

DIET COMPLIANCE OF HOME CARE CLIENTS
WITH DIABETES MELLITUS

by

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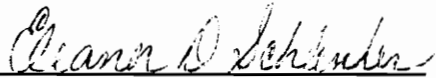
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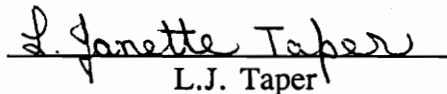
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Human Nutrition and Foods

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(ABSTRACT)

Home health services are increasing for elderly individuals diagnosed with chronic diseases which are often treated by diet modification. This study was undertaken to evaluate the diabetic homebound client's understanding of and compliance to his/her prescribed diet. An interviewer assisted modified food frequency and food habit questionnaire was completed by 20 male and 28 female home care clients, ranging in age from 51 to 91 years. Living in a metropolitan area, these respondents met the Medicare definition of homebound and were diagnosed with diabetes mellitus.

Computer driven dietary analysis was completed from questionnaire responses to estimate the food and nutrient intake of the home care clients. Calculated food intake was compared to physician diet orders taken from the home care medical record and to respondents' verbalization of their diet orders. This comparison was based on the composite diet and the components of energy, sodium, and cholesterol or fat. These findings were evaluated according to sex, age, length of time respondent had been diagnosed as diabetic, and a vulnerability index based on living situation using Chi square methods.

Only 2% of the respondents' reported intakes agreed with the physician diet order

and the individually stated diet. The largest discrepancy was in energy consumption. Respondents' understanding of the prescribed diet differed with respect to kilocalories consumed and the physician order. Sodium was the nutrient for which respondents seemed to have the best understanding of the prescribed diet and the best compliance. More respondents reported following a low cholesterol/fat intake pattern than had diet prescriptions for such a restriction. However, dietary analysis indicated that fewer respondents actually consumed a low cholesterol/fat diet than was self reported or ordered by the physician. Compliance to the diet order was not significantly influenced by sex, age, length of time diabetic, or vulnerability index.

This research indicates that little agreement exists between physicians' expectations and respondents' understanding of their diet prescription. Nutrition education programs for diabetic home care clients should emphasize increasing client understanding of modified diets, increasing client acceptance of diet modification, and providing client counseling to support implementation of individualized diet plans.

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INTRODUCTION

Home care is a growing segment of the health care industry. Home care is defined as a health service provided in the patient's place of residence for the purpose of promoting, maintaining, or restoring health or minimizing the effects of illness and disability (Glanze, 1990). Home health services may include such elements as nursing care, physical therapy, occupational therapy, speech and language pathology services, home health aide services, medical social services, delivery of drugs and supplies, and nutrition services. The foundation of home care regulations is the Medicare Home Health Agency Publication 11 (HIM 11) produced by the Health Care Financing Administration (HCFA). Reimbursement for home care services for individuals age 65 or older or for the medically disabled is provided by Medicare when specified regulations are followed. These regulations define homebound as follows: while an individual does not have to be bedridden to be considered confined to home, the condition must be such that there exists a normal inability to leave home (United States Department of Health and Human Services, 1990). Without home care the homebound individual would not have access to necessary health services. Kay (1989) reported 1% of individuals ages 65-69 and 20% or greater of individuals older than 85 years were homebound.

Balanced nutrition during the adult years can provide several benefits. These benefits include prevention or delayed onset of chronic diseases and their complications, better management of existing medical conditions, more rapid recovery from trauma or

illness, and better resistance to infection. Additionally, adequate nutrition can help maintain an independent life style and allow for potential savings in the cost of medical care, surgery, drug therapy, or institutional care. Yet, little has been written regarding the presence and influence of nutrition intervention in those individuals who receive home health services. This oversight regarding the influence of nutrition services on the home health client is in part due to the lack of payment for nutrition services by Medicare and other payment sources. Because there is no reimbursement for nutrition services by insurance companies, many home health providers do not offer nutrition services.

As early as 1982, the American Dietetic Association (ADA) promoted the idea of a registered dietitian as part of the home health care team. At the time, ADA estimated one half of all home care clients would have some need for nutrition support services (Anonymous,1982). Specifically, home care clients may have a need for nutrition services related to adequate teaching of therapeutic diets, advice to care givers on attractive and appealing presentation of therapeutic diets, and nutritional intervention as related to constipation, dysphagia, anorexia, cachexia, or the administration of tube feedings (Suski,1981).

The use of nutrition services in home health care is more established in Canada. As early as 1983 the Journal of the Canadian Dietetic Association was reporting the use of a full time dietitian in the Hamilton-Wentworth Home Care Program (Smit,1983). Approximately 70% of the dietitian's time was spent on the direct counseling of home care clients. The remaining 30% of the dietitian's time was spent on general nutrition

education of agency staff, client-specific consultation with agency staff, and administrative duties.

Gaffney and Singer (1985) conducted a study documenting the dietary needs of clients referred to home care. This particular study, completed with the cooperation of the Visiting Nurses Association (VNA) of Chicago, looked at medical diagnoses, payment source, height, weight, age, diet prescription, and the number of diet restrictions for home care clients. Greater than 50% of the clients had diet prescriptions from their physicians and 25% had two or more diet restrictions. In addition, an audit conducted by registered dietitians found that 75% of the clients had diagnoses determined to benefit from therapeutic diets and 47% of the clients with diets prescribed by their physician might have benefitted from an alternative diet.

Despite support for in home nutrition education by the nutrition professional, changes in the present system have been slow to occur. This may be in part because clients do not perceive the need for this instruction and in part because there are no mechanisms for reimbursement of the service. In research published by Magilvy et al (1988), when home care clients were questioned about the in-home activities of the home care staff, the clients replied that staff provided nursing care, discussed the client's health problems, and discussed the clients' ability to function independently on a daily basis; teaching was not mentioned as an element of care provided by home health staff. When specifically asked about nutrition instruction, clients admitted that nurses did provide some diet instruction, but this was not considered to be their major function.

Because balanced nutrition is considered to be part of the treatment for several chronic diseases frequently present in the home care population, it follows that nutrition instruction in home care can provide the client with pathways for an improved quality of life. A persistent question is what happens to the home care client who does not understand his/her diet prescription and is not monitored regarding adherence to the plan?

To begin to explore this question, this research project studied a special group of home health clients, those with a diagnosis of diabetes mellitus, and documented the clients' understanding of and adherence to the diet prescription.

PURPOSE

The purpose of this study was to assess the dietary intake in an older, suburban, homebound population diagnosed with diabetes mellitus to determine whether or not these clients understand and are compliant with the dietary restrictions recommended by their physicians. The diagnosis of diabetes mellitus was selected because it is a common diagnosis within the homebound population. In addition, one of the major methods of managing the disease is through diet modification. This research also evaluated the dietary intake of the population in terms of the general diet modifications recommended by the American Diabetes Association and the American Dietetic Association. The demographic elements of sex and age, and length of time the individual had been diagnosed as diabetic were examined to determine if any of these factors affected dietary intake with respect to following the prescribed diet. Additionally, a composite vulnerability index score based on additional medical diagnoses, number of medications being taken, living situation, educational level, marital status, and availability of assistance in purchasing and preparing the food was developed to ascertain if this composite picture of the individual affected dietary intake, diet understanding, and diet compliance.

LITERATURE REVIEW

History of Home Care

The first record of home care can be found in the first century AD when Phoebe went into the community and cared for the sick poor in the Roman Empire (Martin, 1988). In Paris during 1683 Dames de Charite and local nuns visited and nursed families during the cholera and small pox epidemics. During the early nineteenth century in Ireland and England the term visiting nurse began to be used with the development of the current concept of the home care nurse. When Florence Nightingale founded district nursing with a select staff in 1862, home care was established as an individual entity in health care. During the 1880's in the United States, Lillian Wald set up the New York Nurse Service, Mary Breckenridge established the Frontier Nursing Service in the Kentucky mountains, and the first nursing society was founded in Philadelphia. Thus home care began to develop into a specialized form of health care in the United States.

Before 1965 home health care consisted mostly of nursing services provided by private individuals or groups, or services provided by the government when directly financially responsible for the individual's well being (Biro, 1978). With the passage in 1965 of the Health Insurance for the Aged and Disabled Act (Title XVIII of the Social Security Act), also known as the Medicare Act, nurses in home care situations reported an increase in the number of patients they were seeing and also reported an increase in the health related complications of these patients. This increase in the use of services is

related to the period after an acute phase of illness requiring hospitalization when an extended period of convalescence with medical services provided in the home is appropriate for the individuals falling under the auspices of the Medicare Act.

In the late 1970's and early 1980's home care companies began establishing services to provide pharmaceuticals, durable medical equipment, and clinical follow-up services (usually nursing) (Orr, 1989), within reimbursement guidelines for these services outlined under the umbrella of HIM 11. By the mid 1980's home care was a rapidly growing industry. The home care industry has experienced intense competition between agencies resulting in major acquisitions and mergers.

A description of the home care industry in the late 1980's and early 1990's would be explosive expansion. Today home care agencies provide a variety of home health services. Most agencies provide some combination of physical therapy, occupational therapy, speech and language pathology, medical social work services, home health aide services, and nutrition services. Research in home care is small, but growing in popularity, and is addressing significant practice issues. Findings are being utilized within the practice setting (Martin, 1988). Following is a summary of present research in home care.

Current Issues In Home Care

The Home Care Population

The majority of home care clients have medical diagnoses which have resulted in

recent hospitalization. They have a need for continued regular medical care but their condition does not warrant further hospitalization. However, Netting (1989) found that the integration of services between hospital and home sometimes fails when elderly individuals are involved. Thorough understanding of all aspects of the service delivery system, including available nutrition services, is mandatory for the hospital-based professional planning posthospitalization services for the elderly to insure appropriate and continuing care.

After the need for continuing health care is identified, the individual must meet the specific criteria required by the home health agency. For example, between 1973 and 1977 the Commonwealth of Massachusetts developed the Home Care Corporation (HCC) to produce a state wide network of home care service delivery (Branch and Stuart, 1984). The purpose of the twenty-seven established offices was to provide services to avoid and/or delay institutionalization of the elderly. At HCC the criteria for service were: 1) the individual be greater than 60 years of age, 2) the annual income be \leq \$4800/year for an individual and \leq \$7200 for a couple, and 3) the needs of the individual be assessed by a case manager. Priorities under which the individual is seen by HCC were: 1) to provide support during an acute episode of illness, 2) to supervise those individuals whose informal support system is temporarily unavailable, and 3) to supervise those individuals awaiting institutionalization.

A study between 1973 and 1980 involving the Chelsea and Greenwich Village Program in New York examined 792 patients over a total of 8718 home visits

(Brickner,1980). In this program the criteria for acceptance were living within the geographic boundaries of the program, inability of the individual to leave home, lack of current adequate health care, and a willingness to accept the home health care team into the home. Of the 792 referrals, 704 were accepted for care and subsequently discharged, 20 refused contact, 41 were not homebound, and 27 had a health services pay source other than Medicare. Once the home care client meets agency criteria he/she becomes part of a rather clearly defined population.

Part of that definition is reflected in the clients' medical diagnoses. A study using the clinical records of 100 randomly selected clients of a large not-for-profit home health agency in Connecticut found that chronic health problems were the predominant reason clients were being seen (Pasquale,1988). These chronic health problems included diabetes mellitus, hypertension, congestive heart failure, coronary artery disease, and arthritis. Greater than 50% of the clients had at least a moderate number of functional impairments such as poor eyesight, being unable to climb stairs or prepare a meal. Female clients were older, relied more on informal care givers, and were more functionally impaired than male clients. Male clients were usually cared for by their wives.

Additionally, an extensive study undertaken in England evaluated 2000 elderly individuals from 20 general medical practices (Kemp and Acheson,1989). Forty-three percent of the individuals greater than 75 years of age lived alone. This percentage was greater in urban areas, in privately rented or owned dwellings, and among females.

Those elderly individuals living alone had a high level of informal support systems in place in the form of family living nearby or neighbors who gave assistance. Those living alone also showed a greater level of independence than those living with others.

As indicated above, the home care client is often at least partially dependent on other individuals. In a study involving 80 care givers of homebound elderly clients, the researcher (Martin,1988) identified a perceived burden on the care givers with the perceived level of burden increasing when the caregiver was not a spouse of the client.

Changes in the health care delivery system in recent years have resulted in an increased need for home health services. Trying to look at the experience of home health care from the perspective of the client, Magilvy and coworkers (1988) interviewed nine elderly individuals who had recently been discharged from home health services. Three of the subjects were male and six were female. All of the clients had been active with home care services for at least six weeks and were interviewed within four weeks of their discharge from home care services. Many of the clients were unsure of how home health care was initiated. The clients spoke largely around three major themes - nursing care, their own health problems, and their independence. They frequently emphasized the reassurance and support received from the nurses. The clients did not identify teaching as one of the roles of the home care nurse. All of the clients thought home health services were originally helpful. However, as clients began to feel better and became more able to undertake self care, they felt a tendency to relax and become easily dependent on services instead of regaining their independence. Generally, the home

health services population is elderly and debilitated. They are also likely to be dependent on the government for reimbursement of received medical services. This includes payment for any nutrition services.

Payment and Nutrition Services

At the present time nutrition services are not reimbursable through Medicare or through most other third party payers. Therefore, any nutrition services that are provided by the home health agency must be charged to the individual receiving services or to the overhead of the home care provider. Thus many agencies try to provide nutrition services through utilization of reimbursable services such as nursing. The clinicians providing nutrition services while capable of giving general nutrition information are not trained to individualize diet instruction or to counsel patients requiring diet therapy.

As stated earlier, reimbursement for home health services is provided mainly by Medicare. Most important for payment to the agency, the home care clinician (nurse, physical therapist, occupational therapist, speech and language pathologist, medical social worker) must document why the client's condition is being evaluated and what problems may develop with the client. The clinician should demonstrate a need for continuing assessment by documenting the client's prior instability observed in the initial assessment completed in the home. Also reported would be the plan of care developed for the client outlining the actions taken by the client and the clinician based on the clinician's

professional knowledge. The clinician should also document all contacts with and directions of the physician.

Although the majority of reimbursement for services in home health care is through Medicare, private insurance companies can also provide payment for home health services. Addressing payment of home health services from a private insurer's point of view, a survey in 1984 of third party payers implied that any service or procedure that is well established as necessary and cost effective will receive a greater acceptance than a more peripheral or less well defined service (Parver,1984). Reimbursement is available for programs furnished by providers of services to the extent that they are an "appropriate, integral part ... of covered services which are reasonable and necessary for the treatment of the individual's illness or injury". Examples of programs considered necessary are: instruction for self injection, diet instruction for prescribed diets, home instruction of colostomy care, and physical and occupational therapy. Example of programs not considered necessary components of treatment are: programs in preventative health care, general nutrition programs, exercise regimens, and programs in personal hygiene. Reimbursement for a new service requires extensive education of the third party payers regarding the scope and potential for cost effective care. Unfortunately, nutrition care services remain generally undefined with respect to medical necessity. In addition, there are no standard guidelines for reimbursement of nutrition services, although they are generally accepted as being legitimate services for reimbursement when provided by an established clinician such as the registered nurse.

Working toward establishing standard guidelines, the American Dietetic Association defines nutrition care services by component parts. These parts include nutrition screening, nutrition assessment, nutrition care planning, nutrition care evaluation, and nutrition education. To the extent that these nutrition care services are medically necessary in the course of providing explicitly covered home health services under Part A of Medicare regulations, the cost will be incorporated into overhead costs and not billed separately. Nutrition care services can be billed separately, however, if they are offered as "incident to a physician" and there is an employer-employee relationship between the physician and the nutrition professional. In addition the physician must be present at the time services are provided.

Presently, there is no organized and vocal group advocating the reimbursement of nutrition services by third party payers. Thus, no third party payer, either the Medicare system or private insurance companies, have been compelled to develop a definition of nutrition services. No payer has developed specific coverage provisions for nutrition care services. Only a physician can certify that nutrition services are necessary. In today's health conscious society, reluctance to provide coverage does not come from a bias against nutrition services, but from a lack of familiarity and experience related to nutrition assessment and care planning and the cost benefits thereof (Parver, 1989).

Looking toward the future when a definition of nutrition services has been established and accepted, possible funding resources include third party payers, individual consumer fees, and government revenues. A survey of 25 insurance companies

examined provision of nutrition services (Gould, Ernst, and Fairchild, 1989). Fifty-five percent of the companies did not include nutrition services in their policies. Twenty-nine percent said payment of nutrition services depended on medical necessity. The definition of what was medically necessary was rather vague. Most health maintenance organizations (HMO's) tended to reimburse nutrition services. Most respondents equated nutrition services with education in food preparation and did not perceive this education as influencing the health care and treatment of the patient. The majority of respondents did not see a trend toward providing reimbursement of nutrition services. Those who responded in favor of reimbursement thought the cost/benefit effectiveness of nutrition services needed to be better documented. They suggested that chances of payment would increase if nutrition services were directly recommended by and associated with a physician.

In summary, there are several current issues in home care that affect nutrition services. First, most of the clients who utilize home health services are elderly individuals who have chronic health problems. Many of these chronic conditions such as hypertension, heart disease, or diabetes mellitus are treated at least in part with modification in dietary intake. Secondly, although the home health client is grateful to, and at least somewhat dependent on, the clinician who comes into the home, the client does not perceive the clinician in an instructor role. However, if dietary modification is to take place the home health client must perceive that a change in dietary intake needs to take place and that this change is a learned behavior. Finally, if the responsibility for

diet instruction is to be assigned to a nutrition professional, then the role of nutrition services within the care plan developed for the home health client must be explicitly defined. Additionally, the cost effectiveness of using a nutrition professional will have to be documented and third party payers will have to be educated and convinced of the effectiveness of nutrition services as a specific treatment entity.

Nutrition Services in Home Care

Need For the Nutrition Professional in Home Health Services

Within the context of home health care as a component of long term care, nutrition professionals can make a contribution by providing a variety of services. In 1987 the American Dietetic Association published a position paper defining the need for nutrition services for the aging population within the continuum of health care. In 1982 the state of California defined continuum of care as a coordinated continuum of diagnostic, therapeutic, rehabilitative, supportive, and maintenance services that addresses the health, social, and personal needs of (older) persons (Anonymous, 1987). This range of services is intended to help the aging individual maintain an independent life style for as long as possible. Nutritional well being is an integral component of the health, independence, and quality of life of the elderly. The continuum of health services for the aging includes the integration of professional nutrition services, education and counseling, and research.

Approximately 85% of older persons have one or more chronic, potentially

debilitating diseases and could benefit from nutrition services (Anonymous,1987). Up to one half of older individuals have clinically identifiable nutrition problems requiring professional intervention. A continuum of care is intended to provide appropriate medical and support services to the aging population on the basis of their levels of dependency and particular health needs. Most health care programs, however, do not recognize or specify nutrition services as an integral component of long term care.

Some unique characteristics of the older population that must be considered when nutritional status is assessed and intervention strategies are planned include: increased susceptibility to chronic diseases; poor dentition; age-related decreased organ function that can adversely affect the absorption, transportation, metabolism, and/or excretion of essential nutrients; and increased use of prescription and over the counter drugs. Additionally, alterations in psychological and social well being, and financial status can affect nutritional status in the elderly. There is currently a need to define the most efficient and effective strategies for delivering a wide range of nutrition services particularly to older persons in alternative health care settings such as day care for the elderly or to those being cared for in their homes. Findings from nutrition intervention programs described below could be used as a basis for defining new strategies.

Kohrs et al (1980) evaluated the impact of nutrition services on elderly participants in a Title VII (now Title III-C) nutrition program where hot meals were provided in a congregate setting. Using anthropometric, biochemical, and dietary measurements, the nutritional status of 547 participants was assessed. The frequency of

participation in the Title VII program significantly influenced the dietary intakes of vitamin A, vitamin C, riboflavin, and thiamin; and did not significantly influence iron, energy, saturated fat, or cholesterol intakes. The researchers concluded that the Title VII program positively influences the nutritional status of its participants.

