue their dreams through his generosity. His life was a testament to how one person can have such an impact on the lives of others.

Jeanne L. Jennings – a woman who showed her children through example the meaning of dedication, strength, and perseverance, all things are possible.

Acknowledgements

There were many people who offered guidance and support during the course of this research project.

Judith Brooks, PhD, R.D. Judi provided me with an opportunity to develop a study that had personal significance to me as I worked as a Renal Dietitian in the state of Michigan. She understood and supported my interest in exploring the process of nutrition education that was provided to patients with chronic kidney disease in Michigan and the benefit in attempting to evaluate renal dietitians' perception of its effectiveness. She understood that through this process, students would undoubtedly gain an appreciation for those professionals who have dedicated their lives to research. I will always be grateful to her for her continued support as I surely would not have completed this project without her participation.

Dr. George Liepa, PhD., FACN, FAOCS. George was a dedicated educator in every sense of the word. During class, he shared many meaningful and often humorous stories surrounding his many research studies, his pursuit of his doctoral degree at Iowa State University, and his beloved family. He shared with me many stories surrounding his experiences as a graduate student working with his mentor, Dr. Massero, making revision after revision to each chapter of his research papers. He offered encouragement and was persistent in his desire to assure that I had a project of which I was proud. The lessons he taught his students reached far beyond the classroom, and I regard myself as fortunate to have been one of his students.

Shoshana Freedman. I want to express my gratitude to Shani for her time and efforts in formatting this project. She was very gracious and spent many hours of her own time while working on her own graduate thesis and raising a family.

Abstract

The prevalence of end stage renal disease requiring dialysis has risen in recent years. Nutrition education is a crucial component in the prevention of malnutrition in the dialysis population. The present survey-based research study was designed to evaluate educational resources used by Michigan Renal Dietitians in an outpatient dialysis setting. One hundred and one dietitians rated educational resources based on frequency of use, efficacy, and existing limitations. Albumin values were used to compare Michigan renal centers to other renal centers in 11 state renal consortiums (Renal Network 11). It was concluded that frequently used resources were often perceived to be ineffective at improving specific nutritional outcomes. In addition, albumin outcomes in Michigan during the study period were lower than those throughout Renal Network 11. These data suggest that making additional programs and resources available to Michigan Renal Dietitians would benefit this population.

TABLE OF CONTENTS

Dedication.....	ii
Acknowledgements.....	iii
Abstract	iv
Chapter 1: Introduction.....	1
Purpose of Study.....	4
Study Objectives and Justification.....	4
Chapter 2: Review of Literature	6
Nutrition and Kidney Disease.....	6
Clinical Guidelines and Current Practice.....	7
Causes and Metabolic Consequences of Kidney Failure.....	10
Nutrition Assessment.....	12
Education and Adult Learning in the Clinical Setting.....	14
Factors Regarding Compliance.....	15
Nutritional Outcome Markers.....	17
Chapter 3: Methodology	19
Subjects.....	19
Research Design.....	19
Survey.....	20
Statistical Analysis.....	20
Chapter 4: Results.....	22

Demographics of Survey Respondents and Treatment Modalities.....	22
Nutrition Education Resources Used by Michigan Renal Dietitians.....	23
Diet Books and Report Cards	24
Bulletin Boards and Posters	25
Food Models and Containers	27
Product Labels and Restaurant Menus.....	28
Contests and Incentives.....	29
Peer Resource Counselors.....	30
Internet Resources.....	32
Serum Albumin Measurements Taken at Michigan Dialysis Clinics versus Renal Network Eleven Clinics During 2004.....	33
Chapter 5: Discussion	35
Discussion of Results	35
References.....	39
Appendix A: K/DOQI Nutrition Guidelines for Maintenance Dialysis	45
Appendix B: Approval Letters.....	46
Appendix C: Letter to Study Participants	49
Appendix D: Survey Tool.....	51
Appendix E: Laboratory Data.....	58

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Adult Nutrition Guidelines per Treatment Modality	10
2. Demographic Information of Study Participants	22
3. Patient Load and Treatment Modalities of Study Participants	23
4. Limitations in the Use of Contests and Incentives for Nutrition Education	30
5. Statistical Outcomes of Michigan Clinics 2004.....	58
6. Laboratory Outcomes for Network Eleven 2004.....	58
7. Intact PTH Outcomes for Network Eleven 2004.....	58

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Nutritional Assessment Process for ESRD Patients	13
2. Nutrition Education Resources Used by Michigan Renal Dietitians for Outpatient Dialysis	24
3. Frequency of Use of Diet Books, Report Cards, and Pamphlets	24
4. Perceived Efficacy of Diet Books, Pamphlets and Report Cards in Motivating Patients to Adhere to Nutrition Guidelines	25
5. Frequency of Use of Bulletin Boards and Posters	26
6. Perceived Efficacy of Bulletin Boards and Posters in Motivating Patients to Adhere to Nutrition Guidelines	26
7. Frequency of the Use of Food Models and Measuring Containers	27
8. Perceived Efficacy of Food Models and Food Containers in Motivating Patients to Adhere to Nutrition Guidelines	27
9. Frequency of Use of Product Labels and Restaurant Menus	28
10. Perceived Efficacy of Product Labels and Restaurant Menus in Motivating Patients to Adhere to Nutrition Guidelines	29
11. Frequency of Use of Contests and Incentives	29
12. Perceived Efficacy of Contests and Incentives in Motivating Patients to Adhere to Nutrition Guidelines	30
13. Frequency of Use of Peer Resource Counselors	31
14. Perceived Efficacy of Peer Resource Counselors in Motivating Patients to Adhere to Nutrition Guidelines	31
15. Frequency of Use of Internet Resources	32

16. Perceived Efficacy of Internet Resources in Motivating Patients to Adhere to Nutrition Guidelines.....33

17. Percentage of Michigan Dialysis Clinics and Renal Network Eleven Clinics With Suitable Serum Albumin Measurements During 2004.....34

CHAPTER 1: INTRODUCTION

The occurrence of kidney disease and subsequent kidney failure continues to increase throughout the United States. In 2001 the Centers for Disease Control and Prevention (CDC) reported that approximately 11.2 million U.S. residents were living with chronic kidney disease (1). Researchers who maintain the United States Renal Data System (USRDS), a comprehensive database that includes information about chronic kidney disease (CKD) in the United States, indicate that from 2001-2004 the incidence of kidney disease rose 10 percent in all American subpopulations (2). Although kidney disease is prevalent in varying degrees regardless of race, age, and socioeconomic status, national reports list the rates to be highest among African Americans, followed by Native Americans, Asian Americans, and Caucasians (3). There are several factors which may lead to the development of CKD, including conditions such as diabetes, hypertension, and obesity and harmful lifestyle choices such as excessive drug and alcohol intake (4).

Once kidney failure is diagnosed, it is referred to as end stage kidney disease. Treatment options include kidney transplantation and dialysis. While transplantation is the therapy most often recommended, the National Organ Procurement and Transplant Network has reported that adult recipients often face a minimum 3-5 year waiting period for an available organ once they are listed on the registry (5). When transplantation is not possible, dialysis treatments must be implemented. These modalities include hemodialysis and continuous ambulatory peritoneal dialysis. The USRDS indicates that a total of 661,157 individuals received some form of dialysis treatment in 2004 (6). These treatments are life-sustaining and can significantly improve the quality of life for people who receive them.

In order to provide the best care for patients, healthcare teams rely on the medical guidelines outlined in the Kidney Dialysis Outcomes Quality Initiative (K/DOQI). These documents provide evidence-based clinical practice guidelines for healthcare professionals and recommendations for the management of CKD, or as it is more commonly known, chronic kidney disease (4). Topics that are addressed in the K/DOQI guidelines include: CKD and diabetes, dialysis adequacy, vascular access, anemia management, nutritional support, and the monitoring of bone metabolism. Guidelines for the treatment of common co-morbidities that often accompany CKD such as dyslipidemia, hypertension, and cardiovascular disease are also discussed in the K/DOQI (7). These guidelines are useful in directing clinical teams towards desired objectives needed to improve morbidity and mortality in this population.

Specific examples of treatment guidelines and how they apply in clinical practice include determination of dialysis adequacy as measured by changes in urea reduction ratio (URR) volume and time needed for removing metabolic byproducts, anemia management as assessed by serum hematocrit concentrations, and nutritional management via the monitoring of serum albumin. The URR calculation of dialysis adequacy is a measure of the effectiveness of dialysis treatments in clearing metabolic byproducts that result from kidney failure, whereas hematocrit measurements are used to assess the concentration of red blood cells. Both measurements are used as markers to determine the likelihood of survival in the CKD population (8). In a recent national study, it was reported that dialysis facilities with the lowest percentage of K/DOQI compliance for URR and hematocrit guidelines had 22% and 14% greater mortality rates, respectively, when compared to clinics which met the

guidelines (9). In another study, it was determined that patients with CKD who exhibited serum albumin concentrations below 3.5 mg/dl had a higher rate of mortality (10).

Nutritional management is a critical component in CKD treatment as there is a high prevalence of protein-energy malnutrition (PEM) in this population (11). The primary cause of malnutrition in dialysis patients is poorly controlled uremia (4, 12). Protein-energy malnutrition has been identified in as many as 30-50% of dialysis patients and has been established as a morbidity and mortality risk factor (12). Recent studies (13, 14) have shown that chronic inflammation may also play a role in the development of PEM as well as cardiovascular events in this population.

Due to the many metabolic consequences of CKD, dietary modifications are essential in maintaining optimal health in this population and accomplishment of these changes requires continuous educational support from medical teams, family, and friends (15). Renal dietitians are responsible for providing the majority of this education and for monitoring patient outcomes. Modifications in the diet include changes in protein, fat, and cholesterol intake and alterations in potassium, sodium, and phosphate intake in order to prevent serious changes in the cardiovascular system, soft tissues, and bone metabolism (16). Many patients have noted that making changes in their diets is one of the hardest aspects of adjusting to dialysis (17, 18). Support from family members and friends and continued access to nutrition education provided by renal dietitians is crucial for successful patient outcomes (19, 20, 21). A recent survey of nutrition trends in CKD patients showed that the greatest perceived obstacles to positive dietary change included the fear of giving up favorite foods, confusion regarding dietary recommendations, and false beliefs regarding the length of time required to prepare healthy foods (22). When people are faced with the need to follow a therapeutic diet,

compliance is often poor and nutritional education support becomes crucial (23). While resources such as the KDOQI guidelines help focus medical teams towards clinical outcomes, these teams often have freedom to choose the types of resources they use regarding patient education. Many medical teams have developed an array of educational tools that include written, visual, or auditory programs to improve clinical outcomes. Some of these materials or programs have been adopted by local and national renal support networks. Local and national professional associations have played a key role in fundraising and developing research opportunities to improve treatment and prevention of CKD (24, 25, 26).

Purpose of Study

The present study was developed in order to identify the types of nutrition resources that renal dietitians are using in Michigan and establish their frequency of use and effectiveness in improving KDOQI nutrition outcomes and to determine if Michigan dialysis clinics need to improve their teaching methodologies.

Study Objectives and Justification

The factors leading to the development of kidney disease and subsequent kidney failure are multifaceted (4). The increasing incidence of diet-related diabetes, high blood pressure, and obesity has caused an exponential rise in the prevalence of kidney disease in the United States (4). Kidney disease patients have a critical need for nutritional support in regards to disease management (28). It is the Registered Dietitian (RD) who is responsible for providing nutrition resources and interventions that allow patients to meet clinical standards and improve their quality of life. However, since there are no specific guidelines describing the type of resources that should be used for optimal nutrition intervention, the RD must

often develop programs and find tools from various sources to use with his/her patients. Therefore, the present descriptive, survey-based study was designed to obtain feedback from Michigan renal dietitians as to the types of resources they use to educate their dialysis outpatient populations. Aside from identifying these resources, study participants were also asked to state the frequency at which they used each resource as well as the perceived effectiveness of each resource in motivating patients to adhere to nutritional recommendations.

Compliance and success in reaching nutrition outcomes have become even more important since Medicare staff members began reviewing the link between patient reimbursement and clinical outcomes (29). Dietetic professionals would benefit from a study that evaluated the effectiveness of nutrition education resources in altering co-morbidity factors that result from kidney failure (30, 31).

CHAPTER 2: REVIEW OF LITERATURE

Nutrition and Kidney Disease

Nutrition management is an important component in the prevention of malnutrition in patients with moderate to severe kidney disease (7, 18, 32). Creatinine clearance, a measurement that is used to assess filtration rate of the kidney, is one of the serum assays used to evaluate kidney function. Establishment of a normal creatinine clearance for a healthy adult (80-140 ml/sec.m²) is useful in determining the first signs of kidney impairment as well as the need to initiate dietary intervention to minimize further damage (33, 34). Kidney disease is associated with a decline in kidney function that leads to an accumulation of uremic byproducts in the body, which can then lead to a host of metabolic changes. These uremic byproducts are not normally seen in the blood until creatinine clearance drops to ≤ 25 ml/sec.m² (34). Metabolic consequences often include nausea, vomiting, fatigue, anorexia, weight loss, muscle cramps, pruritus, and occasionally changes in mental status (34). Additional abnormalities that present with chronic renal failure (CRF) include fluid, electrolyte, and hormone imbalances, as well as metabolic abnormalities that can lead to the development of malnutrition (34).