Another study by Compher, Colaizzo, and Reike (1989) evaluated the changes in nutrition support services provided to hospital inpatients and home care patients between 1984 and 1986. Questionnaires were mailed to 1000 American Hospital Association members and 236 responses were received. Analysis of the responses found there was an increase in the use of enteral, parenteral, and tube feedings in both inpatients and home care patients. There has been an increase in clinical nutrition support staff, outpatient dietitians, and diet technicians in tertiary and primary care hospitals. Yet, there has been little or no parallel increase of nutrition staff in the home health setting.

There is, however, support from additional studies for the use of nutrition services in home health care. In 1980 the Edmonton, Canada Board of Health carried out a needs assessment which resulted in the hiring of a nutrition consultant (Burns and Bhatti, 1987). The Edmonton Board of Health oversees three offices with 40 case managers and a case load of 3000 clients per year. The needs assessment of clients determined that 94% had problems requiring nutrition intervention including serious overweight, therapeutic diets, and food and drug interactions. A nutrition knowledge questionnaire was administered to agency personnel to evaluate the need for inservice training on nutrition issues. Analysis of the results indicated that the personnel's nutrition knowledge was fair. Staff

identified a need for a nutrition consultant and for information on general nutrition, nutrition of the elderly, and therapeutic diets.

Based on these findings a nutritionist was hired to provide support services in nutrition to the home health program with a goal to promote food and lifestyle options that support nutritional health. The program was organized so that the nutritionist planned the care and the home health team then worked together to implement the program with the primary nurse relaying the appropriate nutrition information to the client as an integral component of his/her care.

The nutritionist's responsibilities at the Edmonton Board of Health were diverse. She/he as a program consultant, developed nutrition indicators and process guides to screen clients potentially at risk. As an educator she/he conducted workshops and inservice programs, prepared a nutrition newsletter, and developed self instructional packages. The nutritionist discussed clients with the case manager and followed through with appropriate advice for both the case manager and the client. Finally, as counselor, the nutritionist provided direct nutrition care to clients.

The responsibilities of the nutritionist in the Hamilton-Wentworth Home Care Program, Ontario, Canada were also diverse. There, the nutritionist provided direct services to the patient, consulted with the primary clinician, and attended team conferences (Smit,1983). The patient counseling component of the nutritionist's time included reinforcement of previous teaching and instruction in new dietary modifications, as well as monitoring the nutrition education of members of the home care team. In

addition, she/he represented the nutrition department in making agency policies and planning the budget. Seminars were presented four times a year for home health staff and there was ongoing instruction of homemaker aides in nutrition and diet therapy. The nutritionist was responsible for the development or collection of teaching aids. Finally, the nutritionist acted as a liaison between the agency, the hospital dietitian, and community service groups and resources. In the Hamilton-Wentworth program 70% of the nutritionist's time was spent in direct contact with patients and in related team communication, documentation, and travel. The remaining 30% of her/his time was spent in nutrition education, consultation, and administration. The nutritionist at the Hamilton-Wentworth Agency admitted and discharged approximately 30 patients per month. This means she/he was directly involved with 2% of the agency's clientele.

In addition to the documentation of effective home health programs in Canada that emphasize nutrition services, there are other issues in the United States that support the need for development of nutrition services in home health care. A change in Medicare regulations in 1987 affected how hospitals are reimbursed for patient services, and decreased the amount of money returned to hospitals resulting in reimbursement for fewer dietary consults and earlier discharge of patients from the hospital (Blackburn and Himburg, 1987). In response, a study was developed to evaluate time a dietitian spends with a patient as related to the patient's medical diagnosis. During a three week period seven hospitals in southern Florida had 31 dietitians see 3827 patients. The time spent with each patient ranged from 13 to 33 minutes. The most frequently occurring medical

diagnoses based on the Diagnosis Related Groups (DRG's) among these patients were diabetes mellitus, heart failure, circulatory disorders, cerebral vascular accidents, and transient ischemic attacks. These are also the most frequent diagnoses for home health patients (Anonymous,1982; Pasquale,1988). Many of these diagnoses require specific nutrition care services. However, only three DRG's categorized under nutrition and miscellaneous metabolic disorders are considered to be directly related to nutrition and, therefore, allow direct reimbursement to dietitians for their services. Yet, the health care system operates under the premise that a well nourished patient responds better to treatment. Blackburn and Himburg conclude there should be a resources for providing optimum nutrition to the patient which could result in a shorter hospital stay and reduce costs.

Keeping in mind that hospital stays are becoming shorter, dietitians recognize that the home is also an appropriate place to assist patients in meeting their nutrition needs. Lack of comprehensive nutrition programs in home health care because of no payment source have forced physicians to use hospital or nursing home beds to facilitate comprehensive nutrition teaching such as instructing patients on using the exchange list for diet planning (Birge and Maxwell, 1979). To document the cost-benefit of nutrition care in the home, 87 Veterans Administration patients were provided with home care which included nutrition services. Eighty-five percent of these patients were > 50 years of age. The patients were evaluated for nutrition needs while still inpatients. Fifty-three percent of the patients accepted for home care were on modified diets. Nutrition

counseling was provided before the patient was discharged from the inpatient facility. All of the patients were also seen at home, shortly after discharge from the inpatient facility, by a dietitian for approximately one hour. During this time a nutrition assessment took place and the necessity for further visits was determined depending on the complexity of the diet and the ability of the patient and caregiver to implement the diet. In 1979 the daily cost of providing home care, including nutrition services, was \$8.54; the inpatient cost was \$128.62.

As documented above the nutrition professional does have a role in the home health setting. The nutrition professional is able to address specific needs regarding the modified diets of clients, the changes in psychological or socioeconomic status of clients, the implementation of parenteral and enteral feedings if needed, and the nutrition education needs of both clients and agency staff. And with an effectively managed home health nutrition program available, hospitals and other nursing facilities may be able to reduce costs by sending individuals home confident that adequate dietary services will be provided.

Role of the Nutrition Professional in Home Health Services

In 1982, 1.7 to 2.7 million individuals were in need of home care services. Only 300,000 to 500,000 actually received home care services (Anonymous, 1982). Sixty-two percent of those clients who did receive home health services required a therapeutic or modified diet. The most common conditions of the home health clients included cardiovascular disease, diabetes mellitus, renal failure, hypertension, decubiti, or various

forms of malnutrition.

The American Dietetic Association proposes that HCFA set reimbursement for a registered dietitian at \$55 per home visit to provide nutrition services (Anonymous, 1982). Reimbursement criteria would include a physician's order and the delivery of nutrition services by a registered dietitian (R.D.) or by someone supervised by an R.D. The nutrition services to be provided would include nutrition assessment, development of a nutrition care plan, implementation of the care plan, inservice education for nursing staff and home health aides, consultation with interdisciplinary team members, and diet counseling. It was anticipated that specific benefits of reimbursed nutrition services would be a decreased need for rehospitalization due to malnutrition or uncontrolled diabetes mellitus, a delaying of the need for kidney dialysis, and an earlier hospital discharge of patients with parenteral or enteral feedings.

To demonstrate the necessity for a nutrition professional in home health care Gaffney and Singer (1985) reviewed the medical records of 812 patients of the Visiting Nurses Association in Chicago. The records were reviewed for physician's diet order, number on diet restrictions, medical diagnoses, age, height, weight, and pay source. Greater than 50% of the patients had therapeutic diets ordered by their physician. There were two or more diet modifications in 25% of the records reviewed. When the charts were reviewed by a registered dietitian, three fourths of the patients were determined to need a therapeutic diet; 47% were identified as likely to benefit from a modified diet other than the diet currently prescribed. The dietitian recommended two or more diet

modifications for >50% of the clients who were considered to need diet modification. The results of this research emphasize the need for a nutrition professional to develop a system for monitoring the dietary requirements of all patients receiving home health care.

Possible client needs to be evaluated when setting up a home health nutrition program include instruction in basic diet principles, assistance with dietary adaptations as related to the client's lifestyle, and nutrition information and education pertaining to a therapeutic diet, disease condition, or physical impairment (Burns and Bhatti, 1987). The client may also need tips on how to increase the nutritional value of meals, advice relating to potential food and drug interactions, assistance with the food budget, and possibly referral to other health professionals.

In addition to direct patient care and education of staff a nutrition professional can be utilized by the home health agency in a variety of ways. Under Medicare regulations a certified home health agency is required to have an advisory group as part of the overall operation. A nutrition professional should be an active part of this group. The purpose(s) of the nutrition professional would be to inform the advisory group about the nutrition services available in the community, to identify the nutrition component of home health aide services, and to take responsibility for defining the qualifications for and assisting in recruiting a qualified nutrition professional for any given program.

Adding a nutrition professional as a new member of a multidisciplinary home health team takes considerable thought and preparation. First, the role of the nutrition professional needs to be made clear within the scope of the team (Burns and

Bhatti,1987). A systematic approach to developing the nutrition care program is important. Nutrition screening indicators need to be identified and incorporated into the nursing assessment. Records of all nutrition related activities including program development, group education, referral sources, disease conditions of clients referred, and intervention strategies must be maintained. The nutrition professional must be responsible for developing, planning, and implementing the agency's nutrition program. Included in the nutrition professional's functions are staff development and education, and coordination of direct patient care.

In summary, the nutrition professional has many opportunities for effectiveness within the home health setting. Most importantly, the nutrition professional can directly assist patients in understanding and following modified diets and be available to the patient to answer nutrition related questions. In addition, the nutrition professional can be invaluable to home health staff for providing general nutrition information, developing appropriate modified diets based on physician's orders, and providing nutrition counseling for the patient either directly or via another home health clinician.

Diabetes Mellitus in Older Individuals

Basis of the Disease

Approximately 6.4% of adults age 65-75 are diagnosed with diabetes mellitus (Zeman,1991). In the acute care hospital setting the highest number of patients requiring a modified diet are diabetic. These patients frequently are discharged from the hospital

into the care of a home health agency. Diabetes mellitus can noticeably affect the quality of life of an individual and often is accompanied by a variety of related conditions. Diet modification is one of the major approaches for management of diabetes mellitus.

Diabetes mellitus is a heterogenous group of diseases of the endocrine system characterized by a failure to control energy production. This is manifested by ineffective metabolism of glucose at the cellular level with secondary effects on metabolism of lipids and proteins. The disease is accompanied by hyperglycemia (an elevated blood glucose concentration) that is the result of an absolute or relative deficiency of insulin. Diabetic individuals frequently develop renal failure and/or generalized vascular disease which may lead to poor skin integrity in the lower extremities and open and poorly healing wounds, gangrene, and possibly amputation.

Diabetes mellitus is a disease that becomes evident at varying intervals during the life cycle. It has been divided into two main categories, insulin dependent (IDDM) and noninsulin dependent (NIDDM) diabetes mellitus. Those with insulin dependent diabetes mellitus are dependent on insulin to prevent ketoacidosis (abnormally elevated ketone and hydrogen levels in the blood). These individuals usually had an onset of the disease in childhood or have been diabetic for a prolonged period of time until the pancreas can no longer produce any insulin. Noninsulin dependent diabetes mellitus is generally associated with middle or older age and in many cases the pancreas is still able to produce an adequate level of insulin to maintain carbohydrate metabolism in the presence of diet modification and oral medication.

The genetics of diabetes mellitus appear to transmit predisposition to the disease rather than the disease itself. The occurrence of diabetes mellitus is strongly influenced by environmental as well as genetic factors. Environmental factors that increase risk of this disease are those elements that increase the demand for insulin, antagonize the action of insulin, or suppress insulin production. These factors include obesity, lack of exercise, hyperlipidemia, and use of steroid therapy.

Treatment of Noninsulin Dependent Diabetes Mellitus

The most typical individual with diabetes mellitus is over fifty years of age and is noninsulin dependent. Many people with diabetes mellitus are undiagnosed until some trauma or development of an unrelated disease occurs. Examples of common precipitating factors are pancreatitis, myocardial infarction, infection, cerebral vascular accident, renal failure, or gastroenteritis. The stress associated with these conditions causes the hyperglycemia to become more severe and symptoms to appear. The overall objectives in the treatment of diabetes mellitus is to prolong life and to improve the quality of life as much as possible. This is accomplished by improving the body's ability to metabolize glucose so that glucose tolerance is improved and insulin resistance is decreased, preventing or correcting complications, and assuring adequate nutrition. There are four facets of diabetic care. The first is control of dietary intake to decrease clinical symptoms while providing for nutritional needs. The other facets include hypoglycemic drugs, exercise, and patient education. In addition, the general hygiene and emotional well being of the individual must receive attention.

The American Diabetes Association advocates the following diet composition for management of diabetes mellitus:

- 50-55% of total energy from carbohydrates
- $\leq 30\%$ of total energy from fat with $\leq 10\%$ from saturated fat, $\leq 10\%$ from polyunsaturated fat and the remaining 10% or more from monounsaturated fat
- 15-20% of total energy from protein
- ≤ 300 mg of cholesterol daily
- no more than 1000 mg sodium/1000 kcal

Carbohydrates may include "modest" amounts of sucrose only if it can be shown not to adversely affect glycemic control or body weight. Use of noncaloric sweeteners is acceptable only if it does not adversely affect glycemic control or body weight. The diabetic individual should achieve and maintain ideal body weight if possible.

The objectives in diet planning differ for IDDM and NIDDM. In IDDM the objective is consistency of dietary intake from day to day coordinating intake with the amount and type of insulin prescribed. Weight reduction and maintenance are the objectives of diet planning in NIDDM with assistance in control of blood glucose levels by oral hypoglycemic agents if necessary. The most commonly used method of diet planning is the "Exchange List for Meal Planning" authored by the American Diabetic Association and the American Dietetic Association.

The exchange system is designed to estimate the total energy need of the individual, partition the kilocalories among the various nutrients, and distribute the

kilocalories among the daily meals. The meal plan is calculated first to initiate treatment and is revised periodically to make adjustments to adapt the diet to the individual's lifestyle, thus promoting compliance. Patient education is vitally important and is often neglected or incomplete. This education should begin as soon as diabetes mellitus is diagnosed and continue throughout the life of the individual. Diabetes mellitus represents a common condition seen in home health care for which a nutrition professional is an asset to the individual's plan of care.

Methodology for Assessing Food Intake

Types of Research Tools in Assessing Food Intake

Medical researchers are increasingly interested in the effects diet has on health and disease. The outcome of such research is influenced by the reliability and validity of the assessment tool used to measure dietary efficiency and stability. In older individuals the evaluation of dietary intake is further complicated by the cognitive and functional impairment sometimes found in this age group. Following is a review of various dietary assessment tools, and their strengths, weaknesses, and appropriateness for use with older subjects.

The dietary history was originally developed by Burke and Stuart in the 1940's (Block,1982). The method is based on the principle that what is important to nutrition research is the individual's long term food history or pattern of usual food intake. In a diet history an extensive interview by a trained nutritionist is designed to elicit the usual

and customary diet of an individual. The method involves establishing meal patterns for the individual, obtaining a 24-hour recall record, and cross checking the information obtained by reviewing how frequently particular foods are consumed. Although very thorough, the dietary history is time consuming to administer, difficult and expensive to code for statistical analysis, and tends to produce an overestimate of nutrient intake. For a frail elderly individual such procedures could produce extreme fatigue unless divided among several visits.

A 24-hour recall record, in contrast to the dietary history, can be administered by interviewers with limited training in a relatively short period of time (approximately 20 minutes); however, it is best administered by a nutrition professional who may probe for related information. The use of food models will enhance the accuracy of portion size estimation. With this method the subject reports in detail all food and liquids consumed during the previous 24 hours. An advantage of the 24-hour recall record is that memory of recent events may be more precise and quantities may be estimated with better accuracy. This is not necessarily true in the elderly and the possibility of poor short term memory must be considered when selecting a method for dietary assessment. Another major draw back is that an individual's diet may vary greatly from day to day so that one 24 hour period may not be representative of overall intake.

The seven day food record offers a compromise between the diet history and the 24-hour recall record. A record of seven days of food intake is completed using weights, household measures, or other estimation of portion sizes. The intent is that an average

of seven days intake is more representative of overall intake than a one day intake. However, a seven day food record is impractical for clinical or epidemiologic studies since it requires a high level of cooperation on the part of the subjects. A seven day written record may be especially difficult for the functionally impaired older adult for whom food related activities are already difficult and writing is a problem. Use of a written food record regardless of the number of days will eliminate older individuals with low literacy skills.

An elaboration of the seven day food record is the diet diary. In a diet diary the individual keeps a record of all the foods and liquid consumed using weights and measures for a period of several days (three days is typical). This method does not rely on the subjects' memory and can provide detailed food pattern information. However, the accuracy of the record keeping tends to fall off after a few consecutive days. In addition, the act of record keeping itself may alter the individual's dietary intake.

A food frequency questionnaire asks the frequency with which the subject eats specific food items. This type of questionnaire can be administered quickly in person or mailed to a large number of subjects. This method is helpful in identifying individuals at the extremes of nutrient intake distribution and is relatively inexpensive to code. However, the individual portion size is not obtained. The validity of the data is highly dependent on the correct selection of foods on the list. Food frequency is limited in its ability to assess accurately the nutrient intake of individuals or groups with dietary patterns markedly different from the food list.

Another tool used for dietary assessment is a list-based diet history in which the subject is presented with a list of foods and asked how often he/she eats them (Block 1982, 1989). The difference between the list-based diet history and a food frequency is the inclusion of portion size for each food, and the list is designed to assess the complete diet rather than the intake of just a few nutrients. An advantage of the list-based diet history is that it can be designed to be self-administered and can be made to be scored by computer. However, the validity of the method depends on the particular food list and its quantitation. Also, the method relies on the ability of the subjects to describe their dietary habits.

It is important in nutrition research to assess and report on the entire diet of the individual. Misclassification of the subject into one category when the true long term intake would be in a different category affects the outcome and in the case of a nutrition intervention program would lead to inappropriate recommendations. Misclassification can be affected by inadequacies in the nutrient data base, poor quality control in coding and/or data entry, questionnaires that do not accurately represent actual dietary intakes, and an inadequate number of days of diet records (Block, 1989).

Each method for assessing food intake must be able to meet certain characteristics expected of all research tools. These characteristics are reproducibility and validity. Reproducibility (reliability) is the ability of an instrument to produce the same estimate on two different occasions (Block and Hartman, 1989). Reliability should be relatively easy to accomplish. If reliability of the instrument can be determined, assessing the

validity of the instrument is simpler. Testing reliability of the instrument can uncover problems in instrument design, respondent instructions, and quality control. Once the reliability of an instrument is known it can be administered twice to the same population to measure the change in the respondents' diets. The following factors may affect reliability: respondents may not be able to estimate their diets accurately or real dietary change by the respondent may have taken place so responses are not the same. Also, the amount of variability allowed affects reliability. For example, if portion sizes are not used it is easier to duplicate results. If there are too few, or too many, category responses reliability is affected. Finally, inadequate instructions to the interviewer or respondent can also influence reliability as can poor quality control of the instruments or methods used.

Validity is the ability of an instrument to measure what it is intended to measure. Because of the nature of assessing dietary intake the researcher must rely on relative or criterion validity rather than true validity. Relative validity is the comparison of a new instrument with another which has a greater degree of demonstrated or face validity. Factors which affect validity include: respondent characteristics such as age or education level; questionnaire design such that all interviewers ask the same question in the same way and all responses are coded accurately and identically; adequacy of the reference data such as the accuracy of the nutrient data base; and quality control of data management throughout the statistical analysis and interpretation.

Current Research Involving Assessment of Dietary Intake

Several studies have compared various methods of assessing food intake in adult populations including the elderly population. Such evaluations have provided the opportunity to examine the relative reliability and validity of different food intake instruments, particularly food frequency questionnaires.