Renal insufficiency and CRF require nutritional treatment that includes dietary modifications in potassium, protein, and sodium intake (35, 36). These changes are incorporated to lessen uremic symptoms and slow the decline in kidney function (36, 37). The nutritional management guidelines outlined in K/DOQI state that individuals with creatinine levels ≤ 50 ml/sec.m² should adhere to a carefully designed low protein diet (0.60 gm/kg/d). This diet will help to decrease uremia-induced metabolite accumulation and delay

the metabolic changes that are associated with abnormal concentrations of serum potassium, sodium, and phosphate (38). Once CKD is diagnosed, nutrition management is crucial to guarantee maintenance of optimal nutritional status. Recent studies (13, 14) report that as many as 50% of kidney patients suffer from mild to moderate malnutrition by the time they start dialysis. Once a patient is diagnosed with end-stage CKD a cascade of potential complications are initiated, which lead to a significant impact on nutritional status. They include alterations in protein and energy intake, acid-base balance, lipid profile, and bone metabolism (7, 8, 38) (Appendix A: K/DOQI Nutrition Guidelines). As a result, medical teams and patients rely on skilled dietitians to educate, monitor, and develop programs that limit the occurrence of these complications. Governmental agencies also recognize the significant role dietitians play in the treatment of kidney disease, as shown by the fact that the Center for Medicare and Medicaid Services approved the provision of medical nutrition therapy for people with diabetes and or kidney disease to help them manage their conditions under the Medicare Reform Act 2002 (39).

Clinical Guidelines and Current Practice

Nutritional requirements for CKD patients include modifications in dietary protein, sodium, potassium, and phosphate intake based on the patient's nutrition status. Regular evaluation of nutrition status includes the measurement of pre-dialysis serum albumin, percent usual body weight, and percent standard body weight. Subjective global assessments, diet diaries, and normalized protein catabolic rates are also used for patient evaluation (7, 8, 38). A renal laboratory evaluation should include the following serum assays: albumin, glucose, and glycosolated hemoglobin (for diabetic patients only), hematocrit, calcium, phosphate, calcium phosphate, potassium, and cholesterol concentrations. Results from these

assays, when used with the “National Renal Diet Guidelines,” assist renal dietitians in developing a nutrition plan that is appropriate for each patient (41).

Renal diets are also developed based on the type of dialysis modality chosen. Treatment modalities include hemodialysis and continuous ambulatory peritoneal dialysis.

Hemodialysis utilizes an artificial kidney to filter metabolic waste products, electrolytes, and fluid from the blood (7, 8). This treatment is generally administered three times per week.

The length of treatment is dependent upon the patient’s body weight and blood volume.

Vascular access is required and is provided via one of the following routes: a central venous access, a surgically constructed fistula, or a venous graft that joins an artery to a vein under the skin.

Hemodialysis requires more dietary restrictions than other modalities. These restrictions are based on (a) treatment adequacy, (b) frequency of treatments needed, and (c) the amount of residual kidney function remaining. These factors vary between patients (14, 43).

Peritoneal dialysis involves use of the peritoneum as a dialysis membrane and as a filtration mechanism. A Tenckhoff catheter is surgically placed in the abdomen, and the peritoneal space is filled with a dialysate solution that is administered through a catheter into the peritoneal membrane. The dialysate is composed of varying concentrations of dextrose that create a concentration gradient between the peritoneal membrane and the blood stream. This promotes the movement of uremic toxins into the peritoneum, where they are filtered, drained through the abdominal catheter, and discarded. The dialysate remains in the peritoneal cavity for several hours to allow waste products to diffuse into the peritoneal cavity. Due to the frequency of exchanges within a 24-hour period, with this type of dialysis,

dietary guidelines for peritoneal dialysis are often liberalized. This is particularly true in regard to potassium and fluid intake (43).

Protein-calorie malnutrition is a common occurrence in CKD patients on dialysis (13, 14). This problem occurs due to many factors, including changes in taste acuity, depression, and anorexia. These changes occur concomitantly with reduced food intake and often are accompanied by muscle wasting (12, 14, 44). Therefore, energy and protein recommendations are increased in renal patients to allow for weight maintenance or repletion of protein losses in visceral compartments (44, 45). Protein requirements for healthy adults are 0.8-1.0 g/kg/d, as compared to the dialysis population where they are 20-24% higher (1.2-1.4 g/kg/d) (46). Prior to the initiation of dialysis, low protein regimens are prescribed to decrease symptoms of uremia and subsequently improve the renal patient's appetite and prevent the incidence of malnutrition while preserving remaining kidney function (43, 44). If patients have been following a low protein diet prior to the initiation of dialysis, they are often relieved to learn that once dialysis is initiated, increased protein intake is desired. A complete set of nutrition guidelines that can be used in the treatment of renal patients is included in Table 1.

Table 1. Adult Nutrition Guidelines per Treatment Modality

Hemodialysis	Peritoneal dialysis
<u>Energy:</u> 30-35 kcal/kg/DW or HBE x Activity Factor <i>Ideal or Underweight pts:</i> BEE (IBW) x 1.3 <i>Obese pts.:</i> BEE (AIBW) x 1.2	<u>Energy:</u> 25-30 kcals/kg DW/day Avoid simple carbohydrates
<u>Protein:</u> 1.2-1.4 g protein/kg/DW/day	<u>Protein:</u> 1.3-1.5 g. protein/kg/DW/day
<u>Sodium:</u> 85 mEq/day (2 grams)	<u>Sodium:</u> 130-175 mEq/day (3-4 grams)
<u>Potassium:</u> 50-60 mEq/day (2-3 grams)	<u>Potassium:</u> 60-70 mEq/day (3-4 grams)
<u>Phosphorus:</u> 800-1000 mg/day	<u>Phosphorus:</u> 800-1000 mg/day
<u>Fluid:</u> Intake 700-1500 cc/d	<u>Fluids:</u> Generally unrestricted unless edematous

DW=Dry Weight
IBW=Ideal Body Weight
HBE=Harris Benedict Equation

ABW=Actual Body Weight
AIBW=Adjusted Ideal Body Weight
BEE=Basal Energy Expenditure

Causes and Metabolic Consequences of Kidney Failure

One of the most common preventable causes of kidney failure noted by the USRDS is hypertension (2). Uncontrolled hypertension often leads to the development of hypertensive nephrosclerosis, which is especially prevalent in the African American population (3). Thus medical management via the use of pharmacologic therapies and diet are necessary for lowering blood pressure. In terms of dietary management, patients diagnosed with hypertension are often educated on how to decrease dietary sodium intake to prevent risks related to the development of edema, congestive heart failure, and stroke (40, 42). Dietary sodium guidelines vary between treatment modalities (2.0-4.0 grams/day). The low sodium diet that is often prescribed includes the use of low sodium seasonings and decreased salt

intake. In order to accomplish this, patients must know how to read labels and learn to identify healthy foods when dining in restaurants.

Potassium is another important mineral that is severely compromised when glomerular filtration rate decreases. This situation can lead to excessive potassium retention and resultant increases in serum potassium concentration. This condition is known as “hyperkalemia” and is of great concern since it may lead to sudden death due to cardiac arrhythmias (47). CKD patients who undergo hemodialysis treatments a few times per week are challenged with the need to restrict their dietary intake of potassium to 2-3 grams/day. This is difficult since potassium is found in many commonly consumed foods. Continuous ambulatory peritoneal dialysis, on the other hand, allows for much more liberal potassium intake (3-4 grams/day). In addition to monitoring dietary intake, dialysis adequacy must also be determined since it is also a factor in potassium homeostasis and may induce hyperkalemia (47).

Bone metabolism is also significantly affected by CKD since the excretion of excess phosphate and serum calcium from the body are dependent on normal kidney function. CKD can also cause acceleration of bone turnover due to an increase in serum parathyroid hormone (PTH) concentration and a lack of activated vitamin D (calcitriol). These changes can lead to hyperplasia, soft tissue calcification, and osteofibrosis (47). Dietary management of these conditions involves the regulation of phosphate intake to 800-1000 mg/d as well as the use of phosphate binding medications to assist in excretion of excess phosphate in the gastrointestinal tract (48). The management of serum phosphate concentrations is imperative since elevated amounts trigger the suppression of serum calcium concentrations and promote significant elevations of PTH (48, 49, 50). Vitamin D analogs (Zemplar®, Calcijex® or

Hecterol®) and calcimetic agents (Sensipar®) are often required to regulate bone metabolism (52).

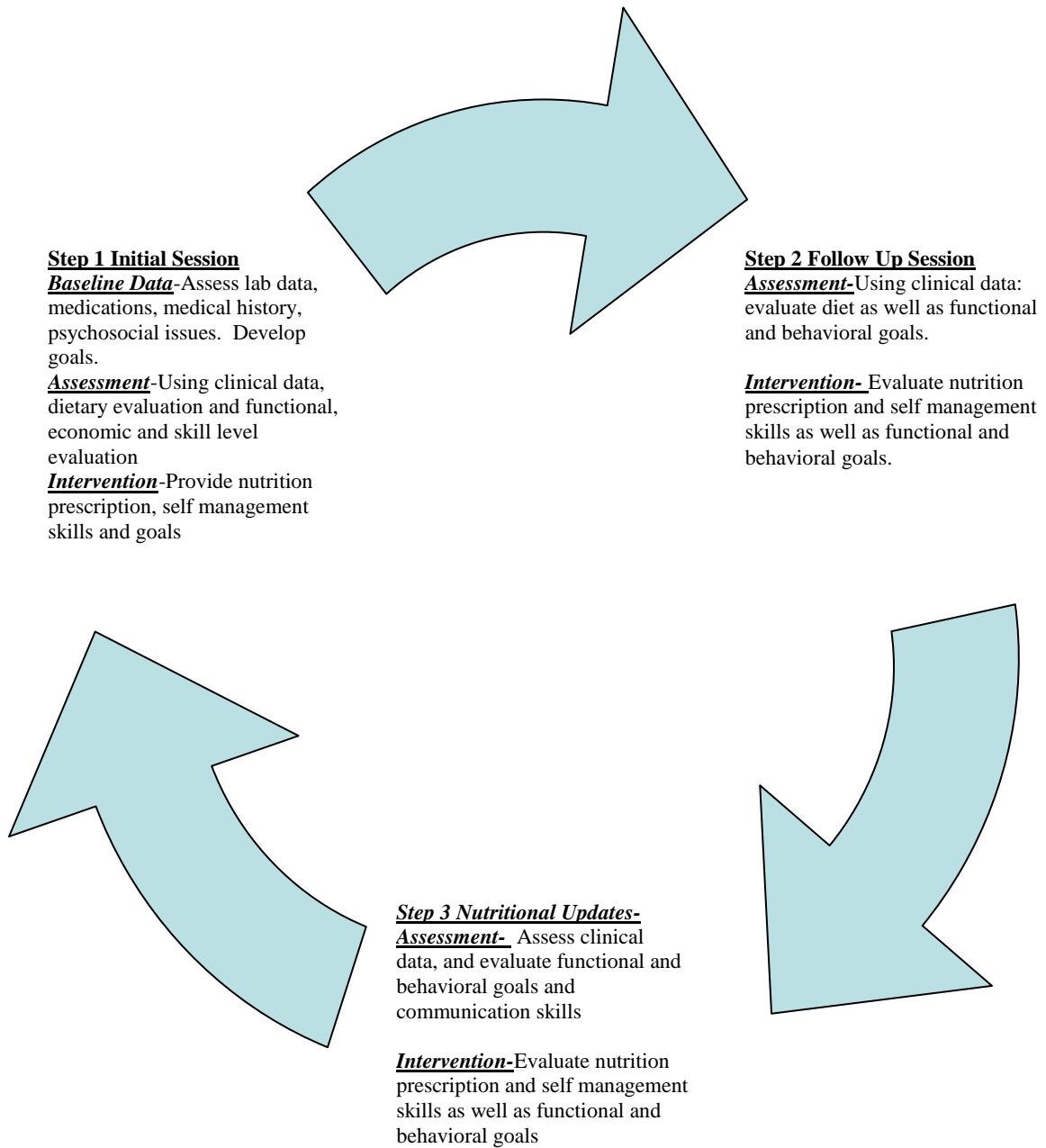
Cardiovascular disease (CVD) is a major problem in patients with CKD since CVD accounts for approximately 40-50% of deaths in renal failure patients (53, 54). CVD is also associated with a number of underlying diseases, including diabetes, hypertension, and lipid disorders (53, 55). Therefore, continual cardiovascular management is essential in this population.

Vitamin requirements are also altered in this patient population due to the lack of kidney function, the use of multiple medications that can alter intestinal absorption, and the loss of water soluble vitamins during dialysis (32, 38). The maintenance of adequate vitamin intake from dietary sources is difficult due to limitations in the renal diet; therefore, supplementation is required with specially formulated vitamin complexes that are high in B vitamins (32, 40, 42). Vitamin C is also supplemented but must be limited since large amounts have been associated with increased plasma oxalate concentrations (53). Studies are currently being conducted that will evaluate whether low doses of vitamins C and E decrease the oxidative stress and inflammation often seen in patients with kidney failure (55).

Nutrition Assessment

Dietitians follow guidelines of nutritional care to assure that adequate time and attention has been given to prevent and treat malnutrition in their patients (*Figure 1*). The American Dietetic Association (ADA) established assessment tools for use with end stage renal disease patients who require dialysis.

Figure 1. Nutritional Assessment Process for ESRD Patients



The use of these assessment tools is supported by Medicare, the primary source for reimbursement for Medical Nutrition Therapy (39). Medicare guidelines require that patients

receive nutritional assessment and education within 30 days following the initiation of dialysis. Many dietitians initiate the process of assessment and education as soon as possible to (a) establish communication with patients and their families, (b) provide education to address any underlying nutritional issues, and (c) calm the fears that many patients have regarding the implementation of the many changes required in their lives (28). A complete assessment involves the analysis of many different factors, including medical history, medications, height and weight history, and evaluation of the economic, psychosocial, motivational, and skill level of each patient to develop an individualized nutritional plan. Since the renal diet guidelines are complex, it is beneficial to periodically re-assess the amount of education and resources needed.

Education and Adult Learning in the Clinical Setting

The medical team in a dialysis clinic consists of nephrologists, registered nurses, registered dietitians, social workers, and patient care technicians. Each of these team members fulfills an important role in developing a patient's plan of care, while providing much-needed support and education to patients and families. Patients benefit from the use of various types of resources and materials that educate them on all aspects of their health (56). However, many times health care professionals rely on the use of these materials (i.e., books, pamphlets, flyers, or information provided on bulletin boards and posters) due to limitations on the time they have to provide health information to their patients (31). Research suggests that these materials may be quite ineffective since people retain only about 10% of what they read and 20% of what they hear (57).