Byers and coworkers (1985) performed 1682 controlled interviews of adults between 1977 and 1983 in upstate New York using a food frequency questionnaire to determine how many foods might be minimally required to estimate specific nutrient intakes. Data collected included a detailed diet history consisting of a food frequency of 128 foods with usual serving size relative to a standard picture, usual means of preparation, and season of the year when consumed. Analysis of these data for six food components (vitamin A, vitamin C, fat, fiber, protein, and kilocalories) focused on how much of the total intake of these components was contributed by each of the 128 foods. Then each food item was assessed for the difference it would make to overall diet quality if it were placed in the wrong category of frequency. Results indicated that a large variance in nutrient intake was explained by relatively few foods. Ninety percent of the variance was accounted for by only 5 food items for vitamin A, 8 for vitamin C, 17 for fat, 18 for fiber, and 21 for total kilocalories. This finding did not vary with age or sex. Food items were not placed in the wrong category by more than one classification. Therefore, it can be assumed that if an individual eats a green or yellow vegetable of one type regularly, he/she is also likely to eat a green or yellow vegetable of another type.

Knowing how frequently an individual consumes particular foods is more useful than it seems. Even though the actual fraction of total mean nutrient intake that is contained within a short list of foods is less than 100%, the ability of that list to properly characterize a specific aspect of study such as fat content for a subject's diet may be considerable.

Willet et al (1985) evaluated the reliability and validity of a 61 item semiquantitative food frequency questionnaire. The form was administered twice to 173 subjects at an interval of approximately one year. In addition, four, one week records were collected during that period for each subject. Nutrient intake values from the one week records and from the food frequency questionnaires were compared. The questionnaire completed at the end of the year had a higher correlation with the four, one week records than the questionnaire administered at the beginning of the year. This higher correlation with the one week records may indicate a greater awareness of the subjects to their food intake. Willet et al concluded that a simple, inexpensive self-administered dietary questionnaire can usefully measure individual intakes for a variety of nutrients.

Looking at how time affects recall of dietary intake, Sobel et al (1989) evaluated two methods of assessing food intake using 216 male participants in the Baltimore Longitudinal Study of Aging. Reference data for past diet consisted of multiple 7-day records collected between 1971 and 1975. The group was randomly assigned to complete a diet history by personal interview or by a mailed self-administered questionnaire. For

both groups the current mean estimated intake was $\pm 10\%$ of the diet record values reported between 1971 and 1975 for most nutrients. When correlating the interview response with the diet records obtained previously, values were approximately as good as correlations obtained in other studies when comparing present diet by two methods. Correlations between past and present diet were considerably lower for those sent the mail questionnaire suggesting that assessment of past diet using this questionnaire without personal instruction and follow-up would yield poor results.

Food frequency methods have also been evaluated in the elderly population. In an assessment of the ability of food frequency methods to measure current dietary calcium in elderly females two types of instruments were administered to 37 females who attended a senior citizen center in San Francisco. The results were compared to a seven day food record obtained from these subjects (Cummings, 1987). A 34-item food frequency instrument with portion sizes of small, medium, and large had a correlation factor of 0.76 with the seven day food records. Limiting the food frequency list to the top 15, 10, or 5 foods produced correlation factors of 0.76, 0.75, and 0.67, respectively. For an 18-item instrument, which asked for a rating of portion size in ounces or cups, there was a 0.49 correlation with the seven day food record. The researchers concluded that a brief food frequency questionnaire that rated portion sizes on a simple qualitative scale may be suitable for many clinical uses.

Caliendo (1980) surveyed participants in an on-site meal service nutrition program to determine diet quality, frequency of participation in the meal program, and the

contribution the program made to their diets. The 73 elderly respondents completed a self administered questionnaire based on a three day diet record. The data collected represented a good review of the dietary habits and nutrition knowledge of this population.

Addressing the homebound elderly, the food and nutrient intakes of 53 subjects who received home medical care in metropolitan Boston were examined using 24-hour recall and food frequency methods (Posner,1987). The mean energy, folic acid, and calcium intakes were below the Recommended Daily Allowances (RDA's) for both males and females. Thiamin intake was below the RDA for males. Less than 20% of the group could name the Basic Four Food Groups or any of their food components. The researchers concluded there was poor dietary intake among the older homebound population coupled with diverse medical problems that placed them at exceptional risk for nutritional problems.

Special needs of the elderly must be considered when evaluating research methods. These considerations include short term memory loss, limited endurance, loss of independence, and functional limitations. Therefore, methods that are brief and uncomplicated and provide assistance from an interviewer would probably be best with the elderly.

METHODS

Subject Selection

The subjects in this research were patients diagnosed with diabetes mellitus who were active clients with the Springfield Branch of Inova Home Care in suburban, northern Virginia during September 1991. To be accepted for services at Inova Home Care a patient 1) must be homebound, 2) must have orders from a physician for services, and 3) must have a need for skilled clinical services as defined by Medicare regulations. The Springfield branch of Inova Home Care services Loudon, Prince William, Stafford, Arlington, and Fairfax counties and the cities of Alexandria, Falls Church, Fairfax, and Vienna. During the first week of September 1991 there were 86 patients with an active status at Inova Home Care who had a diagnosis of diabetes mellitus identified on the Plan of Care by the three digit ICD.9 code 250.

These 86 patients were sent a letter of introduction (Appendix A) signed by the agency administrator stating the purpose of the research and the cooperation required to participate. The letter also explained the author would contact them by telephone to set up an interview. After potential participants had received the introductory letter the author called each patient to confirm his/her willingness to participate and to set up a date and time for the interview. When telephoned, fifty of the possible respondents agreed to participate in the research. Two of these were subsequently eliminated because they were considerably younger (34 and 37 years of age, respectively) than the average home care client. All subjects gave informed consent according to the guidelines of the

Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061 (Appendix B).

Subject Interviews

A standardized 96-item food frequency questionnaire (Appendix C) designed by Dr. Gladys Block of the National Cancer Institute (Block, 1986) was pretested using 15 Inova Home Care clients who did not have a diagnosis of diabetes mellitus, but who otherwise met the criteria for the subject group. Pretesting was done to assess the ability of the population to understand and complete the interviewer assisted questionnaire. The package provided by Dr. Block included her questionnaire, computer software for nutrient calculation, and procedure manual for the computer program. An additional set of questions was designed by the author (Appendix D) to solicit socioeconomic, health, food availability, and food preparation information and was pretested with the same 15 individuals. Pretesting was conducted several months prior to the actual research to examine the length of the questionnaire, the time it took for completion, and the ability of the participants to understand and respond to the questions asked. Minor changes in wording to clarify intent were made to some of the questions written by the author to improve the validity of the instrument before being used in the research project. The author interviewed each subject in his or her home for approximately one hour. The list of food items and the questions were read aloud and subject responses were recorded by the author.

Data Evaluation

After completion of the interview each food frequency questionnaire was coded for computer-assisted nutrient analysis. The coding was completed following the guidelines (see Appendix C) that accompanied the computer program made available by Dr. Block. The nutrient analysis values used in Dr. Block's software package were based on NHANES II nutrient content data base. The NHANES II nutrient content data base is defined from the USDA food consumption data tapes as well as industry and other sources. Because of the wide variety of descriptions used by physicians and respondents for diet orders, a system was developed in which each diet was given a three digit code to standardize the energy and nutrient content (see Appendix E, Appendix F, and Appendix G). The first digit in the code represents the energy content of the diet. The second digit represents the sodium content of the diet. The third digit in the code indicates the fat content of the diet. This three digit diet description was used to compare 1) the physician's diet order with the respondent's verbalization of his or her diet order, 2) the physician's diet order with the respondent's reported intake, and 3) the respondent's verbalization of his or her diet order with reported intake. Analysis was based on the entire diet order (e.g., 1800 kcal, 4 gm Na, no fat or cholesterol restriction), and on the individual categories of energy, sodium, and cholesterol or fat. Each of the above diet components was evaluated in terms of sex, age, length of time the client was diabetic, and a vulnerability index (see Appendix H and Appendix I).

The vulnerability index was developed because there are so many factors that

affect dietary intake. Factors which comprise the vulnerability index are race, education level, whom the subject was living with if anyone, marital status, number of medications the subject was taking, the payment source for home care, who did the grocery shopping and food preparation, did the subject receive Meals on Wheels, did the subject feel there was enough money to purchase adequate food, and did the subject have medical diagnoses other than diabetes mellitus. These factors all have the potential to positively or negatively affect nutritional intake. Instead of looking at each factor separately, a coding system was developed to designate possible options within a particular variable with the lowest code value representing the best scenario and the highest code value representing the worst scenario relative to available resources or potential for well being. For example, pay source had three categories: other, Medicare, and Medicaid, with other indicating reimbursement from a private pay source, Medicare indicating reimbursement from the federal government insurance program, and Medicaid indicating reimbursement from federal and state funds because the individual receiving services does not have an income adequate to provide reimbursement from other sources. The individual factor scores were totaled to obtain the index score. This index score was intended to represent an overall picture of the respondent's living situation. The index was developed by the author based on studies in the literature which have examined factors related to the dietary status in older individuals (Caliendo 1980, Posner, Smigelski, and Krachenfels 1987, White et al 1991). Although this vulnerability index was not evaluated for reliable correlation between index score and dietary pattern it may

suggest vulnerability to nutrition problems. Some of the factors in this vulnerability index such as economic status, number of medications taken daily, ability to shop for and prepare meals, and the presence of chronic disease are also indicators in the Determine Your Health Checklist developed for the Nutrition Screening Initiative (White et al,1991). The factors included in the Determine Your Health Checklist were validated through extensive evaluation of large groups of older individuals in a variety of settings and found to be significantly related to nutritional status.

The Statistical Analysis System (SAS Institute, Inc. Cary, NC) was used to perform chi square tests on these data. Chi square tests were performed on the recommendation of the statistical consultant at the Northern Virginia Graduate Center at Falls Church, Va. Mean and standard deviation values for age, length of time diagnosed diabetic, and nutrient components were computed.

RESULTS AND DISCUSSION

Fifty clients active with Inova Home Care during September 1991 volunteered to participate in the study and were interviewed by the author during September and the first week of October. Two of these subjects were eliminated from the statistical analysis because they were atypical of the home care client. Both of these subjects were in their mid-thirties and their homebound status was extremely temporary. A total of 35 patients invited to participate in the study were not interviewed. This group included 19 males and 16 females. Males were somewhat more likely to refuse to be interviewed than females. Of those who did not participate 11.4% were <50 years of age, 20.0% were ages 51-65, 48.6% were ages 66-80, and 20% were >80 years of age. Reasons individuals did not participate included death, rehospitalization, author unable to reach client by telephone, client no longer home bound, client too ill to participate, and client did not speak English (see Appendix J and Appendix K).

The subjects participating in this study were characteristic of the population of clients at Inova Home Care and the elderly population in general. Of the 48 respondents who participated in the study, twenty (41.7%) were male and twenty-eight (58.3%) were female (Table 1). The proportion of males and females in the research group was basically equivalent to the home care population. The total census at Inova Home Care during the period the subjects were interviewed was 40.9% male and 59.1% female. The average age of the respondents was 71.8 ± 10.2 years with the males being slightly older (73.3 ± 9.5 years) than the female respondents (70.7 ± 10.7 years). Because of the

Table 1
Diabetic Home Care Patients by Sex and Age

	<u>Male</u>		<u>Female</u>		<u>Total</u>	
	Number	Percent	Number	Percent	Number	Percent ^a
<u>Age</u>						
51-65	3	6.3	6	12.5	9	18.8
66-80	13	27.0	17	35.4	30	62.4
> 80	4	8.3	5	10.4	9	18.7
Total	20	41.7	28	58.3	48	99.9

^aTotal percent may not equal 100 due to rounding.

Table 2
Diabetic Home Care Patients by Length of Time Diagnosed^a

<u>Length of Time Diabetic</u>	<u>Number</u>	<u>Percent^b</u>
< 1 Year	18	38.3
1-2 Years	4	8.5
3-5 Years	4	8.5
6-10 Years	5	10.6
> 10 Years	16	34.0

^aUnable to determine length of time diabetic for one respondent.

^bTotal percent may not equal 100 due to rounding.

Table 3
Diabetic Home Care Patients by Demographic Index

<u>Index</u>	<u>Number</u>	<u>Percent^a</u>
15-25	27	56.3
26-30	14	29.2
31-35	7	14.6

^aTotal percent may not equal 100 due to rounding.

earlier mortality of males (U.S. Department of Health and Human Services, 1991) the majority of home care patients are female. Women may be living alone with minimal support systems and needing assistance at an earlier age because of a deceased spouse.

The respondents were categorized into three age groups with 18.8% ages 51-65, 62.4% ages 66-80, and 18.7% greater than 80 years of age (Table 1). Advanced age did not appear to influence participation since 20% of those who did not participate were above age 80 compared to 18.7% of study subjects. At Inova Home Care during September 1991, 12.0% of the population were ≤ 54 years of age, 9.9% were 55-64 years of age, 34.3% were 65-74 years of age, and 36.1% were age 75 or older (Inova Home Care Monthly Census, 1991). Studies of the homebound elderly by Steele and Bryan (1986) and by Stevens, Griveti, and McDonald (1992) had a mean age of 77 years.

Subjects participating in the study had been diagnosed with diabetes mellitus for as little as two weeks and for as long as 43 years. The average length of time the respondents had been diagnosed with diabetes mellitus was 7.8 ± 9.4 years. Male respondents had been diagnosed as diabetic for a longer period of time (9.1 ± 11.6 years) than female respondents (6.9 ± 7.4 years). Categorizing the length of time respondents had been diagnosed as having diabetes mellitus: 38.3% had been diagnosed less than one year, and 34% had been diabetic for over 10 years (Table 2). Fewer numbers of subjects fell between these extremes.

The majority of respondents had been diagnosed with diabetes mellitus for either

less than one year or more than ten years. There are probably a variety of reasons these two groups were larger, but time itself may be one reason. In the group that had been diagnosed with diabetes mellitus immediately prior to admission to home care, this admission may have been directly related to the diagnosis of diabetes mellitus or may have occurred because of another illness or condition which precipitated the diabetes mellitus to the point of development of symptoms. For these clients the disease is unfamiliar and they must absorb a considerable amount of new information related to diet, medications, and general life style changes. This is a learning process and it may take several months or even years for individuals to become familiar with this information.

On the other hand the clients who have been diagnosed longer than ten years may be active with the home care agency due to complications that are becoming evident because of the progression of their diabetes mellitus. These individuals may have always had difficulty with diet compliance and, therefore, may have more difficulty controlling their disease. Additionally, because of the length of time the respondents in this study have been diagnosed with diabetes and because of the increased possibility of complicating factors, they may be more debilitated and less likely to be able to care for themselves, including following a diabetic regime. In a study done by Cerkoney and Hart 80% of the subjects were over age 50 and 28 of 30 subjects had NIDDM; diet compliance was determined to be achieved by 65% of the subjects.

The vulnerability index was designed to be a composite sketch of the living

situation and resources of each subject. Subjects with a higher score for the vulnerability index were considered to have the potential for a compromised nutritional intake. Fifty-six percent of the respondents had a vulnerability index of 15-25, 29.2% had an index of 26-30, and 14.6% had an index of 31-35 (Table 3). The living situation of the majority of subjects (56%) as demonstrated by the vulnerability index appears to be adequate. These individuals have at least a moderate support system from family or friends or are sufficiently independent to be able to provide themselves with meals minimizing concern for adequate nutritional intake. A marginal living situation may exist for 29.2% of the subjects and 14.6% appear to have a composite living situation that may compromise nutritional status. These respondents may have no one available to shop and prepare meals, may not be able to read well enough to understand their condition or may have so many complicating factors in their life they are unable to cope with the ongoing task of a diabetic diet.

Diet Orders vs Individual Compliance

At the time of discharge from the hospital or during a doctor's office visit, each respondent would have had a prescription for a diet order written by the physician. This diet order was ascertained by the admitting home health clinician from a hospital transfer form or by speaking with the physician, and recorded in the home care medical record. Dietary prescriptions elicited from the medical record were assumed to be current, but original date of diet order was not noted. Respondents were not asked detailed questions

about the content of any diet instruction they had received. They were questioned about whether or not any diet instruction was given by the home health nurse. Twenty-nine percent stated they had received some diet instruction from the home health nurse. Of those who responded affirmatively, 14% had their diet reviewed weekly by the home health nurse, 7% three times per week, 64% occasionally, and 14% during each nursing visit whether that be daily, three times per week or some other frequency.

The food intake patterns obtained from the food frequency questionnaires were compared with the physicians' diet orders and self reported diet in three component parts of the diet. First, respondent's understanding of their diet and degree of compliance with regard to energy intake will be reviewed. A similar analysis will be drawn for sodium intake and for fat and cholesterol intake.

Energy Intake - Diet Order and Compliance

To be able to glean any consistency from the diet orders five categories of energy allowance were defined. These five subgroups are as follows:

<u>Diet</u>	<u>Restriction</u>	<u>Range of Intake</u>
Regular	None	Not Specified
No Concentrated Sweets	No items high in simple sugars (e.g. cake, candy, table sugar)	1800 - 2200 kcal
1800 kcal	energy intake \leq 1800 kcal	1651 - 1900 kcal
1500 kcal	energy intake \leq 1500 kcal	1351 - 1650 kcal
1200 kcal	energy intake \leq 1200 kcal	1100 - 1350 kcal

A range of values was utilized for actual intake so that 1) the subgroups were clearly defined and 2) individuals with a diet order for a specific energy intake such as 1600 kcal could be categorized into one of the groups. The range values were derived by finding the midpoint between the standard energy prescriptions developed and taught by the American Diabetes Association and the American Dietetic Association (Zeman, 1991).

The physicians' diet orders taken from the home care medical record indicated 6% of the respondents were to consume Regular diets, 31% No Concentrated Sweets diets, 35% 1800 kcal diets, 25% 1500 kcal diets, and 2% 1200 kcal diets (Table 4). The respondents' perceptions of their diet orders differed markedly from the physicians' assignments. While only 6% of the respondents were prescribed a Regular diet according to the medical record, 35% thought their physician had placed them on a Regular diet. Actual intake as calculated from the food frequency questionnaire showed 27% of the respondents consuming a Regular diet. Looking at the differences between diet orders, stated diet as understood by the respondent, and actual intake calculated from the food frequency questionnaire there is little congruence in all of the energy subgroups. If the respondents were diet compliant, then the diet order, stated diet, and calculated intake would all reflect the same response. The respondents tended to report themselves to be on a less restricted diet than was actually ordered. Interestingly, a larger number of respondents consumed a 1500 kcal diet (44%) than was either reported (2%) or ordered (2%). This lower energy consumption may reflect the decreased energy intake that often accompanies increasing age and decreased activity.

A much larger number of diet orders for a No Concentrated Sweets diet than reported by the respondents may indicate a lack of education regarding the meaning of no concentrated sweets. Most respondents (94%) indicated they used either no sweetener or a noncaloric sweetener when necessary. However, most respondents (87.5%) also indicated they consumed cake or some other food high in refined sugar at least occasionally.

Looking at the assigned energy allowances of the respondents by sex, 50% of the males had physicians' orders for 1800 kcal diets (Table 4). However, only 30% of the male respondents said they were to be consuming an 1800 kcal diet. Thirty-five percent stated they were to be following a Regular diet although only 15% had orders for a Regular diet. Reviewing the actual intake of the male respondents as calculated from the food frequency questionnaire, only 5% consumed an 1800 kcal diet. Forty percent consumed a Regular diet and 20% consumed only 1500 kcal per day.