Unfortunately, simply distributing nutrition information to patients does not effectively promote a change in eating behaviors. Thus, it is important for dietitians to develop an

understanding of the process of adult learning and then develop effective techniques that improve patient compliance. Factors which must be taken into account when providing health education to patients include the patient's learning style, his/her motivation to learn, barriers to his/her learning (i.e., emotional, psychological, health literacy), and the need for an evaluation of the patient's ability to demonstrate the application of new skills (58). In an attempt to help dietitians educate effectively, the Renal Dietitians Dietetic Practice Group of the American Dietetic Association promotes the following teaching methods: 1) incorporate a variety of learning styles into each session, 2) use visual, audio, and hands-on techniques, 3) keep teaching sessions short and simple, 4) include practice and feedback, and 5) provide ongoing educational opportunities (27). Also, in order to improve the patients' likelihood of applying nutrition concepts to their lives, many dietitians have incorporated the use of various types of group activities such as contests, newsletters, teaching videos, cookbooks, cooking demonstrations, and displays (22). The National Kidney Foundation has developed support groups and mentor programs through their local affiliates in order to provide resources for patients and their families and to increase awareness of kidney disease and its treatment. Other groups have used support groups and mentorship programs with great success for treatment of everything from drug and alcohol abuse to conflict resolution in schools (58).

Factors Regarding Compliance

Changing eating patterns can be difficult for many patients. Studies which evaluated nutrition trends throughout the United States have noted some obstacles that exist in regard to having patients change to a healthier eating style. The main obstacles included fear of giving up favorite foods, confusion over recommendations, and beliefs that preparation of healthy

food takes too much time. It was also noted that many participants still believed that foods were classified as “good” or “bad.” Some researchers suggested that food attitudes were more influential in regard to dietary behaviors than nutrition knowledge (60). In addition to the fact that attitudes and beliefs are developed over many years, the occurrence of a chronic illness requiring dietary changes often made it more difficult for people to make changes in their eating patterns (60).

The development of chronic illness is a life-changing event for anyone. Social psychologists have attempted to predict the health behavior of individuals as related to chronic disease. The Health Belief Model, developed in the 1950s, is based on the understanding that people will take health-related action if they feel that (a) the health-related condition can be avoided, (b) the symptoms of the illness will decrease significantly, and (c) they will be successful in making the recommended health changes (60).

Due to the complexity of the renal diet, most patients find these modifications overwhelming and difficult to implement and require ongoing support and education. In fact, patients frequently state that dietary modifications are the most difficult changes that they have to incorporate into their lifestyles (22, 30). Depression and anxiety are also common following the diagnosis of a chronic illness and are often overlooked as factors in patients’ ability to follow medical recommendations (61). Physicians and medical teams need to become aware of the signs and symptoms of conditions like depression and then refer these patients to proper treatment facilities rather than labeling them as “non-compliant.” Therefore, it is crucial that medical teams create an environment that allows patients to learn the strategies that are necessary to improve patient health (20).

Educational materials that are developed for this patient population should be assessed using “readability indexes” to assure that all materials are prepared at a reading level that is appropriate for the general population (57). It has been shown that education materials frequently exceed the reading level of an average adult. Up to 50% of the general public has been shown to read below the 9th grade level. This percentage decreases even further (10%) in inner city and minority populations and for people who are 65 years of age and older (57).

Once a patient has started dialysis treatment and is medically stable, nutrition counseling is done monthly and sometimes weekly. Successful application of the renal diet is often challenging, and the use of a variety of educational resources is beneficial when working with patients and their families. In an ideal situation, patients are allowed to learn at their own speed. Assessing patient knowledge is an important factor in estimating patient compliance to the renal diet. A recent study (30) reviewed the link between a renal patient’s knowledge of dietary restrictions and medical noncompliance. The study concluded that “the effect of different educational approaches on knowledge and compliance needs to be evaluated for efficacy” (30). Dietitians must take the time to evaluate the resources they use regularly. Currently, there is a need for studies examining (a) the types of resources used in the CKD population, (b) how the types of resources used by dietitians vary, and (c) to what degree clinicians feel each resource is effective. These studies become more important as the CKD population grows and health care providers continue to strive to improve the quality of services they provide.

Nutritional Outcome Markers

Clinical outcome markers are tools that are used to evaluate the success of medical teams and programs used in the care of outpatient dialysis patients. Clinical outcome data are

reviewed on a regular basis by medical teams and companies that provide dialysis services. Medicare is currently considering the use of a “pay for performance” program to assure that the best care is given and that the care is provided in a cost-efficient manner. This program would provide reimbursement based on medical outcome criteria. In other words, only patients who meet specific medical criteria would receive reimbursement for specific services (i.e., a patient who displays an albumin ≥ 3.5 mg/dl would be eligible for full reimbursement of nutrition intervention, whereas a patient with an albumin below this level would be eligible only for partial reimbursement) (29). In order to improve patient outcomes, most dialysis teams routinely conduct reviews of these results. The K/DOQI clinical guidelines are used as reference goals, and most medical teams strive to meet or exceed them. The Renal Network, a nonprofit organization developed by the Center for Medicaid and Medicare Services, monitors the quality of dialysis care throughout the United States and routinely collects outcome data from clinics and hospitals across the country. These data allow them to rank clinics and hospitals nationally based on the degree to which they meet the K/DOQI outcome guidelines. The renal network also keeps detailed annual records on renal facility results and sends a report back to each renal center to update them on their progress as related to patient care (2, 3, 10).

CHAPTER 3: METHODOLOGY

The primary purpose of the present study was to identify the types of nutrition resources that renal dietitians were using in Michigan and establish their frequency of use and effectiveness in improving K/DOQI nutrition outcomes. A secondary goal was to compare nutritional outcome marker measurements (i.e. serum albumin) from participating Michigan dialysis clinics to Region 11 values and the national guidelines in order to establish whether Michigan dialysis clinics needed to improve their teaching methodologies.

Subjects

Dietitians from two professional associations, the Council of Renal Nutrition of Michigan (CRNM) and the Michigan Chapter of DaVita, Inc., were asked to participate in the present study. At the time of the study there were 120 members in the combined associations. Members of each association consisted of dietetic professionals who worked exclusively with CKD stage 5 patients. Approval was given by both associations to contact their membership (Appendix B). Approval was also received from the Eastern Michigan University Human Subjects Review Committee (Appendix B).

Research Design

Contact was made by electronic mail to potential survey participants, who were provided with an outline of the study, the survey period, and an online link to the survey (Appendix D). An online survey was developed for data collection using a social statistical software package from SNAP Survey Systems (Appendix C). This integrated software package was also used for data collection and statistical analysis. The survey was placed on the Eastern Michigan University secure online server for participants to access during the study period.

Survey

An electronic, 37-item survey was developed to establish current nutrition education practices used by renal dietitians. This survey was validated by four Renal Dietitians prior to use in the study and modifications were made based on their feedback. The survey instrument was designed to gather data that would provide 1) demographic information about the study participants, 2) information regarding dialysis modalities used in treating CKD stage 5 patients in Michigan, 3) nutritional outcome data (i.e. serum albumin concentrations) that were commonly used for clinical evaluation of this population, and 4) the types of nutrition education resources used by renal dietitians in Michigan. Study participants were also asked to list their use of these educational resources based on frequency and perceived effectiveness in motivating patients to comply with guidelines established by the K/DOQI. Frequency and efficacy of each resource was evaluated using a Likert scale.

Statistical Analysis

Descriptive statistical tests were used for a large portion of the data that were provided in the survey. The demographics obtained were useful for the assessment of characteristics of the Renal Dietitians who participated in the survey. The clinical outcome data and the breakdown of the types of dialysis modalities and number of patients in each clinic were evaluated using descriptive statistics. Basic descriptive statistical tests were conducted to evaluate the mode for frequency, perceived efficacy, and limitations of each resource. The initial goal for statistical analysis was to compare the nutrition outcome indicators provided under Section 2 of the survey and attempt to determine if there was any connection between

the education resources used by Michigan renal dietitians used and their perceived efficacy in motivating patients to follow the recommended nutrition guidelines provided.

CHAPTER 4: RESULTS

Demographics of Survey Respondents and Treatment Modalities

One hundred and twenty surveys were sent through electronic mail to potential study participants, and one hundred and one responses were received (84% response rate). Only completed surveys were included for evaluation. Survey respondents were asked information regarding their backgrounds, including gender, ethnicity, education level, and years working in the field of renal nutrition (Table 2).

Table 2. Demographic Information of Study Participants

Gender	Percent (N=101)
Female	98% (n=
Male	.02%
Ethnicity	Percent
Caucasian	64.4%
African American	23.8%
Asian American	5.8%
Hispanic Latino	5.0%
Native American	1.0%
Education	Percent
Bachelors Degree	100.0%
Masters Degree	6.9%
Certified Specialist in Renal Nutrition (CSR)	5%
Years Working in the Field	Percent
<5	32%
5 to 10	18%
11 to 15	34%
> 15	16%

The survey respondents were primarily Caucasian (64%) or African American (24%) women. All survey respondents had obtained bachelor's degrees. Some (7%) had obtained graduate degrees and 5% were certified as a Specialist in Renal Nutrition (CSR).

Approximately 50% of the dietitians had worked in the field for fewer than 10 years.

Survey participants also reported that they, on average, worked with 113 patients each month. Most of the patients were receiving hemodialysis treatments (Table 3).

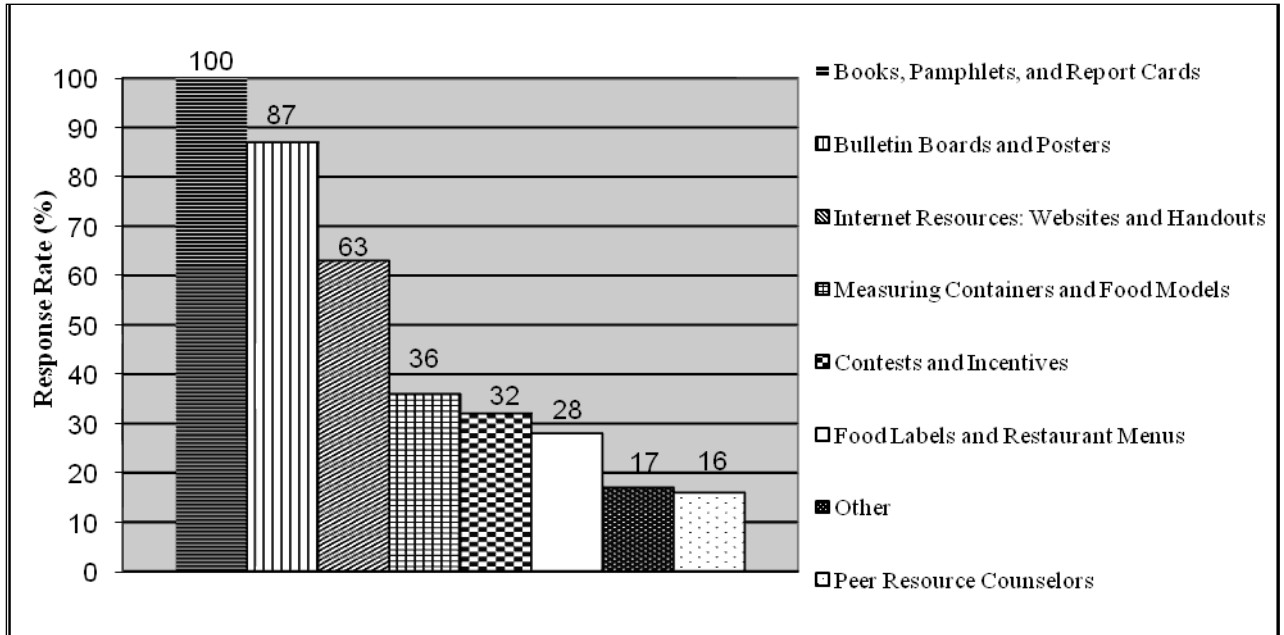
Table 3. Patient Load and Treatment Modalities of Study Participants

	Minimum	Maximum	Mean
Number of Patients	2	220	112.7
Patients on Hemodialysis	2	220	110.3
Patients on Peritoneal Dialysis	0	54	2.4

Nutrition Education Resources Used by Michigan Renal Dietitians

Respondents had the following eight categories of education resources to choose from within the survey: (1) written materials (diet books, pamphlets and report cards), (2) bulletin boards and posters, (3) internet resources (websites and handouts), (4) measuring containers and food models, (5) contests and incentives, (6) food labels and restaurant menus, (7) other resources (resources written in by survey respondents) and (8) peer resource counselors (Figure 2). Written materials were used by all survey respondents. Eighty-seven percent of survey respondents used bulletin boards and posters to convey nutrition information, whereas information obtained from the internet was used at a rate of 63% (n=64). Additional resources were used approximately one-third of the time and included food models and containers, contests and incentives, food labels, and restaurant menus. The remaining resources that were used included peer resource counselors 16% (n=16.7) and other resources 17% (n=17).