This 1500 kcal intake is considered a low energy intake for males. Average intake as reported by the Second National Health and Nutrition Examination Survey (NHANES II), for males age 65-74 in this country is 1829 kcal (Carroll, Abraham, and Dresser, 1983). Stevens, Grivetti, and McDonald (1992) in a study examining the nutrient intakes of homebound elderly in urban and rural settings, found the mean energy intake of urban males to be 1821 ± 172 kcal and rural males to be 1677 ± 124 kcal. In another study by Posner, Smigelski, and Krachenfels (1987) the mean energy intake of homebound males was 1478 ± 630 kcal. From the research available it appears the

Table 4
Percent of Respondents Assigned to Specific Energy Intake According to Sex, Age, Years Diagnosed Diabetic, and Vulnerability Index*

	Physician Order					Self Report					Actual Intake					
	Reg	No Conc Swt 1800	1500	1200	Reg	No Conc Swt 1800	1500	1200	Reg	No Conc Swt 1800	1500	1200	Reg	No Conc Swt 1800	1500	1200
Total Energy Component of Diet	6.0	31.0	35.0	25.0	2.0	27.0	19.0	17.0	2.0	27.0	10.0	10.0	6.0	44.0	13.0	
Sex																
Male (n=20)	15.0	25.0	50.0	10.0	0.0	35.0	25.0	30.0	0.0	0.0	40.0	15.0	5.0	30.0	10.0	
Female (n=28)	0.0	35.7	25.0	35.7	3.6	35.7	28.6	10.7	21.4	3.6	17.9	7.1	7.1	53.6	14.3	
Age																
51-65 (n=9)	0.0	22.2	33.3	44.4	0.0	11.1	11.1	22.2	55.5	0.0	22.2	22.2	11.1	33.3	11.1	
66-80 (n=30)	10.0	36.7	30.0	23.3	0.0	40.0	33.3	16.7	10.0	0.0	23.3	6.7	3.3	43.3	13.3	
> 80 (n=9)	0.0	22.2	55.5	11.1	11.1	44.4	22.2	22.2	0.0	11.1	11.1	11.1	11.1	55.5	11.1	
Years Diagnosed Diabetic																
< 1 Year (n=18)	11.1	22.2	22.2	44.4	0.0	44.4	22.2	16.7	16.7	0.0	38.9	11.1	5.5	33.3	11.1	
1-2 Years (n=4)	0.0	25.0	50.0	25.0	0.0	25.0	50.0	0.0	25.0	0.0	0.0	50.0	0.0	50.0	0.0	
3-5 Years (n=4)	0.0	25.0	25.0	50.0	0.0	25.0	50.0	0.0	25.0	0.0	50.0	0.0	0.0	50.0	0.0	
6-10 Years (n=5)	0.0	60.0	40.0	0.0	0.0	60.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0	
> 10 Years (n=16)	6.3	37.5	50.0	0.0	6.3	25.0	25.0	31.3	12.5	6.3	25.0	6.3	12.5	50.0	6.3	
Vulnerability Index																
15-25 (n=27)	11.1	37.1	33.3	18.5	0.0	33.3	33.3	18.5	14.8	0.0	33.3	3.7	3.7	51.9	7.4	
26-30 (n=14)	0.0	14.3	57.1	21.4	7.1	42.9	7.1	21.4	21.4	7.1	14.3	21.4	7.1	28.6	28.6	
31-35 (n=7)	0.0	42.9	0.0	57.1	0.0	28.6	42.9	14.3	14.3	0.0	28.6	14.3	14.3	42.9	0.0	

*Total may not be equal to 100 due to rounding.

homebound population is consuming fewer kilocalories than the average population of the same age. The low intake in this research may indicate inaccurate information gathered from the food frequency questionnaire. Low energy intake may also be explained by the coaching many of the male respondents received from their spouses during the interview. This may have led to smaller reported intakes than actually consumed. This may be particularly true in relationship to portion sizes. Respondents may have stated consumption of standard portions when actually the amount of food consumed was larger than a standard portion. Another possibility with respect to such low energy intake for certain male respondents may be their debilitated state from complicating conditions and their relative inactivity. Appetite in these individuals may be poor resulting in decreased nutrient intake. Appetite may also be affected by the types and number of drugs the respondent is taking. A specific drug (e.g., digoxin) may have as a side effect appetite suppression or symptoms of nausea. A particular combination of drugs may affect appetite.

At the opposite end of the spectrum, a larger percentage of male respondents thought they were assigned a Regular diet and an even greater number consumed a Regular diet than was ordered by the physician. Additionally, although the number who reported being on a No Concentrated Sweets diet was the same as the diet orders, fewer respondents actually consumed a No Concentrated Sweets diet. Very few of the male respondents (5%) consumed the 1800 kcal diet most frequently ordered by physicians. This indicates the male respondents did not have the same understanding of the energy portion of their diet orders as the physicians. Additionally, the respondents did not

appear to have an accurate sense of their actual energy consumption. This may be because the respondents did not have enough instruction or experience in equivocating the weight or measurement of a food to the energy content of the food.

None of the female respondents (Table 4) had a diet order for a Regular diet. A No Concentrated Sweets diet was ordered for 35.7% of the female respondents. Another 35.7% had a diet order for a 1500 kcal diet. However, 35.7% of the female respondents reported themselves to be assigned a Regular diet, 28.6% a No Concentrated Sweets diet, and 21.4% a 1500 kcal diet. Actual consumption indicated that 17.9% of the women actually ate a Regular diet and 53.6% ate a 1500 kcal diet. Like the male respondents many more female respondents (53.6%) consumed a 1500 kcal diet as calculated from the food frequency questionnaire than had a 1500 kcal diet order. Unlike males it is not unusual for females age 65-74 to have a lower energy intake; NHANES II reported a mean intake of 1295 kcal (Carroll, Abraham, and Dresser, 1983). Interestingly, although the energy allowance the female respondents reported was higher overall than the energy allowances ordered by the physician, the energy consumed daily was less than ordered. This may reflect the tendency of women to be more conscious of their body weight than men. This lower energy consumption may also be a result of poor dietary habits developed from living alone, having difficulty grocery shopping or preparing the food, or possibly not having the desire to put effort into food preparation. In the Stevens, Grivetti, and McDonald (1992) study mean energy intake for urban women was 1531 ± 97 kcal; for rural women it was 1316 ± 65 kcal. Posner, Smigelski, and Krachenfels found a mean energy intake of 1440 ± 539 kcal. The women in these studies generally

had an intake lower than the 1500 kcal consumed by the women in this study.

The respondents were divided into three age categories as defined in Table 4. The diets ordered by physicians were not significantly different between the three age groups. The respondents' reported diets and actual intakes as calculated from the food frequency questionnaire were also not significantly different between the three age groups. A larger percentage of the individuals in the 51-65 age group reported themselves to be on more restrictive diets (55% on 1500 kcal). This awareness of a restricted energy allowance in this group may be due to a more recent diagnosis of diabetes mellitus and, therefore, more recent diet instruction by the physician or nutrition professional. On the other hand, this younger group may have been more involved recently in the community and, thus, be more conscious of diet and energy consumption in general. The number of individuals who actually consumed a 1500 kcal diet, as compared with less restricted energy diets, increased with age indicating that as the respondents got older they tended to consume fewer kilocalories. This was also found to be true by NHANES II (Carroll, Abraham, and Dresser, 1983).

Although only 10% of the physicians of respondents age 66-80 and none of the physicians of respondents in the > 80 age group ordered Regular diets for their patients, 40% and 44%, respectively, of the respondents in these age groups reported that this was the diet they were to be following. The fact that a considerable percentage of the older respondents stated they were not to be following any specific energy allowance indicates that perhaps their physician had not communicated the diet order adequately or even if the physician stressed the importance of controlled energy intake at time of diagnosis,

this was not reinforced by the physician or by the nurse expected to provide subsequent diet instruction.

The older respondents are likely to have been diagnosed with diabetes mellitus for a longer period of time and, particularly if there have been no symptoms or complicating factors, may not have had any changes in their diet or any diet instruction given in an extended period of time. Not only is it beneficial to have good behavior reinforced, but also the dietary guidelines for diabetics have changed over the years. Arnold et al (1992) questioned 440 randomly selected adults who received diabetic care from community physicians about their diabetes education experience. The mean age of the group was 61 years of age with 54% of the subjects being women. The researchers found that physicians referred patients with diabetes mellitus only rarely to a nutrition professional for instruction after initial diagnosis (31% of patients with IDDM, 22% of patients with NIDDM).

In addition to age, the length of time respondents had been diagnosed with diabetes mellitus was also examined in terms of energy allowance and intake. As noted previously, the majority of the respondents had been diagnosed as diabetic for less than one year or for greater than 10 years. Again there were no significant differences among diabetic groups and the diet categories. The only trend noticeable with respect to the length of time diagnosed as diabetic was that those who were diagnosed the longest had less stringent diet orders (43.8% No Concentrated Sweets or Regular diets). However, these same respondents' actual intakes, as calculated from the food frequency questionnaire, fell into the more restrictive categories (56.3% following a 1500 or 1200

kcal diet). This trend may be evident because the diet instruction given a decade or more ago was more restrictive than is the case today. It may also be because these respondents are more debilitated from complicating conditions related to the length of time they have been diabetic which in turn influenced energy intake. Or, the reduced energy intake of the respondents diagnosed longer also represents the respondents who are older chronologically, and are, thus, consuming less food. Perhaps physicians recognizing the lower energy consumption of these older individuals have decreased or removed dietary restrictions which are reflected in the more liberal diet orders.

The last variable reviewed with respect to energy allowance is the vulnerability index. The majority of the respondents (56%) were in the category representing a higher level of resources or support services. There were no statistical differences among the three groups with respect to diet (Table 4), although all of the respondents with an order for a Regular diet were in the group with the lowest index score. This may indicate that a living situation in which health and socioeconomic resources are not substantially limited may alter an individual's need for stringent dietary restriction because the individual is better able to manage their overall health.

Because achievement and maintenance of ideal body weight is essential to control of diabetes mellitus and since increasing activity level in the elderly is often not practical due to physical limitations, understanding the principles of energy consumption is essential to the individual. The homebound population served by Inova Home Care who were diagnosed with diabetes mellitus do not appear to understand the need to balance energy consumption with energy expenditure. This understanding would be represented

by energy consumption equivalent to the physician's prescribed energy allowance which is based on the physician's assessment of the individual's energy needs and expenditures and would be verbalized by the individual when questioned about the diet order and his/her dietary habits.

However, the individual receiving home health services has limitations in addition to poor understanding of their diet order. Frequently, the elderly home health client is dependent on others for shopping and meal preparation. Lack of knowledge or lack of interest on the part of the caregiver only precipitates poor eating habits in the elderly home health client. Or, the individual may be responsible for meal preparation but because of physical limitations or lack of strength and endurance cannot adequately accomplish the preparation and clean-up of a balanced meal and must settle for something that requires little effort. The influence that continuously being alone, especially at meal time, may have on psychological outlook must also be considered in the elderly homebound. In this study, lack of understanding of the prescribed diet appears to be unaffected by sex, age, length of time the respondent has been diagnosed with diabetes mellitus, or a vulnerability index.

Sodium Intake - Diet Order and Compliance

Because many individuals with diabetes mellitus have contributing complications such as cardiovascular disease (Zeman, 1991), diet orders frequently place limits on dietary sodium as well as energy intakes. Restriction of sodium is generally addressed by limiting the sodium added to food in the form of salt during processing, preparation,

and at time of consumption. The sodium occurring naturally in food does not require specific monitoring when sodium added in processing and preparation is minimized. The sodium diet orders recorded for the Inova Home Care clients were categorized into four subgroups as follows:

<u>Diet</u>	<u>Restriction</u>	<u>Range of Intake</u>
Regular	None	any amount of intake acceptable
No Added Salt (NAS)	no sodium added during food preparation or at the table. Foods high in sodium such as pickles or bacon allowed in limited amounts	unable to categorize from analysis of food frequency questionnaire
Low Sodium (4 gm Na)	daily sodium intake ≤ 4000 mg, eliminate foods high in sodium	2051 - 4050 mg Na daily
2 gm Na	daily sodium intake ≤ 2000 mg	≤ 2050 mg Na daily

As with energy consumption, ranges were developed to clearly define the subgroups and to allow for individualized diets such as 3 gm Na. The 2 gm Na range set the upper limit of daily sodium intake slightly above (2050 mg/day) the maximum 2 gm daily intake defined by the diet prescription. The range for the 4 gm Na diet was defined from the upper limit of the 2 gm Na diet to slightly above (4050 mg/day) the 4 gm daily sodium intake diet prescription. The software package used to calculate sodium intake included salt normally added during cooking, but did not include salt added to food at the table. When respondents indicated they sometimes added salt at the table the total

sodium value was increased by 15%. When respondents indicated they always added salt to their food at the table the total sodium value was increased by 30%. Thus the lower sodium intake of those individuals not adding salt at the table is reflected in the total sodium value, but these individuals cannot be specifically identified as consuming a no added salt diet.

The medical records of the respondents indicated that 60.4% were to consume Regular diets with no sodium restrictions, 2.1% No Added Salt diets, 31.2% low Na diets, and 6.3% 2 gm Na diets (Table 5). According to self reports of respondents 62.5% thought they had been placed on a Regular diet and 37.5% on a low Na diet. None of the respondents reported themselves to be following a No Added Salt diet or a 2 gm Na diet. Apparently, the respondents made no distinction between a 4 gm Na and a 2 gm Na diet. This lack of distinction could be due to a lack of communication from physician to patient, a lack of understanding by the respondent because of incomplete education, or a poor interpretation of the question by the respondent. Actual intake as calculated from the food frequency questionnaire indicated that 56.3% were consuming more than 4 gm of sodium per day; 43.8% were consuming 2-4 gm of sodium daily. None of the respondents had a sodium intake of less than 2 gm. Although indistinguishable from the other respondents, when evaluating sodium content of the diet many of the respondents (58%) stated that they did not add salt to their food at the table. As was seen with the energy allowance, respondents did not consume the amount of sodium prescribed by their physician and they also did not have the same idea of prescribed sodium allowance as the physician. The difference between diet order, stated

Table 5
Percent of Respondents Assigned to Specific Sodium Intakes According to Sex, Age, Years Diagnosed Diabetic and Vulnerability Index*

	Physician Order			Self Report			Actual Intake					
	Reg	NAS ^b	Low/4gm/NA	2gm/NA	Reg	NAS	Low/4gm/NA	2gm/NA	Reg	NAS	Low/4gm/NA	2gm/NA
Total Sodium component of diet	60.4	2.1	31.2	6.3	62.5	0.0	37.5	0.0	56.3	0.0	43.8	0.0
Sex												
Male (n=20)	55.5	0.0	40.0	5.0	50.0	0.0	50.0	0.0	55.0	0.0	45.0	0.0
Female (n=28)	64.3	3.6	25.0	7.1	71.4	0.0	28.6	0.0	57.1	0.0	42.9	0.0
Age												
51-65 (n=9)	66.7	0.0	11.1	22.2	66.7	0.0	33.3	0.0	55.6	0.0	44.4	0.0
66-80 (n=30)	60.0	3.3	36.7	0.0	53.3	0.0	46.7	0.0	56.7	0.0	43.3	0.0
> 80 (n=9)	55.6	0.0	33.3	11.1	88.9	0.0	11.1	0.0	55.6	0.0	44.4	0.0
Years Diagnosed Diabetic												
< 1 Year (n=18)	61.1	0.0	33.3	5.5	61.1	0.0	38.9	0.0	55.6	0.0	44.4	0.0
1-2 Years (n=4)	50.0	0.0	50.0	0.0	50.0	0.0	50.0	0.0	25.0	0.0	75.0	0.0
3-5 Years (n=4)	100.0	0.0	0.0	0.0	75.0	0.0	25.0	0.0	75.0	0.0	25.0	0.0
6-10 Years (n=5)	80.0	0.0	20.0	0.0	80.0	0.0	20.0	0.0	80.0	0.0	20.0	0.0
> 10 Years (n=16)	43.8	6.3	37.5	12.5	56.3	0.0	43.8	0.0	50.0	0.0	50.0	0.0
Vulnerability Index												
15-25 (n=27)	63.0	0.0	33.3	3.7	59.3	0.0	40.7	0.0	51.9	0.0	48.1	0.0
26-30 (n=14)	71.4	0.0	21.4	7.1	64.3	0.0	35.7	0.0	71.4	0.0	28.6	0.0
31-35 (n=7)	28.6	14.3	42.9	14.3	71.4	0.0	28.6	0.0	42.9	0.0	57.1	0.0

*Total may not be equal to 100 due to rounding.

^bNAS = No Added Salt

diet, and actual intake as calculated from the food frequency questionnaire is not as marked as related to sodium compared to energy consumption. On the positive side, fewer of the respondents consumed a Regular diet (56.3%) than was ordered by the physician (60.4%). This indicates that respondents may have been monitoring their sodium intake. The American Heart Association (1991) recommends all individuals moderate their sodium intake to less than 3000 mg of sodium daily.

When evaluated by sex, 55% of the males were on a Regular diet, 40% had physicians' orders to follow a 4 gm Na diet, and the remaining 5% were to follow a 2 gm Na diet (Table 5). Fifty percent of the respondents stated their physician did not restrict their sodium intake. The remaining 50% stated they were to be following a Low Sodium diet. The sodium intake of the male respondents as calculated from the food frequency questionnaire indicated that 55% were consuming >4 gm Na daily. Forty-five percent were consuming ≤ 4 gm Na daily. Mean sodium intake for males age 65-74 in the United States is 2894 mg/day (Carroll, Abraham, and Dresser, 1983). The male respondents were compliant in following a low sodium diet when ordered by the physician; however, the 5% of respondents who were prescribed the more restrictive 2 gm Na diet were not compliant with a sodium intake of ≤ 2 gm daily.

Looking at the sodium allowance for the female respondents, 64% were prescribed diets with no sodium restriction, 71% reported no sodium restriction, and 57% were consuming ≥ 4 gm of sodium daily as calculated from the food frequency questionnaire. Mean sodium intake in the United States for females age 65-74 is 1988

mg/day (Carroll, Abraham, and Dresser, 1983). The respondents in this study are consuming more sodium daily than the American female population in the same age group. The sodium intake of the American public may have increased since the data were collected in the NHANES II. Or, the subjects in this study may actually consume more sodium than the average American. Higher consumption of sodium in this elderly homebound population may be due to higher consumption of processed or prepackaged food due to physical limitations necessitating quick and easy food preparation. Possibly the higher sodium intake reflects the dietary habits of a lifetime which precipitated the respondents' homebound status.

Interestingly, more of the female respondents reported they were to be following a diet with restricted sodium intake than had a low sodium diet prescribed by the physician. Yet, fewer of the female respondents actually consumed a low sodium diet as calculated from the food frequency questionnaire than was prescribed by the physician. This indicates that the female respondents were less diet compliant than the male respondents with respect to sodium intake. This difference between male and female respondents may be because women are more likely than men to live alone. Thus, women may be more likely to consume processed food either because of an inability to prepare a meal adequately or because they are eating alone.

Examining sodium allowance by age groups, 67% of the group age 51-65 (Table 5) stated they were to be on diets with no sodium restriction. The same number of respondents in this age group had physicians' orders for no sodium restriction.

Additionally, only 55% of the respondents were consuming a diet containing 4 gm or more of sodium daily. This age group was diet compliant with respect to limiting sodium intake. However, 22.2% of the respondents age 51-65 had diet orders for 2 gm Na diets and none of them reported or consumed ≤ 2 gm of sodium daily. The 66-80 age group also had more respondents following a low sodium diet than the diet orders indicated. In the > 80 age group 88.9% reported diets without sodium restriction. Physicians' orders for this group had only 55% of respondents on diets with no sodium restriction. Actual intake as calculated from the food frequency questionnaire in the > 80 age group indicated 55% were consuming a Regular diet.

The number of respondents in the oldest group who reported no sodium restriction when actually the physician had prescribed a restricted diet represents either a lack of communication between physician and patient or lack of understanding by the patient and appears to be directly related to age. This poor understanding may be due to inadequate knowledge with respect to what foods contain high levels of sodium. This would account for the difference in perception indicated by the number of diets reported to be regular when a sodium modification was ordered. If appropriate dietary information was conveyed, the female subjects may also have chosen not to modify their sodium intake, possibly because they did not perceive a sodium modification as necessary for improved health or because the perceived benefit of reducing sodium intake was not enough to modify their behavior.

Actual consumption of sodium was approximately the same for all age groups.

However, as age increased physicians prescribed more sodium restricted diets. This increase in sodium restricted diets may relate to an increase in diagnosed hypertension which is influenced by sodium intake.