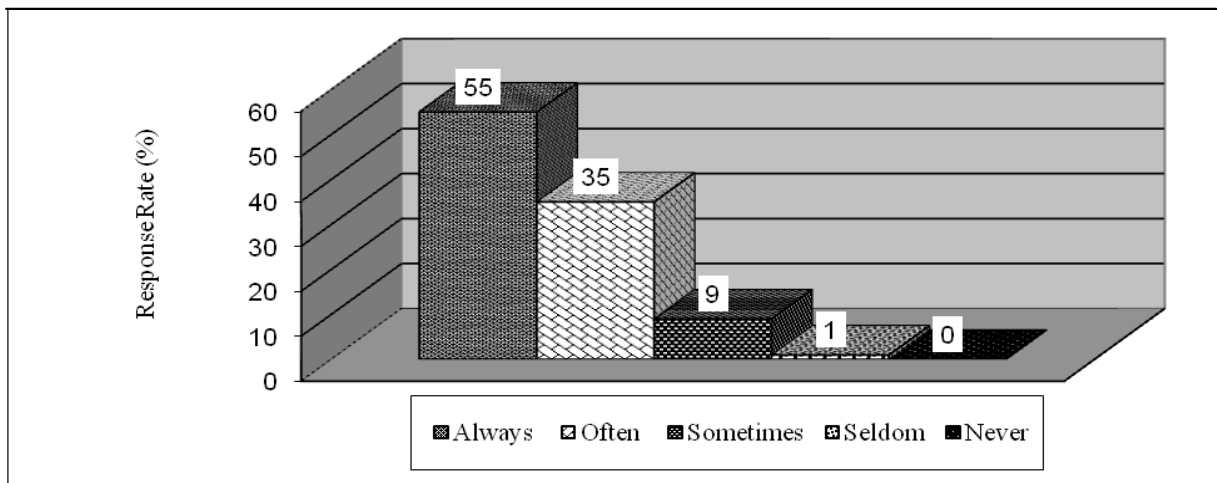
Figure 2. Nutrition Education Resources Used by Michigan Renal Dietitians for Outpatient Dialysis



Diet Books and Report Cards

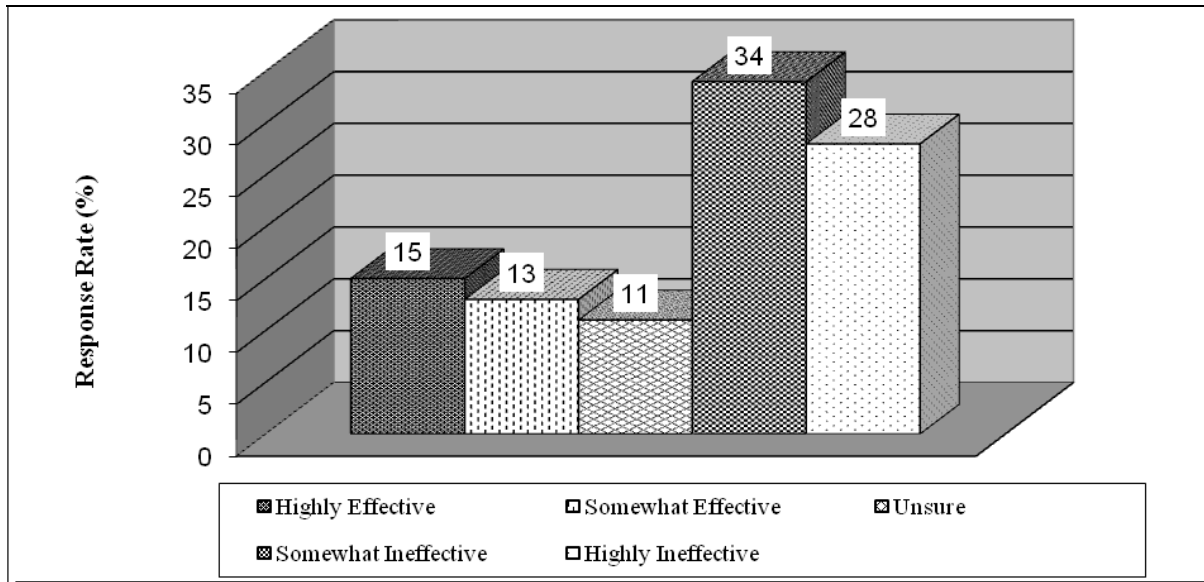
Written materials in the form of diet books, report cards and pamphlets were used “always or often” 90% (n=101) of the time by survey respondents (Figure 3). Only 11 % (n=11) of renal dietitians surveyed noted that they used these resources “sometimes” or “seldom.”

Figure 3. Frequency of Use of Diet Books, Report Cards, and Pamphlets



However, when asked to rate their effectiveness in promoting patient adherence to nutrition guidelines, 62% (n=62.6) stated that they were highly ineffective (Figure 4). Only 15% (n=15) of dietitians rated diet books, pamphlets, and report cards highly effective, and 13% noted them as somewhat effective. The remaining 10% (n=10) stated that they were “unsure.”

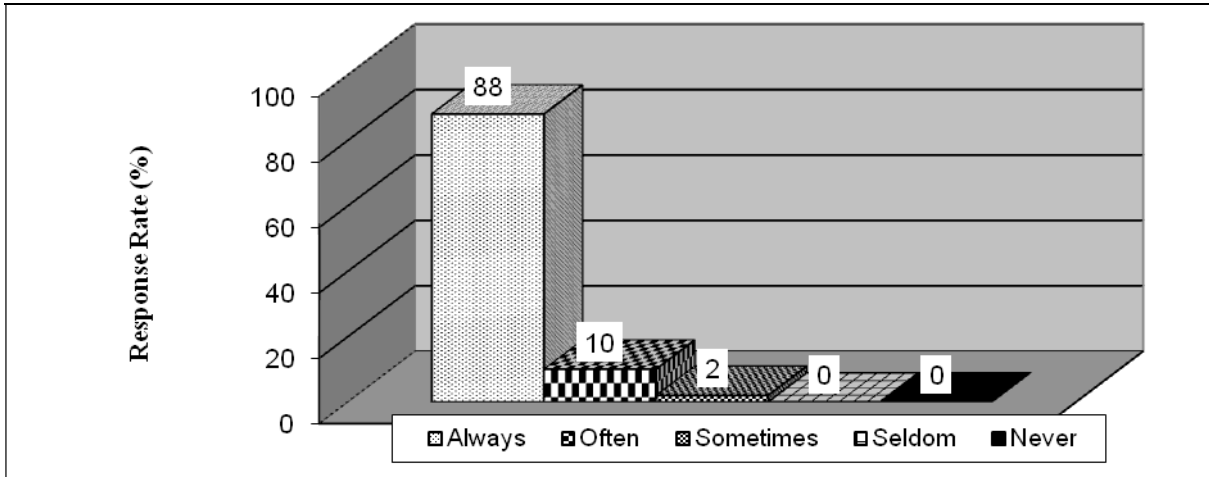
Figure 4. Perceived Efficacy of Diet Books, Pamphlets and Report Cards in Motivating Patients to Adhere to Nutrition Guidelines



Bulletin Boards and Posters

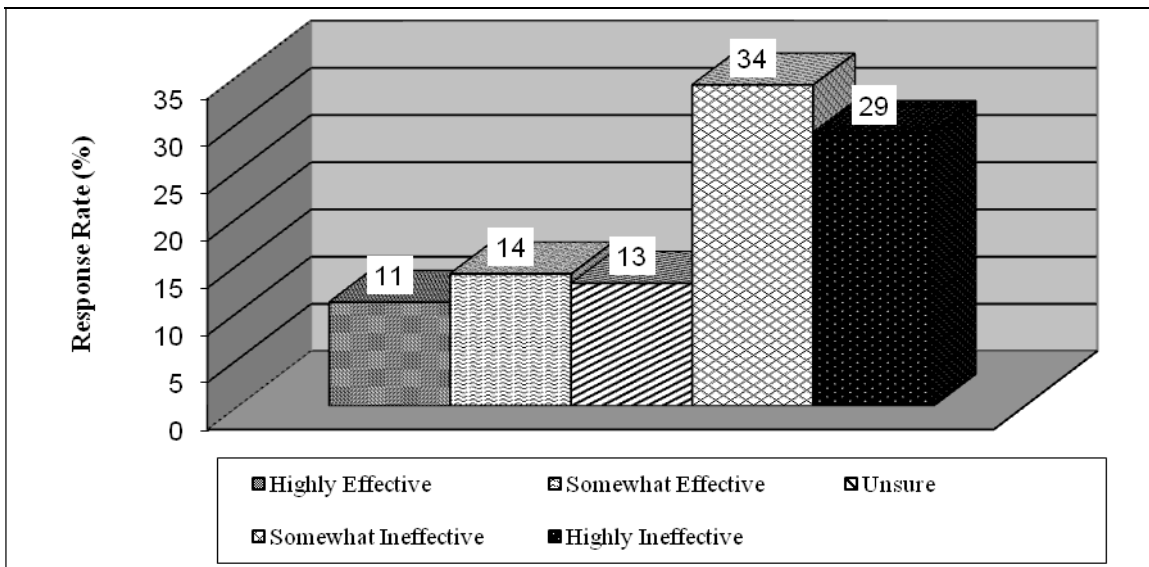
Eighty-eight percent of the survey respondents stated that they always use educational posters and bulletin boards to teach nutrition concepts to their patients (Figure 5).

Figure 5. Frequency of Use of Bulletin Boards and Posters



However, when dietitians were asked whether they believed these items were effective in motivating patients to follow nutrition guidelines, 63% (n=63) stated that they were ineffective (Figure 6).

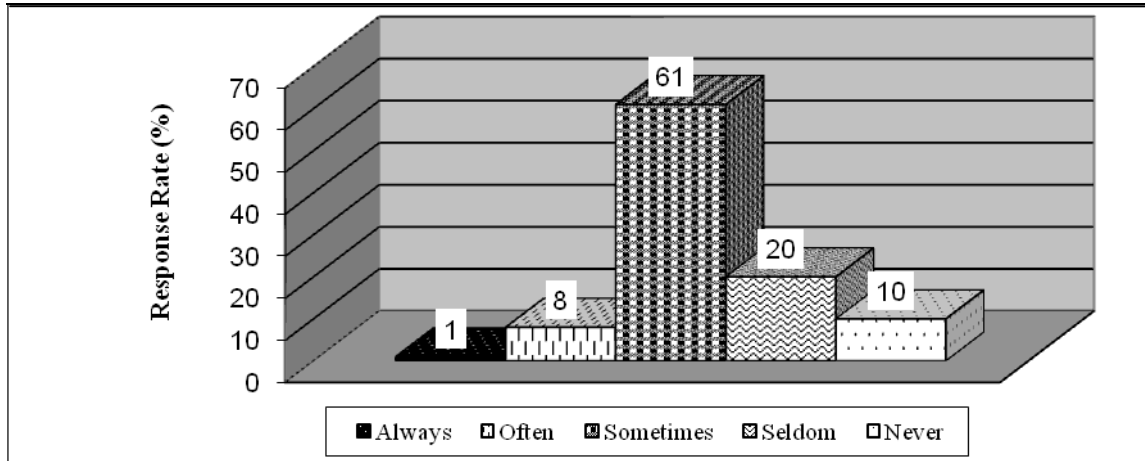
Figure 6. Perceived Efficacy of Bulletin Boards and Posters in Motivating Patients to Adhere to Nutrition Guidelines



Food Models and Containers

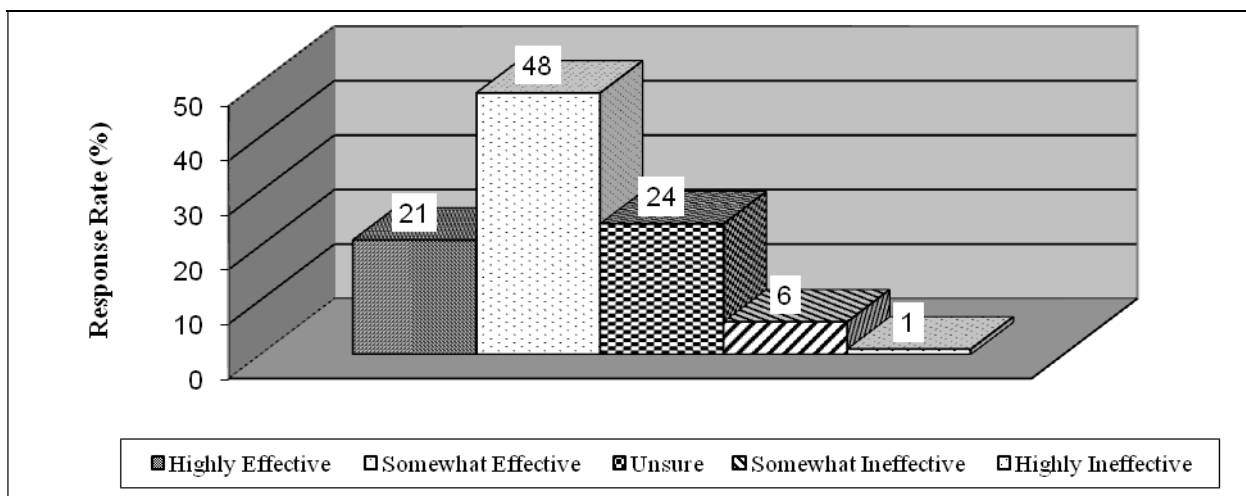
Most dietitians 61% (n=60.6) stated that they used food models and measuring containers “sometimes” (Figure 7). Thirty percent (n=30.3) of dietitians stated they incorporate them into their educational practices “seldom or never.”

Figure 7. Frequency of the Use of Food Models and Measuring Containers



When used for nutrition education, “food models and containers” were believed to be “highly or somewhat” effective 69% (69.6) of the time (Figure 8).