The length of time respondents had been diabetic did not significantly influence sodium restriction (Table 5). The respondents diagnosed as diabetic for >10 years formed the only group in which more individuals were consuming Regular diets than the physicians had ordered. All of the other categories had the same number or more individuals consuming diets lower in sodium than were ordered by the physician. If the oldest respondents, >80 years of age, have been diagnosed with diabetes for the longest time, then this is not surprising. If, however, those diagnosed as diabetic for the longest time included the younger subjects who could have many more years to live if the effects of chronic disease conditions are minimized, this group may have missed important education involving sodium intake. This lack of attention to sodium intake, even if the diabetes mellitus is under control, may accelerate the disease process and affect the individual's ability to function normally over the long term. This emphasizes the need for continuing nutrition education and monitoring for the diabetic individual.

Evaluating sodium intake recommendations according to vulnerability index indicated that the individuals at highest nutritional risk based on living situation and health status were most likely to have a physician ordered restricted sodium diet, although most of the respondents reported they were not sodium restricted (Table 5). Actual intake for this group indicated fewer respondents following a sodium restriction

than they self reported.

Although respondents were unaware of prescribed diets restricted in sodium, they were actually consuming moderate amounts of sodium. It appears, however, that the prescription of the severely restricted 2 gm Na diet is completely ineffective in this population since none of the respondents either reported or consumed a 2 gm Na diet. Unless the individual's health will be severely compromised, as in renal disease, by a diet with moderate sodium intake, emphasis on a diet containing between 3 gm and 4 gm Na daily appears to be far more effective and practical for the homebound population diagnosed with diabetes mellitus. A diet moderate in sodium will enable individuals to limit the amount of salt they add to food at the table or in cooking and modify the amount of processed food consumed without making the diet so unpalatable that nutritional intake and adequacy are compromised.

Fat and Cholesterol Intake - Diet and Compliance

Diet orders for fat or cholesterol were divided into two groups as follows:

<u>Diet</u>	<u>Restriction</u>	<u>Range of Intake</u>
Regular	None	No restriction
Low cholesterol and/or low fat	individual monitors daily intake of fat and cholesterol	<300 mg/day cholesterol ≤30% kcal daily

Mean daily cholesterol intake in the United States for individuals ages 65-74 is

387 mg daily for men and 240 mg daily for women (Carroll, Abraham, and Dresser, 1983). Mean daily fat intake for this age group is 75 gm daily for men and 50 gm daily for women. This represents 36.9% and 34.7% of energy intake respectively. Physicians' diet orders placed 17% of the respondents on low cholesterol/fat diets, although 27% of the respondents reported that their physician had ordered a low cholesterol/fat diet for them (Table 6). Dietary calculations from the food frequency questionnaire indicated that 13% of the respondents actually consumed a low cholesterol/fat diet. The others (87%) consumed greater than 30% of their kilocalories from fat. It is interesting to note that more of the respondents indicated they were to be on a low cholesterol/fat diet than was indicated by the physician in the medical record.

The higher percentage of respondents reporting diet orders for restricted fat or cholesterol probably indicates the influence the media has had in emphasizing the need for Americans to reduce fat and cholesterol intakes. The American Diabetes Association and the American Dietetic Association recommend that all individuals diagnosed with diabetes mellitus restrict their cholesterol intake to 300 mg or less per day and that 30% or less of total kilocalories consumed daily come from fat (Zeman, 1991). The fact that not even those who had prescribed diets low in cholesterol or fat consumed such a diet indicates a misunderstanding within this population of what a low cholesterol, low fat diet is or how much fat and cholesterol is in their normal diet. Since lowering fat and cholesterol intake makes control of energy intake more simple, emphasis for nutrition counseling in this area seems particularly appropriate.

Table 6
Percent of Respondents Assigned to Specific Fat or Cholesterol Intakes According to Sex, Age, Years Diagnosed Diabetic, and Vulnerability Index

	Physician Order			Self Report			Actual Intake		
	Regular	Low Chol/Fat	83.3	Regular	Low Chol/Fat	27.1	Regular	Low Chol/Fat	12.5
Total Fat and Cholesterol Component of Diet	83.3	16.7		72.9	27.1		87.5	12.5	
Sex									
Male (n=20)	70.0	30.0		70.0	30.0		90.0	10.0	
Female (n=28)	92.9	7.1		75.0	25.0		85.7	14.3	
Age									
51-65 (n=9)	77.8	22.2		77.8	22.2		100.0	0.0	
66-80 (n=30)	90.0	10.0		73.3	27.7		83.3	17.7	
> 80 (n=9)	66.7	33.3		66.7	33.3		88.9	11.1	
Years Diagnosed Diabetic									
< 1 Year (n=18)	83.3	17.7		77.8	22.2		88.9	11.1	
1-2 Years (n=4)	100.0	0.0		25.0	75.0		100.0	0.0	
3-5 Years (n=4)	75.0	25.0		50.0	50.0		75.0	25.0	
6-10 Years (n=5)	80.0	20.0		80.0	20.0		100.0	0.0	
> 10 Years (n=16)	81.3	18.7		81.3	18.7		81.3	18.7	
Vulnerability Index									
15-25 (n=27)	81.0	19.0		66.7	33.3		81.0	19.0	
26-30 (n=14)	86.0	14.0		79.0	21.0		93.0	7.0	
31-25 (n=7)	86.0	14.0		86.0	14.0		100.0	0.0	

When categorized by sex, 30% of the male respondents had physicians' orders for, and 30% stated they were to be following, a low cholesterol/fat diet (Table 6). However, only 10% of the males were actually consuming a low cholesterol/fat diet as calculated from the food frequency questionnaire. In contrast, only 7% of the female respondents had physicians' orders for a low cholesterol/fat diet, yet 25% reported they were to be following a low cholesterol/fat diet. Fourteen percent of the female respondents were actually consuming a low cholesterol/fat diet. Female respondents, based on their experience in food preparation, may be more aware of their cholesterol and fat intake. However, even though more female respondents were consuming a low cholesterol/fat diet than was ordered by their physician, another 11% stated they were to be following a low cholesterol/fat diet but were not. The male respondents, although able to state their prescribed cholesterol/fat intake, were not consuming a low cholesterol/fat intake as prescribed.

Looking at the respondents by age category (Table 6), the >80 age group had 33% of respondents with physicians' orders for a low cholesterol/fat diet. The same proportion of respondents in this group also reported they were to be on low cholesterol/fat diets. Only 11% of the respondents >80 years of age actually consumed a low cholesterol/fat diet. The respondents in the group 66-80 years of age had the greatest percentage (17%) consuming a low cholesterol/fat diet, although only 10% had physician orders for a restricted cholesterol/fat intake. In the youngest group, 22% of the respondents both had physician orders for a low cholesterol/fat diet and reported they were to be consuming a low cholesterol/fat diet; however, none actually consumed such

a diet. Both the youngest and the oldest age groups had poor adherence to a diet low in cholesterol and fat since there were less respondents consuming a diet low in cholesterol and fat than had physicians' orders for a restricted diet. This poor adherence to physicians' orders may be due to poor communication between physician and patient, poor understanding of how to prepare a diet low in fat and cholesterol, or lack of desire to comply with physicians' orders. Following a low fat and cholesterol diet requires a considerable amount of discipline and change in life long patterns. Individuals who are instructed to modify their cholesterol/fat intake may not accept the potential benefits or may not consider the sacrifices worth the benefits. It is interesting that these two groups had difficulty consuming a diet low in cholesterol and fat when the 66-80 age group had more respondents consuming a low fat and cholesterol diet than had physician orders for a restricted diet.

This phenomenon might possibly be attributed to the younger and older groups not being willing to modify cholesterol/fat intake because of the effort it requires and their inability to accept and appreciate the benefits. The younger group may have more trouble accepting the presence of chronic disease not wanting to acknowledge the inevitable aging that the presence of chronic disease pronounces (Jenny, 1984; Cerkoney and Hart, 1980). Therefore, these individuals may not be willing to attempt modification of dietary habits and a change in lifestyle which are the backbone of treatment for diabetes mellitus. Those > 80 years of age might think since they have managed to live this long, why bother to modify dietary intake. On the other hand, those individuals ages 66-80, while willing to accept the presence of chronic disease, may not be ready to

accept the confinement of old age and are willing to accept recommended treatment. Because they are retired, this group may also perceive they have time to spend on diet modification that younger individuals feel they do not have. Thus, those individuals ages 66-80 may be more compliant to diet orders.

Turning now to the length of time the respondents had been diagnosed with diabetes mellitus, respondents diagnosed for shorter amounts of time were less likely to have physician prescribed cholesterol/fat restrictions although actual low cholesterol/fat intakes as calculated from the food frequency questionnaire were very close to the number of restrictions ordered by the physicians (Table 6). Of the respondents who had been diagnosed as diabetic 6-10 years, 20% had physician orders for, and reported following, low cholesterol/fat diets; however, none in this age group actually consumed low cholesterol/fat diets. The group diagnosed with diabetes mellitus for > 10 years was diet compliant with respect to cholesterol/fat intake. The same percentage of respondents (19%) had physician orders for, and actually consumed low cholesterol/fat diets.

The vulnerability index made no difference in regard to cholesterol/fat restrictions ordered by the physician (Table 6). The group with the lower index scores had the same number of respondents consuming a low cholesterol/fat diet as was ordered by the physician. On the other hand, the group with the highest index score which indicated the most risk in living situation reported the same percentage (14%) of low cholesterol/fat diets as the physicians ordered; however, none of these respondents actually consumed a low cholesterol/fat diet.

The vulnerability index score appears to have some relationship to dietary intake

of cholesterol and fat, although not to a degree that is statistically significant. The group with the lowest index score was diet compliant for cholesterol and fat. The group with the highest index score, the group more at risk, had no one consuming a low cholesterol, low fat diet although 14% had diet orders for cholesterol and/or fat restrictions.

Overall, this homebound population with diabetes mellitus is not consuming a diet low in cholesterol and fat. Although this dietary pattern may not be unusual it is surprising that more physicians did not prescribe a diet modified in fat and cholesterol since dietary recommendations for the general public as well as for individuals with diabetes mellitus are to lower fat and cholesterol intake. Although not necessarily restricted in energy intake a diabetic diet designed to moderate fat would be beneficial. Diet modification is a process and requires commitment and desire by the individual. This may be impractical for the diabetic elderly homebound population; however, the physicians for these individuals should encourage and reinforce changes in dietary habits. The importance of changes in dietary habits could be emphasized through physician initiated consultation with a nutrition professional who is specifically trained in encouraging dietary modification. There appears to be a need for nutrition education of the physician as well as the individual with diabetes mellitus.

Components of Total Energy Intake

Food frequency information obtained from this homebound population was used to calculate mean intakes of energy and the macronutrients (Table 7). The males as expected consumed more kilocalories on a daily basis than did the females. The average

daily energy intake was 1822 ± 606 kcal/day. Mean energy intake was lower in the group ages 51-65. This may reflect an attempt by this group to monitor energy intake in an effort to control their diabetes. It may also represent a higher level of diet consciousness particularly with respect to weight control in this group. Lower mean energy intake may also reflect more acute disease states in this group resulting in decreased appetite and intake. Error in accurately reporting intake may have significantly affected any of the values.

Fat comprised more than 40% of daily energy intake with women consuming a slightly higher percentage of energy from fat. As stated previously, this population had a diet higher in fat than reported for the same age group in NHANES II. This higher fat intake may be representative of a noncompliant diabetic population or a homebound population. However, Steele and Bryan (1986) found homebound elderly who were recipients of meals on wheels consumed 38% of their energy from fat and nonrecipients consumed 34%. Reasons for the higher fat intake of individuals receiving meals on wheels were not offered by Steele and Bryan. The higher fat intake in their study may not be representative of meals on wheels programs nationwide. However, these meals are frequently prepared by church groups or other civic organizations without the close supervision of a nutrition professional to provide advice on menu selection and nutrient content. This higher fat consumption of meals on wheels recipients may be a factor in this study as 12.5% of the respondents received home delivered meals. Steele and Bryan used a 24-hour recall as did the NHANES II study rather than a food frequency questionnaire. The data collection method used may affect the outcome value

Table 7
Components of Total Energy Intake

<u>Mean</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>51-65</u>	<u>66-80</u>	<u>>80</u>
Energy (kcal)	1822 ± 606	2172 ± 601	1571 ± 478	1652 ± 530	1882 ± 653	1816 ± 549
Carbohydrate(%)	43.6 ± 7.7	43.0 ± 6.9	44.4 ± 8.4	42.1 ± 4.4	43.2 ± 7.8	46.4 ± 10.1
Protein(%)	14.7 ± 3.4	14.6 ± 3.1	14.8 ± 3.6	15.2 ± 3.9	14.3 ± 3.4	15.3 ± 2.8
Fat(%)	40.9 ± 9.1	40.5 ± 7.2	41.2 ± 10.3	42.5 ± 6.7	41.3 ± 9.2	37.7 ± 11.0
Sweets ^a	3.7 ± 4.8	4.3 ± 6.4	3.3 ± 3.3	2.4 ± 2.7	3.9 ± 5.7	4.0 ± 3.1
Alcohol ^b	0.7	0.7	0.0	0.0	.7	0.0

^aSweets are defined as any food with concentrated amounts of simple sugars such as candy, cookies, cake, doughnuts, pie, pastry, coffee cake, sugar in beverages, soda.

^bAlcohol as a significant energy source pertains to only one respondent.

of component parts of energy consumption.

Women in this study consumed a slightly higher percent of energy from fat than the men. In the NHANES II study men consumed a slightly greater proportion of energy from fat (Carroll, Abraham, and Dresser, 1983). The difference in this study may be because many of the women subjects live alone and have no one monitoring their intake whereas the men are more likely to have spouses who are concerned about their health and control their diet more closely.

The percent of energy contributed by fat decreased with age though not to the level recommended by the American Diabetes Association and the American Diabetic Association. This decrease in fat intake may reflect an increasing inability to digest fat. Aging individuals may be eliminating those foods that result in gastric distress and are therefore decreasing overall fat consumption. Or, perhaps these older individuals are no longer independent enough to be making their own meal choices and the individuals preparing the meals for these respondents are more conscious of the fat content of food.

The average protein level of the respondents was 14.7% of energy intake. The female respondents consumed a slightly higher percentage of their energy from protein. The protein content of the diet in this study was less than in the NHANES II study which found men ages 65-74 consumed 16.0% of their energy from protein while women consumed 15.8% (Carroll, Abraham, and Steele, 1983). Steele and Bryan (1986) found elderly homebound who did not receive meals on wheels consumed 18% of their energy from protein. Meals on wheels recipients consumed 16% of their energy intake from

protein. Horwath and Worsley (1991) found elderly individuals with diabetes consumed 19% of their energy from protein.

The protein intake as a percentage of total energy (14.3%) of the respondents ages 66-80 was lower than either of the other age groups. Since money for food was not stated as a problem for the majority of respondents, reasons for this low protein intake are not apparent. Inability to prepare a meal due to physical limitations or poor endurance may decrease protein intake. More likely, poor dentition due to ill fitting dentures or missing teeth may limit the individual's ability to consume foods typically thought of as high in protein in the American diet. The respondent's limited knowledge or the physical limitations mentioned above may limit use of meat alternatives.

Mean dietary carbohydrate content in this study was 43.6% of total energy consumed. Because the respondents consumed more of their energy in fat than recommended, less carbohydrate than recommended by the American Diabetes Association and the American Dietetic Association was consumed. The NHANES II report found average carbohydrate intake for men ages 65-74 was 44.6% of total energy (Carroll, Abraham, and Dresser, 1983). Women in the same age group consumed 48.8%. In the study by Horwath and Worsley (1991) elderly men with diabetes mellitus consumed 39% of total energy from carbohydrate; women consumed 43%. Respectively, recipients and nonrecipients of meals on wheels in the study by Steele and Bryan (1986) consumed 44% and 50% of total energy from carbohydrates.

Male respondents in this study, although consuming less energy from

carbohydrates than individuals in the NHANES II study (Carroll, Abraham, and Dresser, 1983), did consume more energy from carbohydrate than the elderly diabetic subjects in the study by Horwath and Worsley (1991). The same trend was true for women in this study. Perhaps the lower carbohydrate and higher fat intake in this diabetic population can be at least partially attributed to the diet education that was given 15-20 years ago when the most current research recommended a diet lower in carbohydrate and therefore, higher in fat with protein intake between 15-20% of total energy.

In comparing the intake of each of the age groups in the study with the current recommendations of the American Diabetes Association and the American Dietetic Association (Zeman, 1991), the >80 years of age group comes closest to adhering to a diabetic diet. The >80 years group also comes closest to following the dietary guidelines for Americans established by the Food and Nutrition Board (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 1990). This group has the highest percentage of energy consumed in the form of carbohydrate (46.4%) and the lowest amount of energy consumed from fat (37.7%). It is interesting that the >80 years of age group has the lowest average fat intake since only 11% of the group consumed a diet categorized in this study as low in cholesterol and fat. This group consumes a diet with a moderate fat intake although they do not actually consume a diet that meets the dietary guidelines. It is surprising this age group is closest to adhering to current dietary guidelines since they are most likely to have been diagnosed with diabetes mellitus the longest. Thus, these are the respondents most likely to be following the

older guidelines of moderate carbohydrate intake and, therefore, a higher fat intake. Also, this is the age group most likely to decide if they have lived this long why bother changing the dietary habits of a lifetime. However, because of age this group may also be more likely to have retained the dietary habits of another era when processed foods were not as available and eating out, especially in fast food restaurants, was not as common. Instead they may consume a greater number of fresh fruits and vegetables, whole grain products, and protein sources other than fresh meat.

Briefly looking at energy sources other than the three main dietary components, one of the respondents consumed a significant amount of kilocalories from alcohol. This respondent consumed one glass of wine and four ounces of liquor daily. Overall the respondents did not consume alcohol on a regular basis. The average percentage of kilocalories contributed by high sucrose foods such as candy, desserts high in refined sugars, or breakfast pastries and doughnuts was 3-5%. Horwath and Worley (1991) found elderly diabetic individuals just as likely to consume foods high in refined sugars as non-diabetic elderly. The proportions of macronutrients described in Table 7 indicates the respondents are not following the guidelines established by the American Diabetes Association and the American Dietetic Association (Zeman, 1991).

Comparison of Individual Responses Using Three Digit Assignment

To evaluate diet compliance on an individual basis each respondent's individual diet order, stated diet order, and estimated actual intake was standardized using a three

digit code representing energy, sodium, and cholesterol/fat. When the diet code was examined comparing each diet response to the other responses for the same individual there was little confirmation of diet compliance (Appendix G). For example, respondent #9 had the following three digit diet assignments:

Physician Order	Self Report	Actual Intake
411	132	431

This translates to a physician's diet order of 1500 kcal with no sodium or cholesterol/fat restriction. The respondent believed the diet prescribed included no energy restriction but a sodium and cholesterol/fat restriction. Respondent #9 consumed a 1500 kcal low sodium diet, but did not consume a diet in which no more than 30% of the kilocalories came from fat. Tables 8 and 9 describe the number of respondents whose diet assignments, self reports and/or intakes fell within the same diet category. If the respondents were diet compliant, the three codes would match for the individual.

Only one respondent of the 48 had the same three digit assignment for physician's order, self reported diet order, and reported intake as calculated from the food frequency questionnaire. This respondent had no dietary restriction prescribed by his physician. Fifty-four percent of the respondents had no similarities in their diet assignments. If only two diet assignments are compared at a time (e.g., energy and cholesterol/fat), diet compliance improves somewhat; but, even the assignments having the best compliance (sodium and cholesterol/fat) had 25% of the respondents with none of the digits the same. Even looking at one part of the diet assignment, the number of respondents with

matching codes is 50% or less (Table 9). There is no apparent strong point in diet compliance among the respondents that could be used as a building block of success and praise from which emphasis on changing other parts of the diet could be focused.

The dietary intake and diet compliance to physician orders is complex for the diabetic home care patient, as it is for all individuals. The accuracy of the food frequency questionnaire designed by Dr. Block, although tested extensively with the general public, has not been evaluated with elderly individuals. Although the food frequency questionnaire provided a foundation for assessing dietary intake in this population there were some difficulties. First, having to verbalize the portion size of every food item in addition to how many times each item was consumed within a selected time period (e.g., 3x/week, 2x/month) required too many responses. Because of the difficulty the respondents had giving multifaceted responses to each food item, they tended to generalize portion size into the medium category. This tendency may have skewed the results, since the actual portion size consumed may not have been medium. Additionally, although the researcher explained what the equivalent to a medium portion size was and how a small and large portion related to the standard measurement, the respondents may not have had a clear understanding of portion size as it related to individual food items. An overestimation by reporting a medium portion size when actually a small portion was consumed might explain the higher energy intake found in this study as compared to the NHANES II report (Carroll, Abraham, and Dresser, 1983).

Table 8

Response Comparison by Three Digit Diet Order*Energy/Sodium/Fat

	Number	Percent
Physician Order = Self Report = Actual Intake	1	2
Physician Order = Self Report	13	27
Physician Order = Actual Intake	3	6
Self Report = Actual Intake	5	10
No Response the Same	26	54

Energy/Sodium

	Number	Percent
Physician Order = Self Report = Actual Intake	1	2
Physician Order = Self Report	14	29
Physician Order = Actual Intake	6	13
Self Report = Actual Intake	6	13
No Responses the Same	21	44

Energy/Fat

	Number	Percent
Physician Order = Self Report = Actual Intake	1	2
Physician Order = Self Report	16	33
Physician Order = Actual Intake	5	10
Self Report = Actual Intake	5	10
No Responses the Same	21	44

Sodium/Fat

	Number	Percent
Physician Order = Self Report = Actual Intake	19	40
Physician Order = Self Report	5	10
Physician Order = Actual Intake	4	8
Self Report = Actual Intake	8	17
No Responses the Same	12	25

*Note: See Appendix E:Diet Key and Appendix G:Three Digit Diet Order Assignment

Table 9
Response Agreement by Single Component of Diet

	<u>Physician Order and Self Report</u>		<u>Physician Order and Actual Intake</u>		<u>Self Report and Actual Intake</u>	
	Number	Percent	Number	Percent	Number	Percent
Energy						
Regular	3	6	3	6	4	8
No Conc. Sweets	6	13	3	6	0	0
1800 kcal	8	17	2	4	1	2
1500 kcal	6	13	4	8	2	4
1200 kcal	1	2	0	0	0	0
Total	24	50	12	25	7	15
Sodium						
Regular	14	29	14	29	15	31
No Added Salt	-	-	-	-	-	-
4 gm Na	4	8	5	10	7	15
2 gm Na	-	-	-	-	-	-
Total	18	38	19	40	22	46
Cholesterol/Fat						
Regular	19	40	22	46	19	40
Low Chol/Fat	0	0	0	0	2	4
Total	19	40	22	46	21	44

Although the time spent with each respondent was generally 45-50 minutes, some of the respondents became fatigued before the researcher had completed the interview. A food frequency questionnaire was utilized in this research study because it can produce a better idea of overall intake than a 24-hour recall record in the elderly who may have difficulty with short term memory. However, by its very nature, a food frequency questionnaire becomes lengthy when a variety of foods to represent all nutrients are utilized. In subsequent research with an elderly, physically compromised population, the length of time required to complete the dietary interview needs to be closely examined.

In addition, the extensive amount of variability in diet orders presented several problems. The diet orders did not have simple quantitative values, thus, the three digit diet code was developed. More importantly, the large variety in diet orders coupled with the relatively small sample size produced chi square values which were not significant because in many cases cells contained less than five units. If the sample size had been larger, statistical significance may have been found in some of the categories. In the future when additional research with a similar population is considered, simplification of the diet might be considered by limiting the evaluation to one component part of the diet (e.g., energy) along with increasing the sample size of the population. Additionally, some thought might be given to further limiting the demographics of the population since the population in this study was quite diverse. Since Inova Home Care services such a large geographic area the clients are found in both rural and urban locations, and at both ends of the economic boundaries, and come from a variety of cultural and ethnic

backgrounds. In this study 68.8% of the respondents identified themselves as white, 32.2% identified themselves as black. Although other races were not represented in the study, five of the possible respondents were eliminated because they did not speak English. These factors when evaluated more closely may have a greater effect on dietary compliance and compromised dietary status than was seen in this study.

When dealing with a compromised population such as the elderly homebound, medical care providers including the nutrition professional must consider the functional limitations present and adapt standard treatment plans to the situation. The dietary recommendations established by the American Diabetes Association and the American Dietetic Association are difficult for most diabetics to adhere to (Jenny, 1984). A simplification of diet prescription for the elderly seems appropriate. Diet instruction should emphasize increased consumption of complex carbohydrates and decreased consumption of fat while keeping explanations as simple as possible.

Coulston, Mandelbaum, and Reaven (1990) found glycemic control was not significantly changed in diabetic nursing home patients who changed from a diabetic to a regular diet for an eight week period. Justification for the liberalization of the diabetic diet is supported by this study. However, the individuals in that study lived in a structured environment. Although the homebound live in a restricted environment, dietary intake is not limited as it would be in an institution. Therefore the effect of the regular diet on glycemic control cannot be directly extrapolated to the diabetic homebound population. Additionally, the study by Coulston, Mandelbaum, and Reaven

was for a limited period of time. Effect on glycemic control over an extended period of time was not evaluated. In the homebound elderly maintaining balance within the individual's environment can be the deciding factor with respect to institutionalization. Although more lenient dietary management may be acceptable in the diabetic, homebound elderly, to encourage no diet modification may put that delicate balance at risk.

SUMMARY AND CONCLUSIONS

This research suggests that elderly homebound individuals with diabetes mellitus have difficulty understanding and adhering to diet orders as prescribed by the physician. Because the respondents in this study were unable in most cases to state their diet in the same manner as the prescribed diet order, and generally did not consume a diet equal to the prescribed diet, possible reasons for this incongruence need to be evaluated. The individual recently diagnosed with diabetes mellitus may be having difficulty understanding the component parts of a complex diet order. Particularly if the individual has never paid attention to dietary intake, the concept of following a restricted dietary pattern can be overwhelming. It is the physician's responsibility to make sure the diabetic individual becomes comfortable with his/her diet prescription and that it means not only in the literal sense of energy and nutrients, but also in terms of food selection and preparation and changes to the individual's life style. If the physician is unable to impart this information and counseling personally, then it is the physician's responsibility to find a qualified individual, preferably a nutrition professional, to work with the diabetic patient.

The nutrition professional in practice today should be an enthusiastic advocate of active involvement between the physician, the patient, and the nutrition consultant. It is important that nutrition services become a more intricate component of an individual's health plan. This is particularly true for those individuals diagnosed with chronic health

problems where nutrition intervention has already been established as contributing to control of the disease process.

Implementing dietary counseling can become a difficult task when the diabetic individual is elderly and homebound. Instead of the diabetic individual going to the nutrition professional as happens in inpatient facilities or outpatient clinics, the nutrition professional must go to the client. This poses another set of problems directly related to the fact that nutrition services are not reimbursable through most third party payers including Medicare. Nutrition professionals must be paid for their time and expertise. In addition, helping an older person learn and implement a new diet cannot be accomplished in one session. Nutrition intervention should be ongoing for the individual with diabetes mellitus providing new information, reviewing old nutrition information, and adjusting the dietary pattern according to changes in the disease condition. Rettig et al (1986) reported individuals who received continuous instruction in diabetes self care during a six month period showed significantly higher self care skills than those who did not. Instruction was not continued after six months and at twelve months the diabetes care skills in the two groups were found to be equal.

Cost effective methods of providing continued nutrition intervention to the diabetic homebound individual need to be found. Previous research has evaluated the use of a Dial-A-Dietitian system (Robbins and Mullins, 1985) and the receipt of nutrition information in pension check envelopes (Shannon and Pelican, 1984). Both methods of conveying nutrition information were well received by the populations studied. A video

lending library with a nutrition professional available by telephone to answer questions and give support to the individual might provide a program with low maintenance costs once the initial program is established. This might work well with the homebound population with materials exchanging hands through the mail or during visits by a home health agency representative. Another possibility in this media saturated society could be public service programming with segments directed at the Dietary Guidelines for Americans with methods suggested for individualizing the meal plan. Older Americans, particularly the homebound, spend a large portion of their time watching television. Thus, this seems the ideal way to modify the public's dietary habits.

Another possibility would be to develop a method for nutrition information to be passed along via another elderly diabetic individual who is not homebound and who has received training in providing nutrition information. Keller, Flatten, and White (1988) evaluated the use of a friendly visitor to provide homebound individuals with health related community services. Because of the similarities between the two individuals a mutual support system may develop, possibly improving the compliance of both individuals.

If nutrition services continue to be unrecognized as a separate service by third party payers, then providing nutrition information through the registered nurse must be considered. Except for seeing the physician once or maybe twice a month, this homebound population had no means for diet instruction other than the home health nurse. The nurse's time with each patient is limited so nutrition education must be fitted

in among the other components of care. Since nutrition education and the implementation of dietary guidelines may not be areas in which all nurses feel comfortable, diet teaching may not be emphasized. One possibility in the home care setting is to utilize a nurse nutrition specialist in much the same manner as a cardiac or oncology specialist. The specialist visits the client and updates the case manager after the visit. The agency gets paid for the nursing visit. This method may not provide the continued counseling that would be optimum for diabetic individuals, but it would provide both the diabetic individual and the nurse case manager with additional information and guidelines.

Since who is going to provide nutrition education has been discussed, what might be the best nutrition intervention for this population? A major concern with this population appears to be a lack of understanding of what the prescribed diet should be. Therefore, diet prescriptions should be kept as uncomplicated as possible. Emphasis in educating the homebound diabetic on good dietary habits should center around lowering fat intake and increasing intake of complex carbohydrates as established in the guidelines by the American Diabetes Association and the American Dietetic Association. This may be especially difficult for clients who have been diabetic for an extended period of time because only in the last 10 to 15 years has increased consumption of carbohydrates by diabetic individuals been viewed as desirable. Even in the general population bread and pasta are still considered by many to contribute to weight gain. Also, decreasing fat intake requires as much reeducation in cooking methods and table habits as it does in

identifying and reducing foods high in fat such as potato chips or chocolate cake. For the elderly diabetic strict adherence to these guidelines may be unrealistic since dietary patterns are well established and individuals may not be willing to change. Nevertheless, individuals should be continuously encouraged to modify their dietary intake. Developing separate recommendations for the diabetic elderly which are less stringent may be practical.

In addition, special attention must be paid to the unique needs of the homebound population who may be both physically and financially compromised. Sufficient funds must be available to purchase and prepare food adequately. Another problem specific to this population is who does the shopping and food preparation. The homebound diabetic individual cannot leave his/her home to do grocery shopping and may not have the endurance to do the cooking. Although home delivered meals are available to many homebound individuals, consistent nutrient value and quality of the meals have not been standardized nationwide. No amount of nutrition education and diet instruction will be productive if it is not provided to someone empowered to implement the information. Some consideration must be given to how to educate care givers as well as patients without increasing costs.

In looking to the future, nutrition education should be provided to children so their dietary habits develop from the best information that is currently available. Adults of all ages should be encouraged by whatever means available to change their dietary habits. The old adage "an ounce of prevention is worth a pound of cure" certainly

applies, particularly as there is no cure for diabetes mellitus.

Opportunities for Further Research

Research on diet compliance as related to specific aspects of the homebound individual's living situation such as who does the food preparation is a starting point for important research. New opportunities and methods for nutrition education for the homebound is another area that could be explored. The interdependence of the physician, the nutrition professional, and the diabetic homebound individual is another area where research can be expanded, particularly with respect to simplifying and understanding the diet prescription before it is implemented. Looking at lifetime dietary patterns and their influence on development and control of chronic disease and the effect of nutrition education is another possible area for research. The psychological effect of varying degrees of diet restriction on diet compliance with diabetic, elderly, and homebound populations is also important. Continued research in the complexities of establishing and implementing new dietary habits needs to be pursued in the general population, the diabetic population and the homebound population. Finally, dietary research methodology for use with elderly homebound populations must be developed and evaluated.

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APPENDICES



8003 Forbes Place
Springfield, Virginia 22151
703 321-7979

August 19, 1991

Dear Inova Home Care Client,

One of the many important aspects of our services at Inova Home Care is the information the nurses give clients during their recovery after a recent illness and/or hospitalization. Along with teaching the right medication dose or signs and symptoms of a specific condition is the review of appropriate diet as related to the health of the client. In trying to improve our nutrition services, one of our employees, Ms. Abbie Beemer, has developed a research project as part of her masters program in nutrition from Virginia Polytechnic Institute and State University that will allow us to gather information from our clients regarding their diet and any food-related problems they may have.

This is where you can help. In the near future Ms. Beemer will be calling and asking you to allow her to come to your home and interview you regarding your diet. Answering her questions should take approximately one hour. She will set up a time for her visit similar to the way the nurse sets her schedule. Ms. Beemer and I would greatly appreciate your allowing her to come into your home. If you are at all concerned about the procedure please feel free to call the agency and verify the research project and Ms. Beemer's employment with the agency. The number for the office is 321-7979. Thank you for your cooperation.

Sincerely,

Linda Scott, RN
Administrator Inova Home Care



8003 Forbes Place
Springfield, Virginia 22151
703 321-7979

I have agreed to participate in a nutrition study sponsored by Inova Home Care and Virginia Polytechnic Institute and State University. The study will be conducted by Abigail Beemer as part of her master's program in nutrition and will provide important information to help Inova Home Care improve nutrition instruction to clients. Ms. Beemer will come into my home for approximately one hour and ask me to respond to questions relating to my diet and any food related problems I may have. At any time I may refuse to answer a particular question or I may choose to terminate the interview.

All information collected during the research will remain confidential and the respondents will not be mentioned by name at any time. If I have any questions I may call Dr. Ernest Stout, Assistant Provost for Research at, Virginia Polytechnic Institute and State University at 703-231-9359 or Ms Linda Scott, Administrator of Inova Home Care at 321-7979.

Signature: _____

Date: _____

Interviewer: _____ Date: _____

THIS PAGE FOR OFFICE USE
PLEASE GO TO NEXT PAGE

Information for coders:

- Columns 1-10 are identical on each "card". They are omitted after page 2, but should be repeated on each card.
- Col. 90 is blank on each card.
- Enter number of the response which was checked (e.g., 1 for male, 2 for female).
- For those questions in which a quantity is entered (e.g., years), code as entered.
- "9" = Not Stated or Don't know. Leave no blanks. (Blanks are permitted in name and address fields on p. 1, and occupation field on p. 9).
- P. 1, Col. 64-65, Col. 62-63: Use state codes shown below.
- P. 3, Col. 11-17: Include century of birth: MM DD YYY.
- P. 3, Q 10: For each vitamin, code # pills in first two columns; code day, week, etc., in third column (1 = day, 2 = week, 3 = month, 4 = year); code mg/pill in fourth column, using codes shown at bottom of p. 3. If more than one "other vitamin" is checked, code = 8.
- P. 5-6: Code as shown on p. 4.
- P. 7, Q 14: Code first two columns of each food using codes at bottom of p.7, or additional codes from codebook or database. Code remaining four columns as shown at bottom of p.4.
- P. 8, Col. 71-18: No-Yes in 1st column; # times in 2nd col. (8 = 8 or more); age in 3rd-4th col.
- P. 8, Col. 46-47, 50-51: Use codes at bottom of p. 8.

State codes:

01 AL Alabama	13 ID Idaho	25 MS Mississippi	37 OK Oklahoma	49 WV West Virginia
02 AK Alaska	14 IL Illinois	26 MO Missouri	38 OR Oregon	50 WI Wisconsin
03 AZ Arizona	15 IN Indiana	27 MT Montana	39 PA Pennsylvania	51 WY Wyoming
04 AR Arkansas	16 IA Iowa	28 NE Nebraska	40 RI Rhode Island	52 PR Puerto Rico
05 CA California	17 KS Kansas	29 NV Nevada	41 SC South Carolina	53 VI Virgin Islands
06 CO Colorado	18 KY Kentucky	30 NH New Hampshire	42 SD South Dakota	54 GU Guam
07 CT Connecticut	19 LA Louisiana	31 NJ New Jersey	43 TN Tennessee	55 Canada
08 DE Delaware	20 ME Maine	32 NM New Mexico	44 TX Texas	56 Cuba
09 DC District of Col.	21 MD Maryland	33 NY New York	45 UT Utah	57 Mexico
10 FL Florida	22 MA Massachusetts	34 NC North Carolina	46 VT Vermont	59 Remainder of World
11 GA Georgia	23 MI Michigan	35 ND North Dakota	47 VA Virginia	99 Unknown or blank
12 HI Hawaii	24 MN Minnesota	36 OH Ohio	48 WA Washington	

Information for proper use of analysis program:

For use with the Personal Computer analysis program, the questionnaire must be keyed in 80-column lines, with the ID field in columns 1-10 of each line, and a line-identifying letter in column 79 of each line, starting with "A" and progressing evenly upward. For use with the mainframe program, the ID and line-ID requirements are less rigid. See Health Habits and History Questionnaire information package for further instructions.

Version 02 of this questionnaire (this version) differs slightly from earlier versions. To use the diet analysis program with this version, you must select the "Nonstandard" option ("STANDQ = N"), and provide the program with the following information, when prompted:

Number of characters = 960

Position of variables:	Card	Col.		Card	Col.		Card	Col.
Name	A	17	Amt. of weight change	J	67	Type of cooking fat	J	54
Age	C	18	First special diet	C	70	Fat on vegetables	J	56
Sex	C	20	Second special diet	C	71	intake of vitamins	C	43
Height (ft.)	L	43	Whether eats skin	J	47	intake of multiple vits.	C	44
Height (in.)	L	44	Whether eats fat	J	48	intake of single vits.	C	53
Weight	L	46	Freq. of cooking fat	J	51	intake of other vits.	C	69
Weight change	J	68	Unit of cooking fat	J	53	Types of restaurants	C	72

- In addition, if you set VEGADJ = Y, tell it J61 when prompted.
- In addition, if you set ADDSALT = Y, tell it J49 when prompted.
- In addition, if you set COLDCER = Y, tell it J58 when prompted.
- In addition, if you set FRTADJ = Y, tell it J64 when prompted.

Number of food fields = 12

Field	Card	Col.	# foods	Field	Card	Col.	# foods	Field	Card	Col.	# foods
1	D	11	15	5	F	11	17	9	G	59	5
2	D	75	1	6	G	11	4	10	H	11	17
3	E	11	12	7	C	31	7	11	I	11	1
4	E	63	4	8	E	59	1	12	J	43	3

All 98 foods included? No
Number not included = 3 Which ones = 6 8 20

Number of extra foods = 3

- 1 Food: Card D col. 71 Food code: Card I col. 67
- 2 Food: Card G col. 27 Food code: Card I col. 69
- 3 Food: Card I col. 39 Food code: Card I col. 71

Number of open-ended foods = 0 Open-ended information starts in Card I col. 11

If you modify this questionnaire, you must change the above variables to correspond with your revised version

PERSONAL INFORMATION, HABITS

3
8

1. When were you born? _____
Month Day Year

2. How old are you? _____ years

3. Sex: 1 ___ Male 2 ___ Female

4. Race or ethnic background:
 1 ___ White, not of Hispanic origin 4 ___ American Indian/Alaskan native
 2 ___ Black, not of Hispanic origin 5 ___ Asian
 3 ___ Hispanic 6 ___ Pacific Islander

5. Please circle the highest grade in school you have completed:
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16+

6. What is your marital status? 1 ___ Single 3 ___ Widowed
 2 ___ Married 4 ___ Divorced/Separated

7. How many times have you moved or changed residences in the last ten years? _____ times

8. Have you smoked at least 100 cigarettes in your entire life? 1 ___ No 2 ___ Yes If Yes, →

IF YES: About how old were you when you first started smoking cigarettes fairly regularly?
 _____ years old

On the average of the entire time you smoked, how many cigarettes did you smoke per day?
 _____ cigarettes per day

Do you smoke cigarettes now? 1 ___ No 2 ___ Yes

IF NO: How old were you when you stopped smoking? _____ years old

IF YES: On the average, about how many cigarettes a day do you smoke now? _____ cigarettes

9. Have you ever smoked a pipe or cigars regularly? 1 ___ No 2 ___ Yes If Yes, →

IF YES: For how many years? _____ years

About how much? _____ pipes or cigars per _____
(day or week)

10. During the past year, have you taken any vitamins or minerals?
 1 ___ No 2 ___ Yes, fairly regularly 3 ___ Yes, but not regularly If Yes, →

What do you take fairly regularly? # of PILLS per DAY, WEEK, etc.