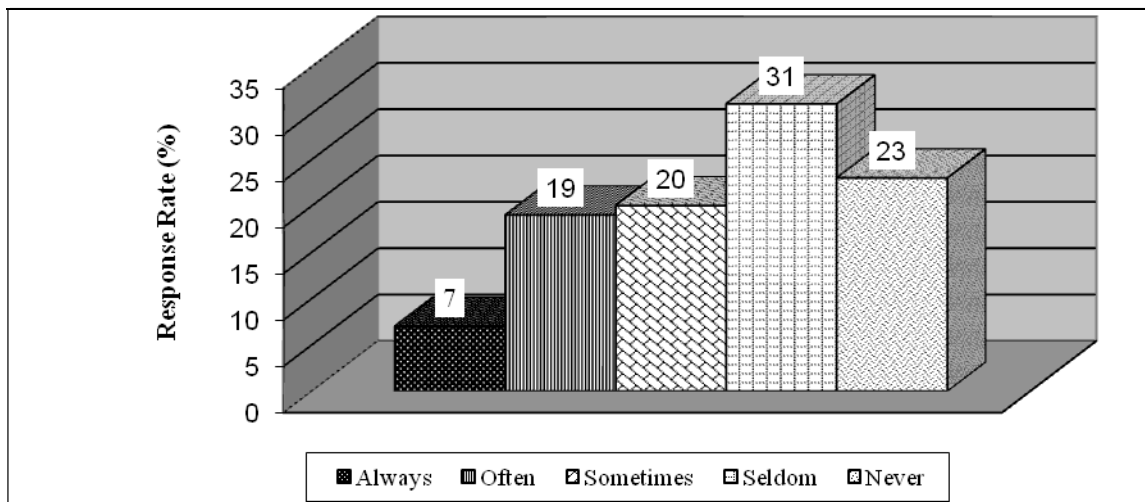
Figure 8. Perceived Efficacy of Food Models and Food Containers in Motivating Patients to Adhere to Nutrition Guidelines



Product Labels and Restaurant Menus

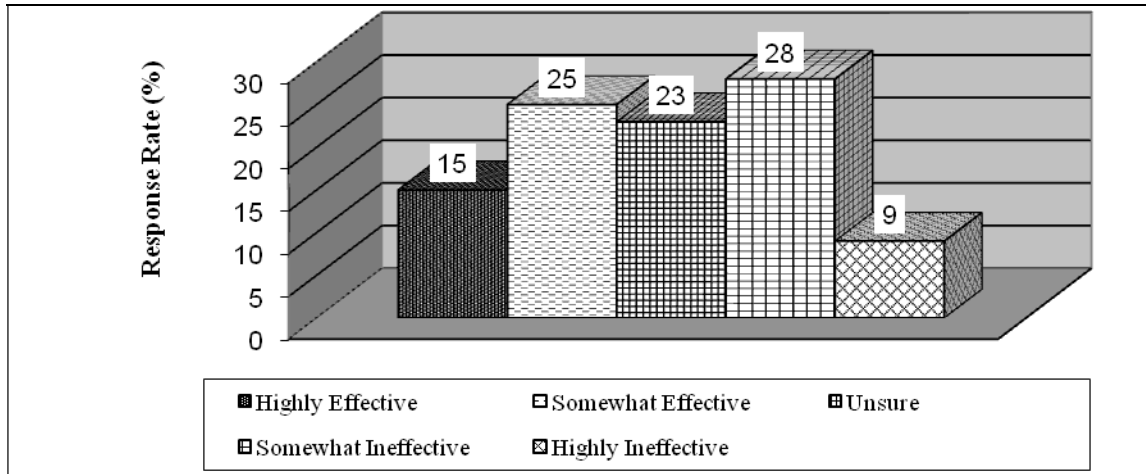
Product labels and restaurant menus were used far less frequently than food models and containers. The following response rates were provided: “always” 7% (n=7.07), “often” 19% (n=19.1), and “sometimes” 20% (n=20.2). Fifty-four percent (n=54.5) of the dietitians stated they seldom or never used them (Figure 9).

Figure 9. Frequency of Use of Product Labels and Restaurant Menus



Renal dietitians stated that product labels and restaurant menus had a more varied degree of efficacy than did food labels and containers, with 15% (n=15.1) stating that they were “highly effective,” 25% (n=25.2) “somewhat effective,” 23% (n=20.2) “unsure,” 28% (n=28.2) “somewhat ineffective,” and 9% (n=9.0) “highly ineffective” (Figure 10).

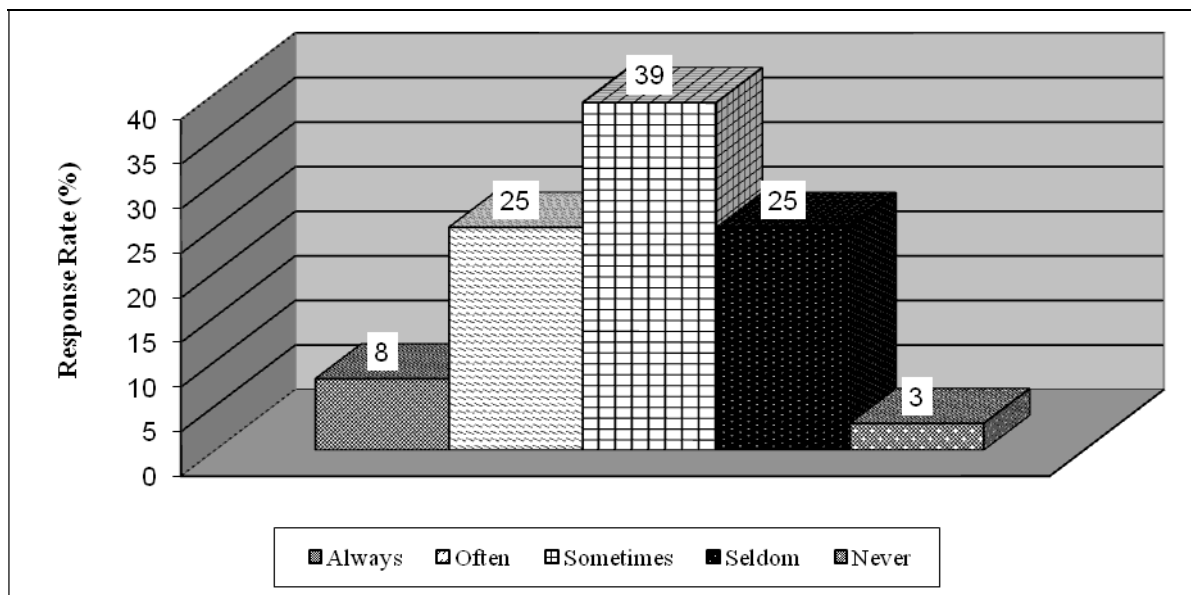
Figure 10. Perceived Efficacy of Product Labels and Restaurant Menus in Motivating Patients to Adhere to Nutrition Guidelines



Contests and Incentives

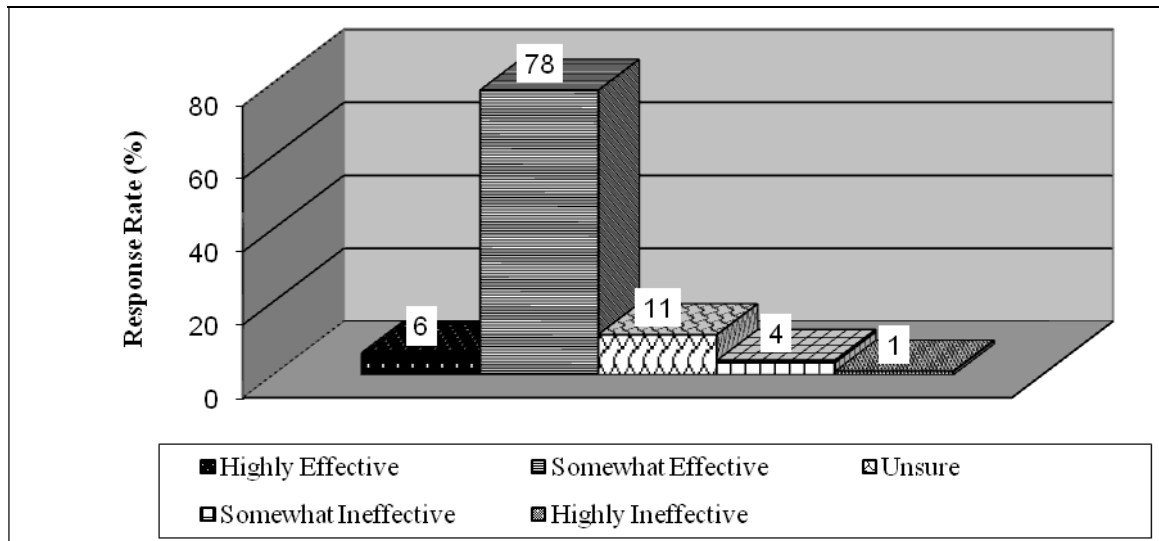
Survey respondents used contests and incentives at the following rates: always 8% (n=8.0), often 25% (n=25.2), sometimes 39% (n=39.3), seldom 25% (n=25.2), and never 3% (n=3.0) (Figure 11).

Figure 11. Frequency of Use of Contests and Incentives



Although they were not used very often, contests and incentives were thought to be quite effective in motivating patients to adhere to nutrition guidelines (Figure 12).

Figure 12. Perceived Efficacy of Contests and Incentives in Motivating Patients to Adhere to Nutrition Guidelines



There were several limitations noted that had an impact on the use of the resources, according to renal dietitians (Table 4). These limitations were primarily centered around funding and lack of resources.

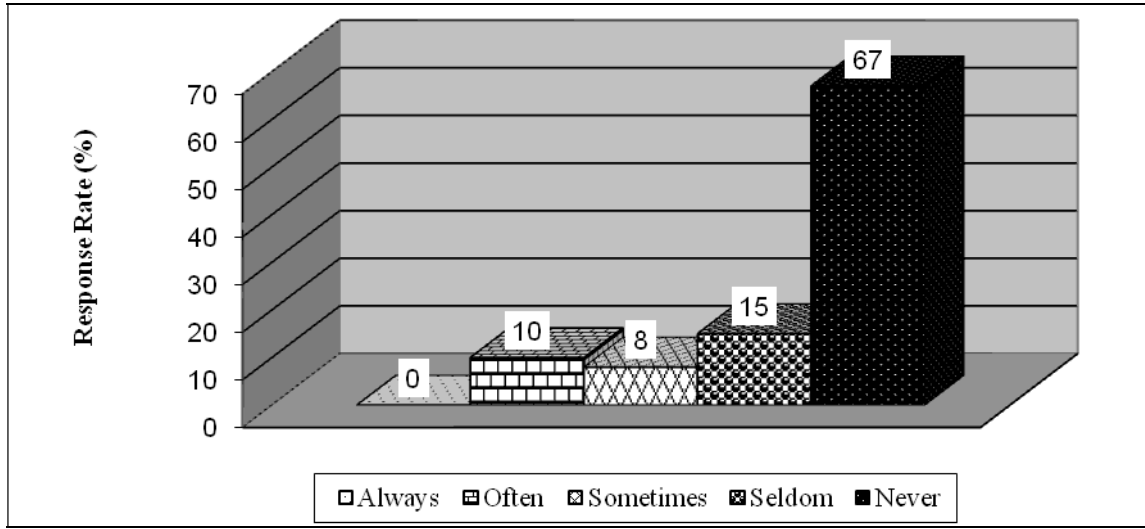
Table 4. Limitations in the Use of Contests and Incentives for Nutrition Education

Limitation	Percent (N=101)
Time (Implementation)	8%
Money (Unavailable Funds)	34%
Availability (Resource)	35%
Support (Administration or Staff)	9%
Other	14%

Peer Resource Counselors

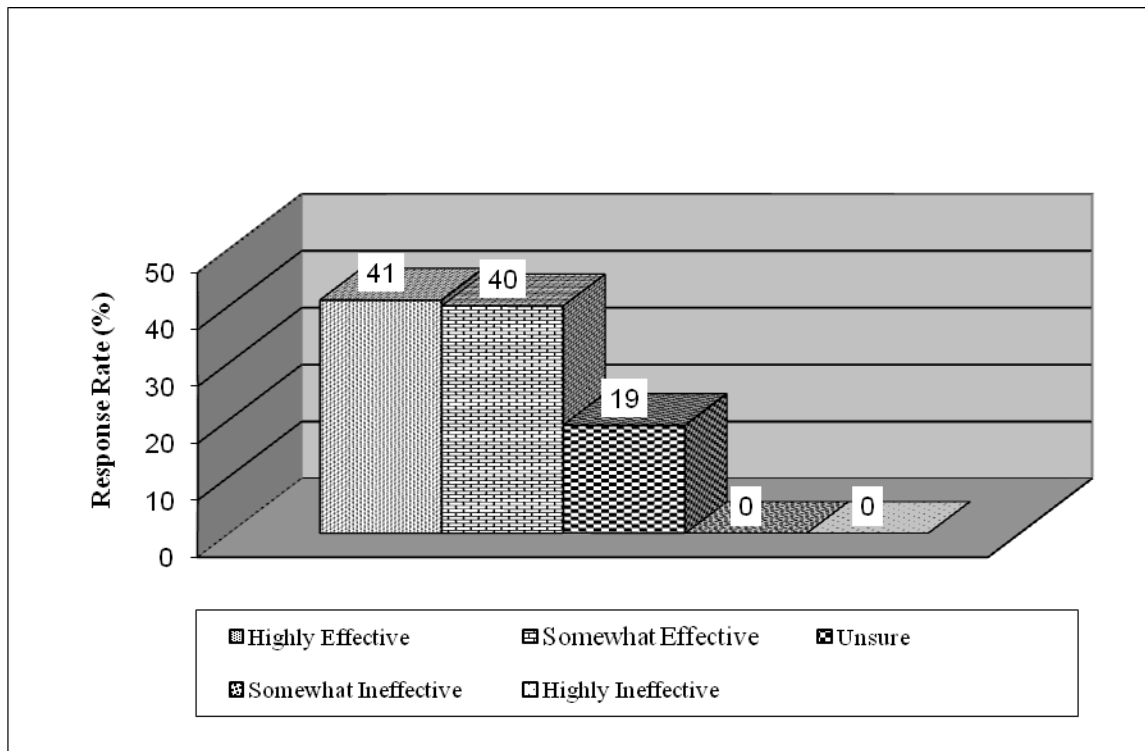
Renal dietitians who participated in this survey did not use peer resource counselors on a regular basis (Figure 13). Sixty-seven percent noted that they “never” use these individuals as means of support for patient education.

Figure 13. Frequency of Use of Peer Resource Counselors



Yet when asked whether they believe that peer resource counselors would be effective in motivating patients to adhere to nutrition guidelines, 81% reported they believe them to be “highly” to “somewhat” effective in this regard (Figure 14).