Multiple Vitamins

One-a-day type _____ pills per _____

Stress-tabs type _____ pills per _____

Therapeutic, Theragran type _____ pills per _____

Other Vitamins

Vitamin A _____ pills per _____ → _____ IU per pill

Vitamin C _____ pills per _____ → _____ mg per pill

Vitamin E _____ pills per _____ → _____ IU per pill

Calcium or dolomite _____ pills per _____ → _____ mg per pill

Other (What?) 1 ___ Yeast 2 ___ Selenium 3 ___ Zinc 4 ___ Iron 5 ___ Beta-carotene
 6 ___ Cod liver oil 7 ___ Other _____

Please list the brand of multiple vitamin/mineral you usually take: _____

11
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57
61
65
69

FOR OFFICE USE

Q10, mg or IU: 1 = 50-100 2 = 200-250 3 = 400-500 4 = 1000 5 = 5000 6 = 10,000 7 = 20,000-25,000 8 = 50,000 9 = Unk.

11. Are you on a special diet?

1 ___ No 2 ___ Weight loss 3 ___ For medical condition 4 ___ Vegetarian 5 ___ Low salt
6 ___ Low cholesterol 7 ___ Weight gain

OFFICE USE

70

12. How often do you eat the following foods from *restaurants* or *fast food places*?

RESTAURANT FOOD	1 Almost every day	2 2-4 times a week	3 Once a week	4 1-3 times a month	5 5-10 times a year	6 1-4 times a year	7 Never, or less than once a year
Fried chicken							
Burgers							
Pizza							
Chinese food							
Mexican food							
Fried fish							
Other foods							

72
73
74
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78

13. This section is about your *usual* eating habits. Thinking back over the past year, how often do you usually eat the foods listed on the next page?

First, check (✓) whether your usual serving size is small, medium or large. (A small portion is about one-half the medium serving size shown, or less; a large portion is about one-and-a-half times as much, or more.)

C
79 80

Then, put a **NUMBER** in the most appropriate column to indicate **HOW OFTEN**, on the average, you eat the food. You may eat bananas *twice a week* (put a 2 in the "week" column). If you never eat the food, check "Rarely/Never." Please **DO NOT SKIP** foods. And please **BE CAREFUL** which column you put your answer in. It will make a big difference if you say "Hamburger once a day" when you mean "Hamburger once a week"!

Some items say "in season." Indicate how often you eat these just in the 2-3 month time when that food is in season. (Be careful about overestimating here.)

Please look at the *example* below. This person

- 1) eats a medium serving of cantaloupe once a week, in season.
- 2) has 1/2 grapefruit about twice a month.
- 3) has a small serving of sweet potatoes about 3 times a year.
- 4) has a large hamburger or cheeseburger or meat loaf about four times a week.
- 5) never eats winter squash.

EXAMPLE:

	Medium Serving	Your Serving Size	How often?				
			Day	Week	Month	Year	Rarely/ Never
Cantaloupe (in season)	1/4 medium	✓		1			
Grapefruit	1 (1/2)	✓			2		
Sweet potatoes, yams	1/2 cup	✓				3	
Hamburger, cheeseburger, meat loaf	1 medium			4			
Winter squash, baked squash	1/2 cup						✓

PLEASE GO TO NEXT PAGE

+

FOR OFFICE USE

On the following two pages, code the four characters for each food as follows:

S-1 No
M-2 Times
L-3
NS-4 NS-99

Da-1
Wk-2
Mo-3
Yr-4
Nev-5
NS-9

If respondent places a checkmark in the "How often" columns, do not impute "01", once, instead, code "99", Not Stated. If respondent does not check a portion size, do not impute medium, but code "9".

	Medium Serving	Your Serving Size	How often?					OFFICE USE
			Day	Week	Month	Year	Rarely/ Never	
FRUITS & JUICES			S M L					
EXAMPLE - Apples, applesauce, pears	(1) or 1/2 cup	✓		4				
Apples, applesauce, pears	(1) or 1/2 cup							11
Bananas	1 medium							15
Peaches, apricots (canned, frozen or dned, whole year)	(1) or 1/2 cup							19
Peaches, apricots, nectarines (fresh, in season)	1 medium							23
Cantaloupe (in season)	1/4 medium							27
Watermelon (in season)	1 slice							31
Strawberries (fresh, in season)	1/2 cup							35
Oranges	1 medium							39
Orange juice or grapefruit juice	6 oz. glass							43
Grapefruit	(1/2)							47
Tang, Start breakfast drinks	6 oz. glass							51
Other fruit juices, fortified fruit drinks	6 oz. glass							55
Any other fruit, including berries, fruit cocktail	1/2 cup							59
VEGETABLES			S M L					
String beans, green beans	1/2 cup							63
Peas	1/2 cup							67
Chili with beans	3/4 cup							71
Other beans such as baked beans, pintos, kidney beans, limas	3/4 cup							75
Corn	1/2 cup							11
Winter squash, baked squash	1/2 cup							15
Tomatoes, tomato juice	(1) or 6 oz.							19
Red chili sauce, taco sauce, salsa picante	2 Tblsp. sauce							23
Broccoli	1/2 cup							27
Cauliflower or brussel sprouts	1/2 cup							31
Spinach (raw)	3/4 cup							35
Spinach (cooked)	1/2 cup							39
Mustard greens, turnip greens, collards	1/2 cup							43
Cole slaw, cabbage, sauerkraut	1/2 cup							47
Carrots, or mixed vegetables containing carrots	1/2 cup							51
Green salad	1 med. bowl							55
Salad dressing, mayonnaise (including on sandwiches)	2 Tblsp.							59
French fries and fried potatoes	3/4 cup							63
Sweet potatoes, yams	1/2 cup							67
Other potatoes, including boiled, baked, potato salad	(1) or 1/2 cup							71
Rice	3/4 cup							75
Any other vegetable, including cooked onions, summer squash	1/2 cup							11
Butter, margarine or other fat on vegetables, potatoes, etc.	2 pats							15
MEAT, FISH, POULTRY & MIXED DISHES			S M L					
Hamburgers, cheeseburgers, meat loaf	1 medium							19
Beef—steaks, roasts	4 oz.							23
Beef stew or pot pie with carrots, other vegetables	1 cup							27
Liver, including chicken livers	4 oz.							31
Pork, including chops, roasts	2 chops or 4 oz.							35
Fried chicken	2 sm. or 1 lg. piece							39
Chicken or turkey, roasted, stewed or broiled	2 sm. or 1 lg. piece							43
Fried fish or fish sandwich	4 oz. or 1 sand.							47
Tuna fish, tuna salad, tuna casserole	1/2 cup							51
Shell fish (shrimp, lobster, crab, oysters, etc.)	(5) 1/4 cup or 3 oz.							55
Other fish, broiled, baked	4 oz.							59
Spaghetti, lasagna, other pasta with tomato sauce	1 cup							63
Pizza	2 slices							67
Mixed dishes with cheese (such as macaroni and cheese)	1 cup							71

	Medium Serving	Your Serving Size	How often?					OFFICE USE	
			Day	Week	Month	Year	Rarely/ Never		
LUNCH ITEMS									
Liverwurst	2 slices							75	F 79 80
Hot dogs	2 dogs							11	
Ham, lunch meats	2 slices							15	
Vegetable soup, vegetable beef, minestrone, tomato soup	1 med. bowl							19	
Other soups	1 med. bowl							23	
BREADS / SALTY SNACKS / SPREADS									
Biscuits, muffins, burger rolls (incl. fast foods)	1 med. piece							27	
White bread (including sandwiches), bagels, etc., crackers	2 slices, 3 cracks							31	
Dark bread, including whole wheat, rye, pumpernickel	2 slices							35	
Corn bread, corn muffins, corn tortillas	1 med. piece							39	
Salty snacks (such as chips, popcorn)	2 handfuls							43	
Peanuts, peanut butter	2 Tblsp.							47	
Butter on bread or rolls	2 pats							51	
Margarine on bread or rolls	2 pats							55	
Gravies made with meat drippings, or white sauce	2 Tblsp.							59	
BREAKFAST FOODS									
High fiber, bran or granola cereals, shredded wheat	1 med. bowl							63	
Highly fortified cereals, such as Product 19, Total, or Most	1 med. bowl							67	
Other cold cereals, such as Corn Flakes, Rice Krispies	1 med. bowl							71	
Cooked cereals	1 med. bowl							75	G 79 80
Sugar added to cereal	2 teaspn.							11	
Eggs	1 egg = small, 2 eggs = medium							15	
Bacon	2 slices							19	
Sausage	2 patties or links							23	
SWEETS									
Ice cream	1 scoop							27	
Doughnuts, cookies, cakes, pastry	1 pc. or 3 cookies							31	
Pumpkin pie, sweet potato pie	1 med. slice							35	
Other pies	1 med. slice							39	
Chocolate candy	small bar, 1 oz.							43	
Other candy, jelly, honey, brown sugar	3 pc. or 1 Tblsp.							47	
DAIRY PRODUCTS									
Cottage cheese	1/2 cup							51	
Other cheeses and cheese spreads	2 slices or 2 oz.							55	
Flavored yogurt	1 cup							59	
Whole milk and bevs. with whole milk (not incl. on cereal)	8 oz. glass							63	
2% milk and bevs. with 2% milk (not incl. on cereal)	8 oz. glass							67	
Skim milk, 1% milk or buttermilk (not incl. on cereal)	8 oz. glass							71	
BEVERAGES									
Regular soft drinks	12 oz. can or bottle							75	H 79 80
Diet soft drinks	12 oz. can or bottle							11	
Beer	12 oz. can or bottle							15	
Wine	1 med. glass							19	
Liquor	1 shot							23	
Decaffeinated coffee	1 med. cup							27	
Coffee, not decaffeinated	1 med. cup							31	
Tea (hot or iced)	1 med. cup							35	
Lemon in tea	1 teaspn.							39	
Non-dairy creamer in coffee or tea	1 Tblsp.							43	
Milk in coffee or tea	1 Tblsp.							47	
Cream (real) or Half-and-Half in coffee or tea	1 Tblsp.							51	
Sugar in coffee or tea	2 teaspn.							55	
Artificial sweetener in coffee or tea	1 packet							59	
Glasses of water, not counting in coffee or tea	8 oz. glass							63	

14. Think about your diet over the last year and the responses you have just made on this questionnaire. Are there any foods not mentioned which you ate *at least once a week*, even in small quantities, or ate frequently in a particular season? Consider other meats, breakfast foods, catsup, green chilies or jalapenos, avocado (guacamole), Mexican dishes, Chinese or other ethnic foods, other fruits or vegetables, as well as nutritional supplements (bran, etc). Please take a look at the list of foods at the bottom of the page.

FOOD

	Your Serving Size			How Often?		OFFICE USE Code	Amounts
	S	M	L	Day	Week		
						11	-----
						17	-----
						23	-----
						29	-----
						35	-----
						41	-----

- | | 1
Seldom/Never | 2
Sometimes | 3
Often/Always | | |
|-----------------------------------------------|-------------------|----------------|-------------------|----|-----|
| 15. How often do you eat the skin on chicken? | _____ | _____ | _____ | 47 | --- |
| How often do you eat the fat on meat? | _____ | _____ | _____ | 48 | --- |
| How often do you add salt to your food? | _____ | _____ | _____ | 49 | --- |
| How often do you add pepper to your food? | _____ | _____ | _____ | 50 | --- |

16. How often do you use fat or oil in cooking?
For example, in frying eggs, meat or vegetables? _____ times per _____
day, week, month
- 51 -----

17. What do you usually cook with? 1 ___ Don't know or don't cook 2 ___ Soft margarine
3 ___ Stick margarine 4 ___ Butter 5 ___ Oil 6 ___ Lard, fatback, bacon fat
7 ___ Pam or no oil
- 54 -----

18. What kind of fat do you usually add to vegetables, potatoes, etc?
1 ___ Don't add fat 2 ___ Soft margarine 3 ___ Stick margarine 4 ___ Butter
5 ___ Half butter, half margarine 6 ___ Lard, fatback, bacon fat
- 56 -----

19. If you eat cold cereal, what kind do you eat most often? _____
- 58 -----

20. Not counting salad or potatoes, about how many
vegetables do you eat per day or per week?
_____ vegetables per _____ day, week
- 61 -----

21. Not counting juices, how many fruits do you
usually eat per day or per week?
_____ fruits per _____ day, week
- 64 -----

22. Have you gained or lost more than five pounds in the past year? (You may check more than one answer.)
1 ___ No 2 ___ Lost 5-15 lbs. 3 ___ Lost 16-25 lbs. 4 ___ Lost more than 25 lbs.
5 ___ Gained 5-15 lbs. 6 ___ Gained 16-25 lbs. 7 ___ Gained more than 25 lbs.
- 67 -----

68

DO YOU EAT THESE ONCE A WEEK*

veal, lamb	01	pancakes, waffles	21	onions	41	H-C
tofu	03	instant breakfast, metrecal	22	summer squash	42	cranberry juice cocktail
mixed dish w/meat	04	pudding	23	asparagus	43	grapes
mixed dish w/chicken	05	milkshake	24	sweet green peppers	44	mangoes
Chinese dishes	06	other dairy product	25	sweet red peppers	45	papayas
Mexican dishes	07	other dessert, sweet	26	bean sprouts	46	honeysuckle or cassaba melon
seafood creole	08	sour cream, dips	31	avocado, guacamole	47	lemons or lemon juice
refried beans or bean burritos	09	diet salad dressing	32	beets	48	nuts and seeds
Polish or Italian sausage	10	catsup	33	pineapple or pineapple juice	51	bran
cream soups	11	green chilies, jalapenos	34	prunes or prune juice	52	other vegetable/fruit
						not mentioned here

MEDICAL INFORMATION

OFFICE USE

23. In the past five years, how many times have you been hospitalized?
(if female, omit childbirths) _____ times

70 _____

24. Have you ever had any of the following tests or treatments?

	1 NO	2 YES	IF YES, HOW MANY TIMES?	AGE AT FIRST TREATMENT
X-ray treatments for acne, ringworm, enlarged tonsils, adenoids, thymus	_____	_____	_____	_____
Treatment with radium, cobalt, or other radioactive isotopes	_____	_____	_____	_____
Upper GI series (x-ray of stomach after drinking white liquid)	_____	_____	_____	_____
Lower GI series (Barium enema)	_____	_____	_____	_____

71 _____

73 _____ $\frac{J}{79 \ 80}$

11 _____

15 _____

25. Have you ever been told by a doctor that you had any of the following conditions?

	1 NO	2 YES	DON'T KNOW		1 NO	2 YES	DON'T KNOW
Heart disease or angina				Kidney disease			
Heart attack				Bladder disease			
High blood pressure				Liver cirrhosis			
Stroke				Hepatitis			
Tuberculosis				Stomach ulcers			
Chronic bronchitis or emphysema				Rheumatoid arthritis			
Asthma				Other arthritis			
Hay fever				Osteoporosis			
Diverticulosis				Fractured hip			
Rectal/colon polyps				Prostate trouble			
Chronic colitis				Abnormal Pap smear			
Diabetes				Skin cancer			
Thyroid condition				Leukemia			
				Other cancer			

19 _____

21 _____

23 _____

25 _____

27 _____

29 _____

31 _____

33 _____

35 _____

37 _____

39 _____

41 _____

43 _____

45 _____

If yes to leukemia, skin, or other cancer, fill in below:

What kind of cancer? (Lung, breast, etc.) _____ Year 1st Diagnosed _____

46 _____

What kind of cancer? (If you had a second) _____ Year 1st Diagnosed _____

50 _____
(See codes below)

26. In the past year, have you had

	1 NO	2 YES		1 NO	2 YES
Bleeding or sore gums	_____	_____	Difficulty seeing in the dark	_____	_____
Bruise easily	_____	_____	Frequent or chronic fever	_____	_____
Nosebleeds	_____	_____	Frequent constipation or hemorrhoids	_____	_____

54 _____

56 _____

58 _____

PLEASE GO TO NEXT PAGE

FOR OFFICE USE

Ca _____	Yr _____	01—Bladder	09—Liver	17—Rectum
		02—Bone	10—Leukemia	18—Skin—Melanoma
		03—Brain	11—Lung, bronchus	19—Skin—Not melanoma (Basal or squamous)
		04—Breast	12—Lymphoma, including Hodgkins	20—Skin—Not specified
		05—Cervix	13—Mouth, oral	21—Stomach
		06—Colon	14—Ovary	22—Thyroid
		07—Esophagus	15—Pancreas	23—Uterus
		08—Kidney	16—Prostate	24—Other

OCCUPATIONAL INFORMATION

OFFICE USE

27. What is your current employment status? Check the one that applies to the greatest percent of your time.

- 1 Employed
- 2 Homemaker
- 3 Retired
- 4 Disabled, unable to work
- 5 Unemployed
- 6 Student
- 7 Other

60

28. What has been your usual occupation or job — the one you have worked at the longest? (For example, carpenter, executive, salesman, foreman, waitress, truck driver)

Job/occupation _____

61

Years in this job _____

70

In your work, did you spend more time 1 indoors 2 outdoors? (Please check one.)

72

29. In your work, have you ever been exposed for a year or more to any of the following?

	1 NO	2 YES	DON'T KNOW
Asbestos			
Radiation			
Welding			
Coal tar, soot, pitch, creosote, asphalt			
Mineral, cutting or lubricating oil			
Benzidine, beta-naphthylamine			
Benzene			
Isopropyl oil			
Dyestuffs			
Arsenic			

	1 NO	2 YES	DON'T KNOW
Iron foundry			
Nickel smelting			
Underground mining			
Lumber industry, or heavy wood dust			
Rubber or cablemaking industry			
Chemical or plastics industry			
Pesticides, herbicides			
Mustard gas			
Chromium			
Cadmium, beryllium, vinyl chloride			

73

75

77

K
79

11

13

15

17

19

21

23

FAMILY HISTORY

30. Have any close relatives had cancer? 1 No 2 Yes

25

IF YES, please fill this out for each blood relative who had cancer. Include your natural parents, sisters and brothers, daughters and sons, grandparents.