Figure 14. Perceived Efficacy of Peer Resource Counselors in Motivating Patients to Adhere to Nutrition Guidelines



Internet Resources

Many dietitians in the present study appear to use the Internet when providing nutrition information to their patients (Figures 15-16). Ninety-five percent of those surveyed stated that they used nutrition education resources found on the Internet, and 37% stated that they were highly effective in promoting patient adherence to guidelines. There were no notable limitations to the use of this resource.

Figure 15. Frequency of Use of Internet Resources

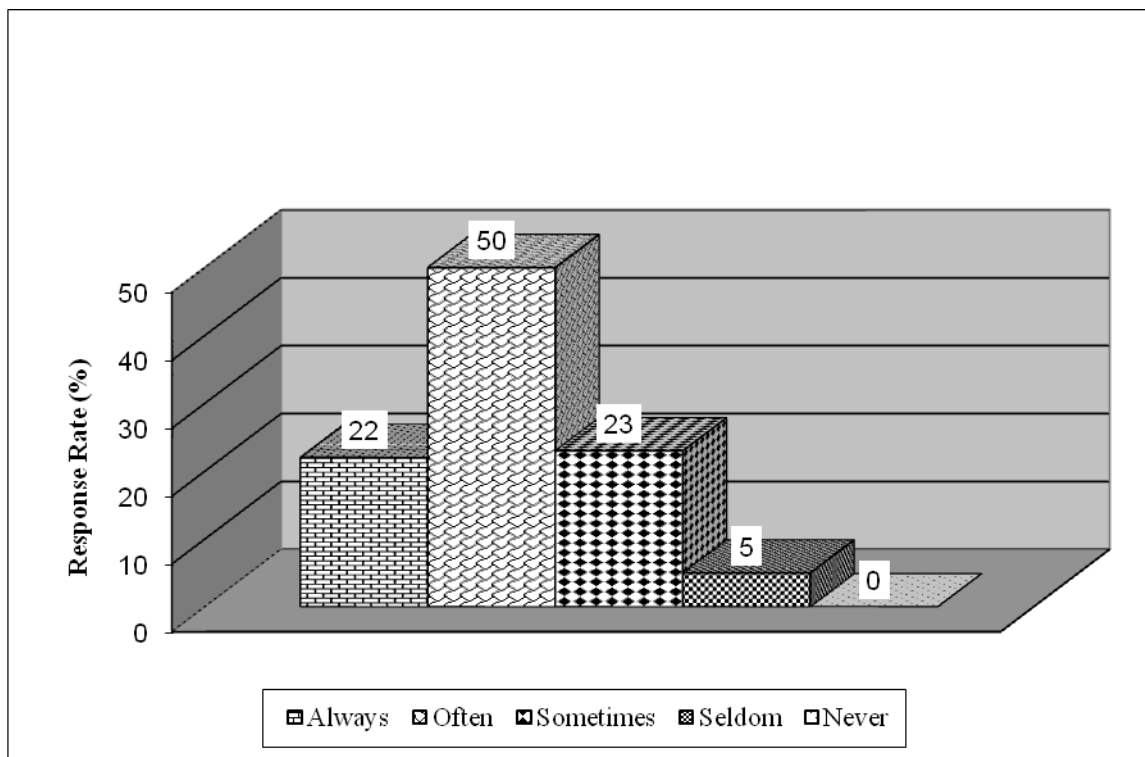
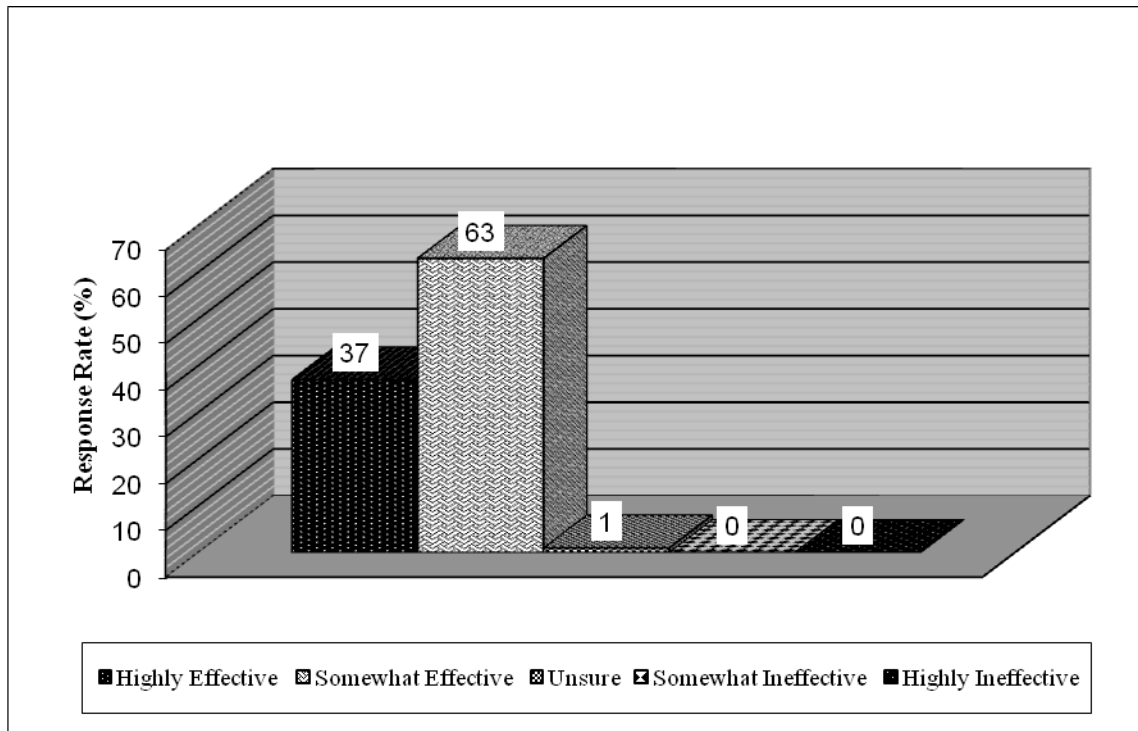


Figure 16. Perceived Efficacy of Internet Resources in Motivating Patients to Adhere to Nutrition Guidelines

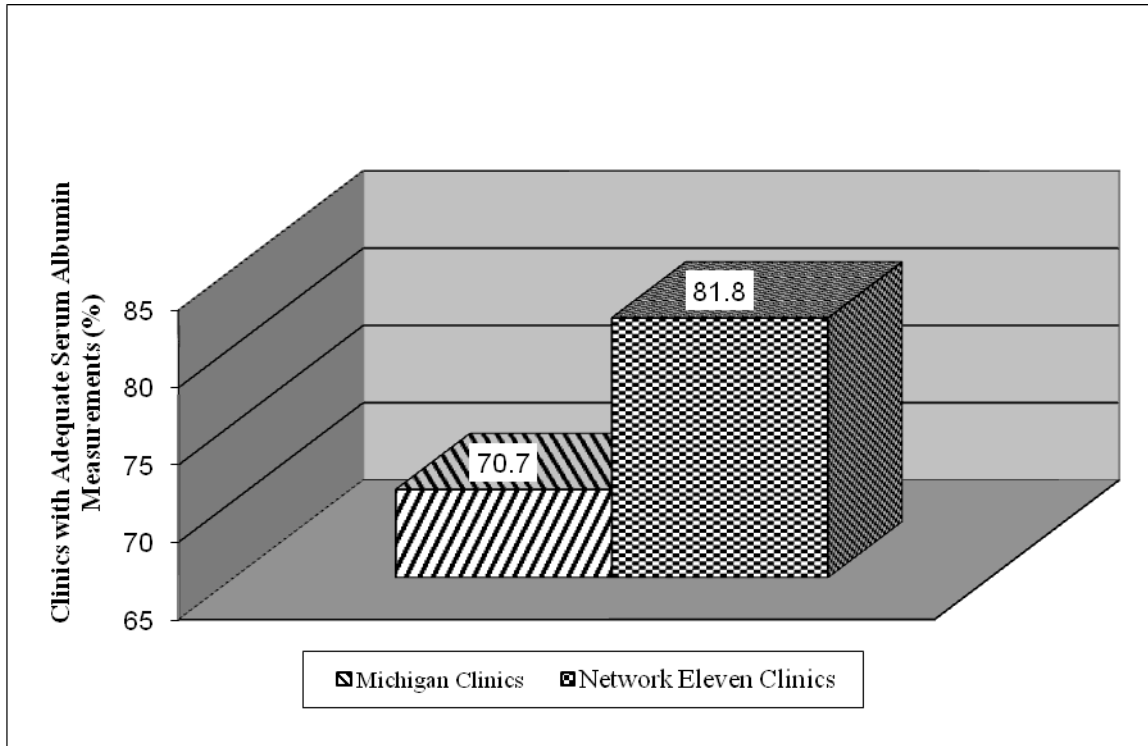


The survey also included a question which allowed dietitians to list additional resources they use in educating patients. However, there were only a small number of responses to this question, and no clear pattern was identified.

Serum Albumin Measurements Taken at Michigan Dialysis Clinics versus Renal Network Eleven Clinics During 2004

Serum albumin is measured at dialysis clinics and collected and reported quarterly by the Renal Network as a measure of nutritional outcomes. The target goal for serum albumin concentrations is ≥ 3.5 mg/dl. The present study compared the percentage of clinics meeting this criterion in Michigan during October 2004 and compared it to the total percentage for the Renal Network Eleven clinics (Figure 17). Michigan clinics participating in this study were noted to have a 71% pass rate, compared to 82% for all clinics in the Renal Network Eleven region.

Figure 17. Percentage of Michigan Dialysis Clinics and Renal Network Eleven Clinics with Suitable Serum Albumin Measurements During 2004



Additional nutritional outcome data were collected from study participants during this period. However, no comparison was made due to changes in outcome goals as they varied from clinic to clinic during the course of the study. This information is listed in Appendix E.

CHAPTER 5: DISCUSSION

Discussion of Results

The incidence of Stage 5 CKD has continued to increase at an alarming rate in America based on data provided by the CDC and the United States Renal Data Base (1, 20). A recent study estimated that by the year 2020, an additional 785,000 people will be diagnosed with Stage 5 CKD (63). This trend will require providers to offer services and therapies that are cost effective and that have proven outcomes. As this population grows, the need for dialysis services will increase. Specialized medical teams that include renal dietitians are essential to prevent and treat the complications that often follow diagnosis.

Nutritional therapies are a crucial component in the prevention and treatment of malnutrition as well as other health-related problems in this population. Renal Dietitians are required to provide a great deal of nutritional education and encouragement to patients to ensure that they take an active care in their own care. However, as healthcare costs continue to rise, it is essential that these resources be evaluated to determine their benefit in promoting positive outcomes in a cost effective manner. The present study obtained valuable data regarding the use of educational resources for the treatment of Stage 5 CKD patients in Michigan.

Renal Dietitians in Michigan use a wide variety of resources to educate renal patients. In the present study, written materials in the form of booklets, report cards, posters, handouts, and bulletin boards were reported to be used most frequently of all options. However, more than 60% of survey respondents believed that these teaching aides were ineffective in motivating patients to adhere to nutritional guidelines. A second group of education aids studied encompassed “actual handouts,” in the form of restaurant menus, food models, and

product labels. These aids allowed patients to receive “hands on” experience reading menus and labels and deciding what was beneficial for them. These techniques were used by approximately 5 percent of survey respondents. Unfortunately, responses showed that only 50 percent of the Dietitians believed their aids were effective in motivating patients to follow the provided guidelines. These findings can be partially explained by data in other studies, which showed that people retain only a small amount of information after listening to a presentation (20 percent) and only 10 percent of what they read (57). Additional resources used to educate patients were contests and incentives. Patients who participated in contests were given a nominal prize or some type of recognition for attaining a certain goal for successfully applying the concept. Renal Dietitians who responded noted that they believe that these types of resources were “somewhat” to “highly effective” in motivating a patient to apply nutritional concepts (>80).percent They also stated that they would use them more; however, they commented that lack of funding often limited their ability to implement these types of programs. Unfortunately, funding often seems to create barriers to the use of these aids by Renal Dietitians and other medical professionals (30). Many health professionals often face time constraints in terms of patient education and thus they use easily presented quick information for education (31). The Renal Dietitians Practice Group of the American Dietetic Association promotes the use of various teaching methods to assure that patients have the best opportunity to successfully implement nutritional concepts (27).

The need for clinicians to provide cost effective health education continues to be important in educating renal patients. As a result it may be a benefit for health professionals to receive training about the best way to educate patients and to assure that they are providing this education in the most cost effective manner to meet the needs of each patient (28).

Many studies have shown that the general public reads at a 9th grade reading level' therefore, it is imperative that educational approaches are tailored to the individual to allow them the best opportunity for success (57). This will assure that patients receive the most appropriate intervention rather than being labeled as non-compliant (20).

Comparison of Serum Albumin Concentrations for Michigan Outpatient Dialysis Clinics versus the Renal Network Eleven

In order to evaluate the efficacy of the use of these educational tools by Renal Dietitians in Michigan, the present study attempted to find some connection between the use of educational aids commonly used within the state and clinical outcomes. Albumin outcomes were requested during the study period from Renal Network Eleven, and they were compared to the average obtained from the clinics that participated in the present study. The serum albumin concentration that was considered to be within the normal range was 3.5 mg/dl and higher. During October 2004, Network Eleven noted that 81.8 percent of the clinics in their area met this outcome goal for serum albumin. Unfortunately, the clinics that participated in this study met only 70.7 percent of this outcome. Although it is understood that a complete assessment of nutritional status is not solely based on albumin, it is known to be one of the most important clinical components. It should also be noted that each clinic reports all clinical markers related to laboratory assays to the Renal Network on a quarterly basis where they are evaluated regularly as to their progress. Albumin is one of several nutritional markers followed closely. While this study faced challenges related to overall design, it did discover that there appears to be a significant gap between teaching aids Renal Dietitians in Michigan use for nutrition education and their perceived benefit of the effectiveness of these aids. Whether this event exists as a local trend or if it is a common occurrence is unknown as this time. However, it may be of benefit to further explore this possibility. If indeed this is a

commonly occurring trend, it sheds light on an area that must be addressed as the population needing these services grows.