One RELATIVE per line (Mother, son, etc.)	Circle one		If Alive, give age	If Dead, give age at death	Type of Cancer	Age at Diagnosis
	1	2				
	Alive	Dead				
	Alive	Dead				
	Alive	Dead				
	Alive	Dead				
	Alive	Dead				

26 See below

PLEASE GO TO NEXT PAGE

FOR OFFICE USE

M-1 Sn-3 Dis codes
F-2 Di-4 See p 3
B-3 GF-7
S-4 CM-4

No. Rel.	Rel.	Al. Dd.	Age	Dis	Age
25					
35					

OTHER HEALTH FACTORS

OFFICE USE

31. How tall are you? ___ feet ___ inches 32. How much do you weigh? ___ pounds 43

33. What is the most you have ever weighed? ___ pounds 49

34. About how many times have you gone on a diet to lose weight?
 ___⁽¹⁾Never ___⁽²⁾1-2 ___⁽³⁾3-5 ___⁽⁴⁾6-8 ___⁽⁵⁾9-11 ___⁽⁶⁾12 or more times 52

35. How many hours of sleep do you usually get at night?
 ___⁽¹⁾6 hours or less ___⁽²⁾7 hours ___⁽³⁾8 hours ___⁽⁴⁾9 hours or more 53

36. How often do you feel under stress which makes you tense or worried, or causes physical problems such as stomach or back trouble or headaches?
 ___⁽¹⁾Every day ___⁽²⁾Several times a week ___⁽³⁾Several times a month ___⁽⁴⁾Several times a year ___⁽⁵⁾Rarely or never 54

37. Here is a list of active things that people do in their free time. How often do you do any of these things?

	1 MORE THAN ONCE A WEEK	2 ABOUT ONCE A WEEK	3 A FEW TIMES A MONTH	4 A FEW TIMES A YEAR	5 RARELY OR NEVER	
Active sports	_____	_____	_____	_____	_____	55
Doing physical exercises	_____	_____	_____	_____	_____	56
Jogging or running	_____	_____	_____	_____	_____	57
Swimming or taking long walks	_____	_____	_____	_____	_____	58
Gardening, fishing, hunting	_____	_____	_____	_____	_____	59
Something else	_____	_____	_____	_____	_____	60

38. How many close friends do you have? (People that you feel at ease with, can talk to about private matters, and can call on for help.)
 ___⁽¹⁾None ___⁽²⁾1 or 2 ___⁽³⁾3 to 5 ___⁽⁴⁾6 to 9 ___⁽⁵⁾10 or more 61

How many relatives do you have that you feel close to?
 ___ None ___ 1 or 2 ___ 3 to 5 ___ 6 to 9 ___ 10 or more 62

How many of these friends or relatives do you see or talk to at least once a month?
 ___ None ___ 1 or 2 ___ 3 to 5 ___ 6 to 9 ___ 10 or more 63

39. How often do you participate in the following groups or activities?

	1 MORE THAN ONCE A WEEK	2 ABOUT ONCE A WEEK	3 A FEW TIMES A MONTH	4 A FEW TIMES A YEAR	5 RARELY OR NEVER	
Go to church or temple	_____	_____	_____	_____	_____	64
Participate in group meetings or activities (such as clubs, PTA, professional, labor or service groups)	_____	_____	_____	_____	_____	65

Please take a moment to fill in any questions you may have skipped. Version # 2/2

THANK YOU VERY MUCH for taking the time to fill out this information. The answers you have given will be very useful in interpreting the results of this study, and in helping to understand and control disease. Your participation is sincerely appreciated. Coder 1/1

2/2
1/1
1/1

APPENDIX D

Survey # _____
ID # _____

1. What were the dates of your last hospitalization?

2. How long has the home care nurse been coming?
_____ < 1 week (01) _____
_____ 1-2 weeks (02) _____
_____ 2-4 weeks (03) _____
_____ 4-8 weeks (04) _____
_____ > 8 weeks (05) _____
3. List of medications.

4. Are you insulin dependent? yes _____ no _____
5. Pay source _____
6. What do you usually cook with: sugar, brown sugar, honey, sugar substitute? _____
7. Is the canned fruit you eat packed in heavy syrup, light syrup, juice, or water? _____
8. Who does your grocery shopping? self, spouse, child, other family, other -please specify? _____
9. Who prepares the food you eat: self, spouse, child, other - please specify? _____
10. Does MOW deliver to you? _____
11. Did you have to give up any foods that you liked after you found out you had diabetes? _____
Which ones? _____
12. Do you eat any foods now that you didn't eat before?
What are they? _____
13. Are there any foods that you are supposed to eat that it is difficult for you to get? _____
What are they? _____

14. Have you changed the amount of food you eat now from & before? _____
Do you eat more or less? _____
15. Do you have any trouble having enough money to purchase the right foods for you to eat? _____
16. What kind of diet, if any, does your physician want you to follow? _____
17. Does your doctor allow you to eat as much as you want? _____
18. Does your doctor want you to lose weight? _____
How much? _____
19. What was the reason your doctor put you on the kind of diet you are on, if any? _____

20. Can you explain your diet? _____

21. Is this diet easy to follow? _____
If not what are the problems following the diet? _____

22. How well do you think you follow your diet?
very well___ well___ ok___ not very well___ badly___
23. Do you understand your diet?
very well___ well___ ok___ not very well___ badly___
24. Does the home care nurse go over your diet with you? _____
25. How often does the home care nurse review your diet with you?
daily___ weekly___ 2x/wk___ 3x/wk___ occas.___ Q visit___
26. Insulin Dependent _____
27. Diet order _____
28. Comments:

APPENDIX E

Diet Key

Energy Diet Order:

Regular	1
No Concentrated Sweets	2
1800 kcal	3
1500 kcal	4
1200 kcal	5

Sex:

Male	1
Female	2

Sodium Diet Order:

Regular	1
No Added Salt	2
Low Sodium/4 gm Na	3
2 gm Na	4

Time Diabetic:

< 1 Year	1
1-2 Years	2
3-5 Years	3
6-10 Years	4
> 10 Years	5

Cholesterol/Fat Diet Order:

Regular	1
Low Cholesterol/Fat	2

Index:

15-25	1
26-30	2
31-35	3

APPENDIX F

APPENDIX F
Diet Order and Actual Intake of Diabetic Home Care Client

Subjects	Physicians Order	Self Report	Energy (kcal)	Carbohydrate (% total kcal)	Protein (% total kcal)	Fat (% Total kcal)	Sweets (% total kcal)	Sex	Age	Years Diabetic	Index Years Diabetic
01	Regular	Regular	2211	57.6	10.3	33.0	26.9	M	73	10.0	5
02	1800, Low Na	No Conc Swt, Low F	1433	53.3	12.3	35.1	6.0	F	85	1.5	2
03	1200	1200, Low Na - C/F	1483	64.7	17.8	16.8	0.3	F	82	15.0	5
04	No Conc Swt, NAS	No Conc Swt, Low Na - F	1453	48.0	21.2	30.3	1.3	F	79	15.0	5
05	1600, 4g Na	Low Na - C	1518	38.7	10.5	52.4	8.3	F	69	0.25	1
06	1800, low residue	Regular	1081	45.6	16.1	39.0	0.0	F	71	0.25	1
07	1800	Regular	1313	44.7	17.0	38.2	2.1	M	91	11.0	5
08	1800, Low Na	No Conc Swt, Low Na - F	2837	39.4	14.0	47.5	7.2	F	68	14.0	5
09	1500	Low Na - F	1583	40.6	15.8	45.2	0.2	F	75	0.25	1
10	1600, Low Na	1600, Low Na	2312	36.4	17.2	44.0	3.8	M	75	0.2	1
11	No Conc Swt	Regular	2425	33.8	12.6	31.4	0.2	M	67	0.25	1
12	1800, Low Na - C/F	1800	2779	39.3	14.9	39.4	0.6	M	72	43.0	5
13	1500	1400, Low Na	1193	43.1	20.0	38.1	2.5	F	69	0.2	1
14	1600, 2g Na, Low C/F	Regular	1537	51.9	16.5	32.1	0.1	F	90	0.4	1
15	1500, Low Na	No Conc Swt	2636	37.4	9.6	52.9	1.7	F	72	0.2	1
16	1800	1800	1689	47.7	19.4	34.6	1.5	M	84	0.2	1
17	No Conc Swt	No Conc Swt	1450	53.1	19.2	27.5	1.5	F	79	0.5	1
18	No Conc Swt	No Conc Swt	1523	33.1	16.3	49.7	7.9	F	69	8.0	4
19	1500	No Conc Swt, Low C/F	1395	54.0	16.0	31.0	3.6	F	68	3.0	3
20	No Conc Swt, Low Na	No Conc Swt	1684	33.7	14.9	52.2	5.1	M	90	16.0	5

Subjects	Physicians Order	Self Report	Energy (kcal)	Carbohydrate (% total kcal)	Protein (% total kcal)	Fat (% Total kcal)	Sweets (% total kcal)	Sex	Age	Years Diabetic	Index Years Diabetic
21	1800,2g Na	1800	1424	50.6	16.3	33.9	1.1	F	51	20.0	5
22	1800,Low C/F	2400,Low C/F	1661	44.4	17.7	37.6	1.1	M	64	5.0	3
23	No Conc Swt, Low Na	No Response	2010	41.8	15.2	42.4	1.3	F	63	2.0	2
24	1800,Low C/F	1800,Low C/F	3088	46.2	15.1	34.1	5.4	M	82	0.25	1
25	No Conc Swt	1500	1356	43.6	14.8	42.3	8.3	F	54	17.0	5
26	1800,Low Na	No Conc Swt,Low Na	2837	41.9	10.1	49.2	7.4	M	77	12.0	5
27	No Conc Swt	1800	1262	39.9	11.5	50.5	8.8	F	64	0.6	1
28	No Conc Swt,Low C/F	No Response	2227	31.1	10.5	53.1	6.7	F	85	26.0	5
29	No Conc Swt	Regular	1311	44.3	12.0	44.6	7.3	F	78	6.0	4
30	1800,2g Na,Low C/F	1800,Low Na	1939	37.2	10.3	51.5	0.2	M	57	29.0	5
31	1500	1600,Low Na - F	2359	41.6	18.2	40.7	1.4	M	55	2.5	2
32	1500	1500	749	41.6	23.5	32.8	0.4	F	60	0.5	1
33	1600,Low Na	No Conc Swt,Low Na	1720	42.5	14.1	44.3	0.7	F	77	0.25	1
34	1500	1500	1331	42.7	13.7	42.9	4.4	F	51	no answer	0
35	2000,Low Na	2000,Low Na	2850	48.4	10.4	43.0	4.2	M	68	0.2	1
36	Low Na - C/F	Regular	2928	36.1	13.5	47.6	2.3	M	72	1.0	1
37	1800	Regular	2517	42.7	13.2	44.4	9.2	M	78	1.0	1
38	2000	Regular	1068	51.3	14.0	33.1	0.1	F	69	4.0	3
39	No Conc Swt,Low Na - C/F	Low Na,no fried foods	1359	48.3	14.9	38.5	0.8	M	79	10.0	4
40	Regular	Low Na - F	2881	31.1	10.4	51.6	13.3	M	68	0.5	1

Subjects	Physicians Order	Self Report	Energy (kcal)	Carbohydrate (% total kcal)	Protein (% total kcal)	Fat (% Total kcal)	Sweets (% total kcal)	Sex	Age	Years Diabetic	Index Years Diabetic
41	1800	1800	1585	49.6	15.9	34.3	0.1	M	68	25.0	5
42	1400	1400	2432	35.1	12.1	50.8	3.3	F	52	5.0	3
43	1800,Low Na	1800,Low Na	1679	50.7	19.2	29.1	0.4	M	68	12.0	5
44	1800	1800	1089	22.3	10.6	67.3	0.0	F	68	10.0	4
45	No Conc Swt	1500,4g Na	1580	51.6	18.3	30.2	0.7	F	71	12.0	5
46	1800	Regular	1888	43.9	13.9	42.7	8.8	F	85	14.0	5
47	1800	Regular	1425	45.4	9.1	44.6	0.2	F	77	9.0	4
48	1800	No Conc Swt,Low Na - F	1352	48.9	16.1	34.7	0.1	M	78	2.0	2

APPENDIX H
Key for Index

Race:

White	1
Black	2
Other	3

Food Preparation:

Spouse	1
Other Family	2
Self	3
Other	4

Education Level:

Post Graduate	1
College	2
High School	3
<High School	4
<10th Grade	5

Meals on Wheels:

No	1
Yes	2

Living Situation:

Other Family	1
Spouse	2
Other Caregiver	3
Self	4

Enough Money:

Yes	1
Generally	2
No	3

Marital Status:

Yes	1
No	2

Physician's & Self Order Same:

Yes	1
No	2

Number of Medications:

1-3	1
4-6	2
6-10	3
> 10	4

Diagnosis:

Only Diabetic	1
Other not Related	2
Other Chronic	3
Other Related	4

Pay Source:

Other	1
Medicare	2
Medicaid	3

Age:

51-65	1
66-80	2
> 80	

Shopping:

Spouse of Family	1
Self	2
Other	3

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APPENDIX I
 Vulnerability Index of Diabetic Home Care Clients

Subject	Age	Age Index	Education Level	Marital Status	Living Circumstances	Shopping	Food Prep	MOW	Money	Pay Source	Race	# Meds	MD/Self Same	Diagnosis	Total	Index
01	73	2	5	1	2	1	1	1	1	2	1	4	1	2	24	1
02	85	3	2	2	1	1	2	1	1	2	1	4	2	3	25	1
03	82	3	5	2	1	1	1	1	1	2	1	4	1	4	27	2
04	79	2	5	2	4	3	4	2	1	2	1	3	1	3	33	3
05	69	2	5	2	1	1	2	1	1	2	1	2	2	3	25	1
06	71	2	5	1	2	1	3	1	1	2	1	4	2	4	29	2
07	91	3	3	2	3	3	3	1	1	2	1	3	2	2	29	2
08	68	2	5	2	1	1	2	1	2	2	1	4	1	2	26	2
09	75	2	2	2	1	1	2	1	1	2	2	4	2	2	24	1
10	75	2	1	2	4	4	4	1	1	2	1	2	1	4	29	2
11	67	2	1	1	2	1	1	1	1	2	1	1	2	2	18	1
12	72	2	2	1	2	1	1	1	1	2	1	3	1	2	20	1
13	69	2	3	1	1	2	3	1	2	2	1	3	1	2	24	1
14	90	3	3	2	4	3	3	2	1	2	1	3	2	2	31	3
15	71	2	5	1	2	2	3	1	2	2	1	3	2	4	30	3
16	84	3	4	2	4	2	3	2	1	2	1	3	1	1	29	2
17	79	2	5	2	1	1	2	2	1	2	1	1	1	2	23	1
18	69	2	1	2	4	2	3	1	1	2	1	2	1	2	24	1
19	68	2	3	1	1	1	1	1	1	2	1	2	2	2	20	1
20	90	3	5	1	1	1	1	1	1	2	1	2	1	3	23	1
21	51	1	4	2	1	1	2	1	1	2	2	2	1	4	24	1

Subject	Age	Age Index	Education Level	Marital Status	Living Circumstances	Shopping	Food Prep	MOW	Money	Pay Source	Race	# Meds	MD/Self Same	Diagnosis	Total	Index
22	64	1	3	1	1	1	1	1	1	1	2	2	2	3	20	1
23	63	1	5	2	1	2	3	2	2	3	2	4	1	3	31	3
24	82	3	3	1	1	1	2	1	1	2	1	3	1	2	22	1
25	53	1	3	2	1	1	2	1	1	3	2	3	1	3	24	1
26	77	2	5	2	1	1	1	1	1	2	2	2	2	3	25	1
27	64	2	5	2	1	1	3	2	2	3	2	4	1	4	32	3
28	85	3	5	2	4	1	2	1	1	2	1	3	2	2	29	2
29	78	2	3	2	4	1	3	1	1	2	1	2	2	2	26	2
30	57	1	5	1	1	2	1	2	2	3	2	4	1	4	28	2
31	55	1	5	1	1	1	1	1	2	2	2	4	1	4	26	2
32	60	1	3	2	4	3	3	1	2	3	1	4	1	3	31	3
33	77	2	5	2	4	1	3	1	2	2	1	3	2	3	31	3
34	51	1	4	2	4	2	3	1	2	3	1	3	1	2	29	2
35	68	2	3	1	2	1	1	1	1	2	1	3	1	3	22	1
36	72	2	3	2	1	1	1	1	1	2	1	2	2	3	22	1
37	78	2	3	2	3	3	4	1	1	2	1	2	2	3	29	2
38	69	2	5	2	1	1	2	1	1	2	1	2	1	4	25	1
39	79	2	5	1	1	1	1	1	1	2	1	3	2	3	24	1
40	68	2	3	2	1	1	1	1	1	2	1	4	1	3	23	1
41	68	2	4	2	1	1	1	1	1	2	1	3	1	2	22	1
42	52	1	3	2	1	1	1	1	2	2	1	4	1	2	22	1

Subject	Age	Age Index	Education Level	Marital Status	Living Circumstances	Shopping	Food Prep	MOW	Money	Pay Source	Race	# Meds	MD/Self Same	Diagnosis	Total	Index
43	68	2	3	2	1	1	1	1	1	2	1	2	1	3	21	1
44	68	2	5	2	1	2	3	1	1	2	1	4	1	3	28	2
45	71	2	3	2	1	1	1	1	1	2	1	4	1	3	23	1
46	85	3	3	2	1	1	2	1	1	2	1	2	2	4	25	1
47	77	2	3	2	4	1	1	1	1	2	1	3	2	4	27	2
48	78	2	5	2	1	1	1	1	1	2	1	3	2	3	25	1

APPENDIX J

Patients Eligible for Interviews Who Did Not Participate and Why

Patient	Sex	Age	Primary Diagnosis	Reason Not Interviewed
1	M	71	Cardiac Arrhythmia	Interviewer late/Pt refused
2	M	77	Cerebral Vascular Accident	Unable to reach
3	F	35	Multiple open wounds	Unable to reach
4	F	74	Uncontrolled IDDM	Interviewer appt/Pt not home
5	M	82	Unstable DM	Unable to participate
6	F	88	Cardiomyopathy	Refused
7	F	65	Pulmonary Edema	Refused
8	F	58	Cerebral Vascular Accident	Hospitalized
9	M	80	Open wound - foot	Refused
10	M	81	Pneumonia	Hospitalized
11	F	59	Thrombophlebitis	Refused
12	F	67	IDDM	Refused
13	F	68	Breast Cancer	Refused
14	M	81	Fractured Femur	Refused
15	F	75	Acute Myocardial Infarction	Refused
16	M	54	NIDDM	Unable to speak English
17	F	74	Hypertension	Unable to speak English
18	M	86	Pleural effusion	Refused
19	M	42	Gangrene foot/amputation	Unable to reach
20	M	31	Osteomyelitis	Unable to reach
21	M	69	Open wound lower extremity	Expired
22	M	58	Uncontrolled IDDM	Unable to reach
23	M	47	New IDDM	Unable to reach
24	M	72	Rectum & Colon Cancer	Expired
25	M	83	Dehydration	Hospitalized
26	M	74	Urinary retention	Unable to speak English
27	F	66	Cerebral Vascular Accident	Tube feeding
28	F	72	Peripheral neuropathy	Hospitalized
29	F	65	Pleural effusion	Expired
30	M	77	Transient Ischemic Attack	Unable to participate
31	F	67	Cellulitis lower extremity	Expired
32	M	56	Coronary Artery Disease	Unable to speak English
33	F	77	Sacral decubitus	Unable to speak English
34	F	70	Chronic Obstructive Pulmonary Disease	Unable to participate
35	M	74	Orthostatic Hypotension	Hospitalized

APPENDIX K

Summary of Patients Who Did Not Participate

SEX	Male	19
	Female	16
AGE	<50	4
	51-65	7
	66-80	17
	>80	7
REASON	Unable to speak English	5
	Unable to participate	3
	Refused	9
	Unable to reach	6
	Hospitalized	5
	Expired	4
	Not home/refused visit	2
Tube feeding	1	
PRIMARY DIAGNOSIS	Diabetes	6
	Cerebral Vascular Accident	4
	Cardiac	4
	Lung	5
	Wound	6
	Other	10

VITA

Abigail M. Beemer was born in Willow Grove, Pennsylvania on July 16, 1959. She received her bachelor of science degree in Human Nutrition and Foods from Virginia Polytechnic Institute and State University in June 1981. After graduation she went to work for ARA Services, Inc. as assistant food service director at Virginia Intermont College in Bristol, Virginia. In 1983 she began employment with Nutrition Management Services Company as assistant food service director/dietitian first in Yeadon, Pennsylvania then in Bethesda Maryland. Continuing as assistant food service director/dietitian she went to work for Morrisons Custom Management Corporation early in 1985 in Hyattsville, Maryland and began her master degree at Virginia Tech's continuing education center in northern Virginia later the same year. In 1987 she became administrative dietitian at another locale in Hyattsville, Maryland. Since 1989 she has been employed with Inova Home Care in a variety of positions.