What is known at this time is that all services, therapies, and programs used for patient education must have proven success in promoting targeted outcomes. If not, their uses should be discontinued, and the use of successful therapies should be increased. If this type of chasm exists in other areas of medical care, it is of great concern as the population continues to age, health care costs rise, and the strain on the health care system continues.

References

1. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. National Center for Health Statistics. Available at: <http://www.cdc.gov/nchs.fastata/kidbladd.html>. Accessed August 25, 2005
2. United States Renal Data System. Annual Report, Reference Section C. 2003. Available at: http://www.usrds.org/2004/ref/C_tables_04.pdf. Accessed March 2, 2005. (B-4, 345)* N-11 Stats)
3. United States Renal Data System. Annual Report. Reference Section A. 2006 Available at: http://www.usrds.org/2006/ref/A_tables_06.pdf. Accessed July 15, 2007
4. Greenberg A (ed): Primer on Kidney Diseases. 2nd Edition. New York, NY, Academic Press; 1998, pp 4-10, 440-447
5. The Organ Procurement and Transplantation Network. Available at: <http://www.optn.org/latest/Data/rptData.asp>. Accessed July 10, 2007
6. United States Renal Data System. *USRDS 2006 Annual Data Report*. Bethesda, MD: National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH), U.S. Department of Health and Human Services (DHHS); 2006. Available at: www.usrds.org. Accessed July 10, 2007
7. National Kidney Foundation Kidney Disease Outcomes Initiatives. Available at: <http://www.kidney.org/professional/kdoqi/guidelines.cfm>. Accessed September 10, 2005
8. Rocco MV, Frankenfield DL, Hopson SD, McClellan Wm.: *Relationship between clinical performance measures and outcomes among patients receiving long-term dialysis*. *Ann Intern Med* 145:512-9, 2006
9. Wolfe RA, Hulbert-Shearon TE, Ashby VB, Mahadevan S, Port KM. *Improvements in dialysis patient mortality are associated with improvements in urea reduction ratio and hematocrit*. *Am J Kidney Dis* 45:127-35, 2005
10. Combe C, McCullough KP, Asano Y, Ginsberg N, Maroni B, Pifer TB.: *Kidney disease outcomes quality initiative (KDOQI) and the dialysis outcome practice patterns study (DOPPS): nutrition guidelines, indicators, and practices*. *Am J Kidney Dis* 44:39-46, 2004 (suppl 2)
11. Cohen SD, Kimmel PL: *Nutritional status, psychological issues and survival in hemodialysis patients*. *Contrib Nephrol* 155:1-17, 2007
12. Qureshi AR: *Factors malnutrition in hemodialysis patients predicting*. *Kidney Int* 53:773-782, 1989

13. Kumagai H: *Nutritional therapy for patients undergoing hemodialysis*. *Contri Nephrol* 155:59-71, 2007
14. Ching-Ha Kwan B, Beddhu S: *Metabolic syndrome and chronic kidney disease*. *Urol Nephrol* 58(1):1-12, 2006
15. Beanlands H, Horsburgh ME, Fox S, et al: *Caregiving by family and friends of adults receiving dialysis*. *Neph Nurs J* 32(6):621-31, 2005
16. Packard DP, Milton JE, Shuler LA, Short, RA, Tuttle KR, *Implications of chronic kidney disease for dietary treatment in cardiovascular disease*. *J Ren Nutr* 16(3):259-68, 2006
17. Teta D, Phan O, Halabi G, : *Chronic renal failure: what diet?* *Rev Med Suisse* 2 (55): 566-9, 2006
18. Hoover, H: *Compliance in patients on hemodialysis: a review of literature*. *J Amer Diet Assoc* 89:957-959, 1989
19. Karalis M, Stafford C: *Coaching patients to succeed in adhering to a renal diet* *Nephrol Nurs J* 34(3): 336-8, 2007
20. Kaveh K, Kimmel PL. *Compliance in hemodialysis patients: multidimensional measures in search of a gold standard*. *Am J Kidney Dis* 37(2):244-66, 47-8, 2001
21. Kimmel PL, Peterson RA, Weihs KL, Simmons SJ, Alleyne S, Cruz I, Veis JH: *Psychosocial factors, behavioral compliance and survival in urban hemodialysis patients*. *Kidney Int* 54(1):245-54, 1998
22. Nutrition Trends Survey. Chicago, IL, Amer Dietetic Assoc, September 1997. Available at: www.eatright.org. Accessed Sept 18, 2005
23. Hochbaum, GM: *Strategies and their rationale for changing people eating habits*. *J Nut Educ* 13: 59-65, 1981
24. The National Kidney Foundation “People Like Us.” Available at: <http://www.kidney.org/patients/plu/>. Accessed May 24, 2007
25. American Association of Kidney Patients “The Voice of All Kidney Patients.” Available at: <http://www.aakp.org/>. Accessed May 24, 2007
26. Kidney Times, Health Information Beyond the Ordinary.” Available at: <http://www.ikidney.com/>. Accessed July 14, 2007
27. National Kidney Disease Education Program. Available at: http://nkdep.nih.gov/patients/kidney_disease_information.htm#3. Accessed Jun 28, 2007

28. Clements L, Ashurst I: *Dietary strategies to halt the progression of chronic kidney disease*. J of Renal Care 32: 192-97, 2006
29. Lusic, I: Linking medicare reimbursement to quality outcomes. Congress considers “pay for performance” legislation. The ASHA Leader 1,15, 2005
30. Durose CL, Holdsworth M, Watson V, Przygodzka, F *Knowledge of dietary restrictions and the medical consequences of noncompliance by patients on hemodialysis are not predictive of dietary noncompliance*. J Am Diet Assoc 104:35-40, 2004
31. Byham-Gray L, Wiesen K (eds): *A Clinical Guide to Nutrition Care in Kidney Disease*. Chicago, Ill, Diana Faulhaber, 2004, pp 223-227
32. Wiesen K, Byham-Gray L (eds): *A Guide to Nutrition in End Stage Kidney Disease*. Chicago, Ill, Diana Faulhaber, 2002, pp 223-227
33. Panaga KD, Panaga, TJ: *Mosby’s Manual of Diagnostic and Laboratory Tests*. St. Louis, MO, Mosby Inc., 1998, pp 180
34. The National Institutes of Health. Prenal Azotemia. Available at: <http://www.nlm.nih.gov/medlineplus/ency/article/000508.htm>. Accessed July 29, 2007
35. Cupisti A, D'Alessandro C, Morelli E, Rizza GM, Galetta F, : *Nutritional status and Dietary manipulation in predialysis chronic renal failure patients*. J Ren Nutr 14(3):127-33, 2004
36. Karalis M, McQuiston B: Preventing malnutrition: management of the pre-ESRD patient. Nephrol News Issues 16(5):44-6, 48, 50-1, 2002
37. The National Kidney Foundation K/DOQI Guidelines 2000. Adult Nutrition Guidelines for Advanced Chronic Renal Failure without Dialysis. Available at: http://www.kidney.org/professionals/KDOQI/guidelines_updates/nut_a24.html. Accessed July 30, 2007
38. Wiggins, KL: *Guidelines for nutritional care of renal patients*. 3rd edition. Renal Dietitians Dietetic Practice Group, ADA, 5-13, 2002
39. United States Health and Human Services, Center for Medicare and Medicaid Services. Medical Nutrition Therapy Overview Available at: <http://www.cms.hhs.gov/MedicalNutritionTherapy/> Accessed December 12, 2006
40. Schiro-Harvey, K: *National Renal Diet: 2nd ED*. Renal Dietitians Practice Group, ADA, 2002

41. Moore H, Reams S, Wiesen K, Nolph KD, Khanna R, Laothong C, *National kidney foundation council of renal nutrition survey*. J Clin Nutr 13:233-240, 2003
42. Twork A, DeVee J, Jahnke, M: Nutrition guidelines for acute and chronic kidney failure in adults. University of Michigan Medical Center, Department of Food and Nutrition Services. 54: 1-11, 1995
43. Bohé J, Rennie MJ: *Muscle protein metabolism during hemodialysis*. J Ren Nutr 16(1):3-16, 2006
44. Ikizler TA: *Effects of hemodialysis on protein metabolism*. J Ren Nutr 15(1):39-43, 2005
45. United States Department of Agriculture. Dietary Reference Intakes for Individuals. Available at: <http://www.iom.edu/Object.File/Master/21/372/0.pdf>. Accessed July 30, 2007
46. Disorders of Potassium Metabolism. Available at: http://www.kidneyatlas.org/book1/adk1_03.pdf. Accessed July 31, 2007
47. Ganesh, SK, Stack, AG: *Association of elevated serum Po4, CaxPo4, prod and PTH with cardiac mortality risk in chronic hemodialysis patients*. J Amer Soc Nephrol 12:2131-2138, 2006
48. K/DOQI Clinical Guidelines for Bone Metabolism in Chronic Kidney Disease. Available at: http://www.kidney.org/professionals/kdoqi/guidelines_bone/index.htm Accessed: July 31, 2007
49. Muntner P, Ferramosca E, Bellasi A, Block GA, Raggi P *Development of a Cardiovascular Calcification index using simple imaging tools in haemodialysis patients*. Nephrol Dial Transplant 22(2):508-14, 2006
50. Coen G, Manni M, Mantella D, Splendiani G. *Can cardiovascular calcifications be prevented in chronic kidney disease?* G Ital Nefrol 34:21-5, 2006 (suppl 21)
51. Campean V, Neureiter D, Varga I, Runk F, Reiman A, Garlichs C, Achenbach S, Nonnast-Daniel B, Amann K.: *Atherosclerosis and vascular calcification in chronic renal failure*. Kidney Blood Press Res 28(5-6):280-9, 2005
52. Lazar E, Hebert K, Poma T, Stankus N.: *Long-term outcomes of cinacalcet and paricalcitol titration protocol for treatment of secondary hyperparathyroidism*. Amer J Nephrol 27(3):274-8, 2007
53. Block G, Port FK: *Calcium phosphate metabolism and cardiovascular disease in patients with chronic kidney disease*. Semin Dial 16(2):140-7, 2003

54. Shils ME, Olson JA, Shike M (ed): Modern Nutrition in Health and Disease. 8th ed. Philadelphia, Pa. Lea & Febiger 1994, pp 1102-1134
55. Martin CJ, Goeddeke-Merickel CM: *Oxidative stress in chronic kidney disease* Nephrol Nurs J 32(6):683-5, 2005
56. Gehling E: Medical nutrition therapy: an individualized approach to treating diabetes. Lippincotts Case Mngt, Jan-Feb 2001, pp 2-9
57. Wlodkowski RJ,: Strategies to Enhance Adult Motivation to Learn. A Guide For Effective Instruction. Kregier Publishing Company. Nebraska Institute for Studying and Illiteracy. 2004
58. Benard, B. The Case for Peers. Western Center for Drug-Free Schools and Communities. Department of Education, Washington, DC. 1990. Available at: http://www.nwrac.org/pub/library/c/c_case.pdf Accessed June 2007
59. Thomas L, Sargent R, Michels P.; Richter, D., Valois, R., & Moore, C. *Identification of the factors associated with compliance of therapeutic diets in older adults with end stage kidney Disease.* J Ren Nutr 11:80-88, 1997
60. United States Public Health Service. The Health Belief Model. Available at: <http://health.enotes.com/public-health-encyclopedia/health-belief-model>. Accessed July 31, 2007
61. DiMatteo M, Lepper H, Croghan T: *Depression is a risk factor for non-compliance with medical treatment.* Arch of Intern Med 1(160); 2102-2107, 2001
62. SNAP Survey Software. Mercator Research Group Limited. Version 7. Available at: <http://www.snapsurveys.com/software/>. Accessed on September 12, 2004
- 63 United States Renal Data Base System. Available at: http://www.usrds.org/2007/view/02_incd_prev.asp. Accessed August 21 2010.

APPENDICES

Appendix A: K/DOQI Nutrition Guidelines for Maintenance Dialysis

I. ADULT GUIDELINES

A. Maintenance Dialysis

1. Evaluation of Protein-Energy Nutritional Status

Guideline 1. Use of Panels of Nutritional Measures

Guideline 2. Panels of Nutritional Measures for Maintenance Dialysis Patients

Guideline 3. Serum Albumin

Guideline 4. Serum Prealbumin

Guideline 5. Serum Creatinine and the Creatinine Index

Guideline 6. Serum Cholesterol

Guideline 7. Dietary Interviews and Diaries

Guideline 8. Protein Equivalent of Total Nitrogen Appearance (PNA)

Guideline 9. Subjective Global Nutritional Assessment (SGA)

Guideline 10. Anthropometry

Guideline 11. Dual Energy X-Ray Absorptiometry (DXA)

Guideline 12. Adjusted Edema-Free Body Weight (aBW_{ef})

2. Management of Acid-Base Status

Guideline 13. Measurement of Serum Bicarbonate

Guideline 14. Treatment of Low Serum Bicarbonate

3. Management of Protein and Energy Intake

Guideline 15. Dietary Protein Intake (DPI) in Maintenance Hemodialysis (MHD)

Guideline 16. Dietary Protein Intake (DPI) for Chronic Peritoneal Dialysis (CPD)

Guideline 17. Daily Energy Intake for Maintenance Dialysis Patients

4. Nutritional Counseling and Follow-Up

Guideline 18. Intensive Nutritional Counseling With Maintenance Dialysis (MD)

Guideline 19. Indications for Nutritional Support

Guideline 20. Protein Intake During Acute Illness

Guideline 21. Energy Intake During Acute Illness

Appendix B: Approval Letters



EASTERN MICHIGAN UNIVERSITY

December 13, 2004

Susan Leslie c/o
Judi Brooks
School of Health Sciences
Eastern Michigan University
Ypsilanti, MI 48197

Dear Ms. Leslie,

The CHHS Human Subject Review Committee finds that your request entitled "Nutrition Education Resources used by Renal Dietitians in Michigan for the Outpatient Dialysis Population" resubmitted on 12/04, meets the Minimal Risk Standards and is approved for initiation.

The Committee may request further approval if secondary analysis of the data is conducted.

Sincerely,

A handwritten signature in black ink, appearing to read "S. Sonstein".

Stephen A. Sonstein, PhD
Chair, CHHS Human Subjects Review Committee



DaVita Dialysis Kresge
4145 Cass Avenue
Detroit, Michigan 48201
Tel: 313-833-4330 | Fax: 313-833-4257
www.davita.com

Susan Leslie, RD
3051 Primrose Lane
Ypsilanti, MI 48197

September 10, 2004

Re: "Nutrition Education Resources used by Renal Dietitians for the Education of the Outpatient Dialysis Population in Michigan"

Dear Sue,

Please know that we are always interested in supporting our teammates in their interests to conduct research. I was happy to hear of your study and would ask that once your study is complete that you consider sharing them with us. DaVita and the National Kidney Foundation have grant opportunities available to assist researchers in conducting studies. I have read your research proposal and have no problem with you sending a letter to DaVita dietitians in Michigan as possible study participants. I would ask that you keep their contact information confidential and use the results for the purpose of your research only.

I look forward to hearing the results and learning more about how our teammates in Michigan feel "we can improve nutrition together!"

Best of luck with the study!

Warm Regards,

A handwritten signature in black ink that reads "Debbie Benner".

Debbie Benner, RD, CSR
Nutrition Services Corporate Dietitian
DaVita Dialysis Incorporated
Casa DaVita
El Segundo, CA 90245

Susan Leslie, RD
3051 Primrose Lane
Ypsilanti, MI 48197

September 10, 2004

Re: "Nutrition Education Resources used by Renal Dietitians for the Education of the Outpatient Dialysis Population in Michigan"

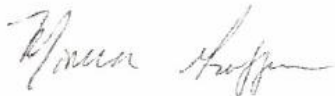
Dear Sue,

I received your request to use our current membership directory as a means of reaching potential research participants for your Master's thesis at Eastern Michigan University. It sounds like an exciting opportunity to gain insight into specifics related to the daily practice of renal dietitians in Michigan. My only request is that you use the membership directory for this purpose and keep the members contact information confidential.

Please provide us with the results of your study as this may help us improve the how we assist our patients. If you would like to present your results at one of our meetings we would be happy to place that into our schedule.

Best of luck with the study!

Warm Regards,



Monica Griffin, RD
President of the Council of Renal Nutrition
Michigan Chapter
Southgate MI, 48111

Appendix C: Letter to Study Participants

Dear _____,

I am contacting you to request your participation in completing an online survey regarding the types of nutrition resources used by renal dietitians in Michigan. I have worked as a renal dietitian for the past 9 years and am also a member of CRN. I am very interested in assessing the effectiveness of the various resources used to educate patients with kidney disease. I am currently pursuing a Masters Degree in Nutrition at Eastern Michigan University and have developed this project to meet graduate requirements this Spring. This project is being supervised by Dr. Judi Brooks, R.D. Ph.D., Director of Dietetics and Human Nutrition at Eastern Michigan University.

The benefit of this study is to evaluate what tools are currently used, those that work well, and to identify additional resources to assist our patients. The questions address the most commonly used and ask dietitians to evaluate their frequency of use and their effectiveness. There are 37 questions which will take approximately 10-15 minutes to complete.

There will be no personal information requested and no way of identifying those who complete surveys. The results will be evaluated using statistical software and stored into a secure excel database. They will then be written into a thesis manual and exhibited into a poster session during the winter 2005 semester.

To complete the survey please click into the following link and answer each question:
http://survey.emich.edu/sleslie/sleslie_live_survey.htm

Again the survey is brief and will only take a short time. You will be asked to provide results from your October 2004 CQI reports regarding the percentage of PTH, Albumin and Phosphorus met from your clinics during this time frame. Therefore please have the report with you for reference as you complete the survey. At the end of the survey there will be a link that allows participants to enter a raffle where they will be eligible to win paid registration to the Michigan Dietetic Association Conference in May 2005!

Your input will be extremely valuable in identifying these resources and could provide great insight into those most valuable in meeting the guidelines set forth by the Kidney Disease Outcomes Quality Initiatives

If you wish to participate or have any additional question please don't hesitate to contact me or Dr. Brooks.
The survey will be available online until February 14, 2005.

Thank you once again!

Susan Leslie, R.D.
3051 Primrose Lane
Ypsilanti, MI 48197
Cell: (734) 604-8266
DaVita Units:
Highland Park, Michigan
New Center Detroit, Michigan
sleslie@davita.com

Judi Brooks, PhD, RD.
Associate Professor and Director
Dietetics and Human Nutrition
308 Marshall Building
Eastern Michigan University
Ypsilanti, MI 48197
(734) 481-7862
judi.brooks@emich.edu

Appendix D: Survey Tool

Nutrition Education Resources used by Renal Dietitians for the Outpatient Dialysis Population in Michigan

There are 37 questions included in this survey. The questions ask basic information regarding the types of nutrition education resources that you currently use in your clinics. Please read each question carefully and choose the answer that reflects your current professional practices. This survey will take approximately 15 minutes to complete. Please note that you will need to refer to your October 2004 Clinical Quality Results for questions 7-9.

Demographic Information

- 1) Please state your gender:
 Male Female

- 2) What is your level of education?
 Bachelors Degree
 Masters Degree
 Specialization Credentials (ex. CSR)

- 3) How many years have you worked in the field of dietetics?
 < 5 years
 5-10 years
 11-15 years
 16 years or more

- 4) What is your ethnic origin/race?
 Caucasian
 Native American
 African American
 Hispanic Latino
 Asian American
 Other

- 5) How many patients are at your clinic?
 Patients

- 6) List the approximate number of patients at your clinic who receive the following modality.
 Hemodialysis
 Peritoneal dialysis

The next 3 questions will ask you to provide information regarding your Clinical Outcome Results for the month of October. Please provide the results based on the percentage of patients that met the criteria based on guidelines set forth by K/DOQI.

These reference guidelines are provided for each question. Please refer to them when providing each answer.

7. During the month of October what percentage of patients met the criteria for phosphorus and therefore were in compliance with K/DOQI Guidelines?
_____ % (NKF Guidelines are 3.5-5.5 mg/dL)
8. During the month of October what percentage of patients met the criteria for albumin and therefore were in compliance with the K/DOQI Guidelines?
_____ % (NKF Guidelines are ≥ 4.0 g/dL as measured by the bromcresol green method).
9. What percentage of patients met the criteria for ***Intact PTH*** levels during your last quarterly lab draw? _____ % (NKF Guidelines are 150-300 pg/ml)

The following questions ask you to choose the nutrition resources that you currently use at your clinic on a regular basis, how frequently they are used and how effective they are in motivating your patients to follow recommended nutrition guidelines. You will also be asked to evaluate if there are factors which affect your use of each resource.

- 10) Please choose the following resources you currently use in your clinic to provide nutrition education to your patients. (Choose all that apply)
_____ Diet books, pamphlets and report cards
_____ Bulletin boards and posters
_____ Measuring containers (bottles, cups etc.) and food models
_____ Food labels and restaurant menus
_____ Contests or incentives
_____ Peer resource counselors
_____ Internet resources (ex. iKidney.com)
_____ Other
- 11) How *frequently* do you use “diet books, pamphlets and report cards” to provide nutrition information to your patients?
_____ Always
_____ Often
_____ Sometimes
_____ Seldom
_____ Never

- 12) I would use this resource more if there were not the following limitations.
Please check all that apply
- Time (ex. to implement or monitor)
 - Money (ex. unavailable funds)
 - Availability (ex. of resource)
 - Support (ex. from administration or staff)
 - Other (please list)_____
- 13) How *effective* are diet books, pamphlets and report cards” in motivating your patients to follow recommended nutrition guidelines?
- Highly *effective*
 - Somewhat *effective*
 - Unsure
 - Somewhat *ineffective*
 - Highly *ineffective*
- 14) How *frequently* do you use “bulletin boards and posters” to provide nutrition information to your patients?
- Always
 - Often
 - Sometimes
 - Seldom
 - Never
- 15) I would use this resource more if there were not the following limitations.
- Time (ex. to implement or monitor)
 - Money (ex. unavailable funds)
 - Availability (ex. of resource)
 - Support (ex. from administration or staff)
 - Other (please list)_____
- 16) How *effective* are “bulletin boards and posters” in motivating your patients to follow recommended nutrition guidelines?
- Highly *effective*
 - Somewhat *effective*
 - Unsure
 - Somewhat *ineffective*
 - Highly *ineffective*
- 17) How *frequently* do you use “measuring containers and food models” to provide nutrition information to your patients?
- Always
 - Often
 - Sometimes
 - Seldom
 - Never

- 18) I would use this resource more if there were not the following limitations.
- Time (ex. to implement or monitor)
 - Money (ex. unavailable funds)
 - Availability (ex. of resource)
 - Support (ex. from administration or staff)
 - Other (please list)_____
- 19) How *effective* are “measuring containers and food models” in motivating your patients to follow recommended nutrition guidelines?
- Highly *effective*
 - Somewhat *effective*
 - Unsure
 - Somewhat *ineffective*
 - Highly *ineffective*
- 20) How *frequently* do you use “food labels and restaurant menus” to provide nutrition information to your patients?
- Always
 - Often
 - Sometimes
 - Seldom
 - Never
- 21) I would use this resource more if there were not the following limitations.
- Time (ex. to implement or monitor)
 - Money (ex. unavailable funds)
 - Availability (ex. of resource)
 - Support (ex. from administration or staff)
 - Other (please list)_____
- 22) How *effective* are “food labels and restaurant menus” in motivating your patients to follow recommended nutrition guidelines?
- Highly *effective*
 - Somewhat *effective*
 - Unsure
 - Somewhat *ineffective*
 - Highly *ineffective*
- 23) How *frequently* do you use “contests or incentives” to provide nutrition information to your patients?
- Always
 - Often
 - Sometimes
 - Seldom
 - Never

24) I would use this resource more if there were not the following limitations.

- Time (ex. to implement or monitor)
- Money (ex. unavailable funds)
- Availability (ex. of resource)
- Support (ex. from administration or staff)
- Other (please list)_____

25) How *effective* are “contests or incentives” in motivating your patients to follow recommended nutrition guidelines?

- Highly *effective*
- Somewhat *effective*
- Unsure
- Somewhat *ineffective*
- Highly *ineffective*

26) How *frequently* do you use “peer resource counselors” to provide nutrition information to your patients?

- Always
- Often
- Sometimes
- Seldom
- Never

27) I would use this resource more if there were not the following limitations.

- Time (ex. to implement or monitor)
- Money (ex. unavailable funds)
- Availability (ex. of resource)
- Support (ex. from administration or staff)
- Other (please list)_____

28) How *effective* are “peer resource counselors” in motivating your patients to follow the recommended nutrition guidelines?

- Highly *effective*
- Somewhat *effective*
- Unsure
- Somewhat *ineffective*
- Highly *ineffective*

29) How *frequently* do you use “Internet resources” to provide nutrition information to your patients?

- Always
- Often
- Sometimes
- Seldom
- Never

30) I would choose this resource more if there were not the following limitations.

- Time(ex. to implement or monitor)
- Money (ex. unavailable funds)
- Availability (ex. of resource)
- Support (ex. from administration or staff)
- Other (please list)_____

31) How effective are “Internet resources” in motivating your patients to follow recommended nutrition guidelines?

- Highly *effective*
- Somewhat *effective*
- Unsure
- Somewhat *ineffective*
- Highly *ineffective*

32) If you listed another resource in question 10, please list how frequently it is used. (Otherwise skip to question 35)

- Always
- Often
- Sometimes
- Seldom
- Never

33) I would use this resource more if there were not the following limitations.

- Time (ex. to implement or monitor)
- Money (ex. unavailable funds)
- Availability (ex. of resources)
- Support (ex. from administration or staff)
- Other (please list)_____

34) How effective is this resource in motivating your patients to follow recommended nutrition guidelines?

- Highly *effective*
- Somewhat *effective*
- Unsure
- Somewhat *ineffective*
- Highly *ineffective*

35) Rate the amount of influence that the following people have when it comes to motivating your patients to follow dietary guidelines?

- 1-Great 2-Some 3-Unsure 4-Little 5-None
- Family and friends (not on dialysis)
 - Nephrologist
 - Other dialysis patients
 - Nurses, technicians and social workers
 - Dietitian

_____ Family Physicians

36) Where do you think your patients are getting additional information regarding their renal diet? (Please check all that apply)

_____ Family and friends

_____ Radio and television

_____ Newspapers and magazines

_____ Other dialysis patients

_____ Other healthcare professionals

_____ Lay people (ex. personnel from GNC, Kroger, etc.)

37) What additional resources would be useful in promoting improved dietary compliance from your patients?

Thank you for your input! Please enter the link below to enter a drawing where the winner will receive paid registration to the Michigan Dietetic Association Conference in May 2005. If you have any comments or questions please contact Sue Leslie, R.D. at Susan.Leslie@earthlink.net or (734) 604-8266. Requests for results can be made to the above.

“SUBMIT”

Appendix E: Laboratory Data

Table 5. Statistical Outcomes of Michigan Clinics 2004

Laboratory Assay	Guidelines Met (%)
Serum Phosphorus –3.5-5.5 mg/dl % meeting this criteria	51%
Serum Albumin – BCG assay- \geq 3.5 mg/dl. % meeting criteria	70.7%
Intact Parathyroid Hormone Level – between 150-300 pg/ml % meeting this criteria	49%

Table 6. Laboratory Outcomes for Network Eleven 2004

Laboratory Assay	Guidelines Met (%)
Albumin BCG- \geq 3.5 mg/dl	81.1%
Phosphorus < 6.0 mg/dl	73%

Table 7. Intact PTH Outcomes for Network Eleven 2004

Laboratory Assay	Guidelines Met (%)
Intact PTH 75-300 pg/ml	38%

