PREDICTORS OF HOSPITALIZED PATIENTS'
ACCESS TO POST-DISCHARGE
HOME HEALTH SERVICES

by
Jeanne A. Matthews

Dissertation submitted to the Faculty of the Graduate School of the University of Maryland in partial fulfillment of the requirements for the degree of Doctor of Philosophy 1990

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**APPROVAL SHEET**

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Abstract

Title of Dissertation: Predictors of Hospitalized Patients' Access to Post-Discharge Home Health Services.

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An ex post facto study was conducted to identify factors associated with diabetic patients' access to home health services following hospital discharge. The Andersen (Aday, Fleming, & Andersen, 1984) model of access served as the conceptual framework for the study which examined the relationship between the predisposing, enabling, and need characteristics of the sample, and the realized access indicators of referral to, and acceptance for post-discharge home health services.

A sample of 300 hospitalized patients was identified at three study sites. One-half of the sample had been referred for home health services and one-half had not been referred for post-discharge home health services. Data regarding acceptance for services were collected on 136 patients. Discriminant analysis was conducted to identify the set of predictors of referral and subsequent acceptance for home health services.
A discriminant function, strongly related to dependency, was found to maximize the differences between groups referred and not referred, and accounted for 33.5% of the variance between groups ($p<.0001$). Length of stay, number of secondary diagnoses, age, and marital status showed moderate association with the function. Stepwise discriminant analysis identified a six variable function, in which dependency was the primary predictor, that significantly ($p<.0001$) discriminated between the groups. No differences were found between the groups accepted and not accepted for home health services following referral.

Nine research hypotheses were tested for significance using chi square and correlations. Patients more likely to be referred for home health service were older, female, lived alone or with friends or family other than a spouse, were covered by Medicare or Medicaid, had a longer hospital stay, had more secondary diagnoses, and were more dependent at discharge. Weaker support was found for persons who had been hospitalized within the prior 24 months. Significant correlations among predictors were found for dependency with age, length of stay, and secondary diagnoses. Additionally, the number of secondary diagnoses were found to correlate significantly with length of stay.

It was concluded that need, primarily dependency, is the best predictor of referral to home health. Continued study, incorporating both population and health system
characteristics, is recommended to further examine acceptance for home health services following referral.
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DEDICATION

This work is dedicated to my husband, Norman Welsch, without whose patience this endeavor would not have been possible, to my daughters Meredith and Samantha, who endured many Saturdays without Mom, and to my parents, Edith and Jerome Matthews, who taught me the value of an education.
ACKNOWLEDGEMENT

This dissertation would not have been possible without the assistance and support of many people. Many thanks to my co-chairpersons, Dr. Audrey G. Gift and Dr. Joan L. Creasia, for their time, patience and helpful feedback. I am also very greatful for the support and varied expertise of my other committee members: Dr. Shirley Damrosch, Dr. Henry Brehm and Dr. Ann Cary. A special thanks to Dr. Ada Jacox, committee member and former chair, for her many years as research advisor, and her unending support and encouragement.

To my colleagues in the Division of Community Health Nursing, The Catholic University of America, I extend my appreciation for making it possible to be a teacher, a student and a mother. Finally, to all my friends and family, I give a special thanks for the cheers and support as each phase of my doctoral education was completed.
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Chapter I: The Problem

Introduction

Controversy exists in the United States as to whether health care is a right or a privilege. The choice any society makes regarding this dilemma will have an impact on its role in health care. If deemed a privilege, the marketplace and consumers can be left to their own devices. On the other hand, the notion of a right to health care assumes that equity exists regarding access to care.

Although federal health policy in this country, where individualism is highly valued, has been tentative in addressing health care as a right, a number of health policy initiatives were designed to meet the goal of improving access to care (Mooney, 1989). Health manpower and construction initiatives improved availability of resources to some extent, while financing programs, such as Medicare and Medicaid, served to expand the purchasing power of the vulnerable health care consumer (Aday & Andersen, 1974).

These programs have achieved some success regarding improved access to care for some populations. Improvement does not mean equity, however. Social, political and economic influences continue to play a major role in who has access to what care. Inequities still exist among the uninsured poor and near-poor, and minorities (Freeman,
Aiken, Blendon & Corey, 1990). Additionally, health policy changes, motivated by cost concerns during the last decade, are likely to act as barriers to care in both acute and long-term service arenas (Vladeck, 1981; Rinke, 1987; Aday & Andersen, 1984). The dynamic nature of the health care system makes it imperative to regularly evaluate continued equity in access (Aday & Andersen, 1984).

This study was designed to examine factors that are associated with which diabetic patients gain access to home health care services following hospital discharge. An adaptation of the Andersen model of access (Aday & Andersen, 1984) was used to predict which patients would be referred, and subsequently accepted for follow-up care at home.

Background of the Study

The notion is found throughout the literature that one of the primary goals of the United States' health policy has been the improvement of access to health care. Philosophically, most authors support the notion of equal access, though variations exist regarding how that should be operationalized.

In order to adequately address the issue of equal access, one must deal with the question: access to what? Thus far, no consensus has been reached. Daniels (1982) suggested that the lack of convergence was due to three factors: first, that access itself is multidimensional; second, that health care services are varied and that the
level of provision must be determined; and, third, that
inability to reach consensus on equitable access is related
to societal disagreement on fundamental moral issues, in
particular, that of distributive justice. Additionally,
society has yet to determine the place of health care among
all other social needs (Aroskar, 1985; Callahan, 1990;
Daniels, 1982).

Daniels' recommendation was that access to health care
be treated in terms of "fair equality of opportunity" (1982,
p. 72), as is done with other societal institutions. In
this case, health services defined as needed to "maintain,
restore, or compensate for the loss of normal functioning"
would be those deemed "socially guaranteed" (Daniels, 1982,
p. 73). Access to those services should be free from
obstacles.

Guttman (1981) supported the idea of debating the
principle of equal access which
demands that every person who shares the same type
and degree of health need must be given an equally
effective chance of receiving appropriate
treatment of equal quality so long as that
treatment is available to anyone (p. 543).

The government's position, during the Reagan
administration, as detailed by the President's Commission
(1983), viewed society's obligation regarding equal access
as a moral one, but made it clear that it was not asserting
a right to care; nor did it assert that health care was a
privilege. The obligation is rather to ensure access to a minimum level of services. The Commission has been criticized for its unwillingness to further elaborate on those services, and to address whether a right to health care does exist (Brody, 1989). Clearly, this conceptual confusion affects how health policy operationalizes equal access, and determines an "adequate level of care without excessive burdens" (President's Commission, 1983, p. 4).

While debate continues, most discussions of access are built on the premise of equal opportunity, and consistently describe access as a phenomenon of multiple dimensions. Alternately defined as the relationship between the consumer of health service and the service (Vladeck, 1981), the degree of fit between the clients and the health system (Thomas & Penchansky, 1984), and the dimensions which describe the potential and actual entry of a given population group into the health care delivery system (Aday, Andersen & Fleming, 1980), access commonly includes characteristics of both the population and the health care system (Aday & Andersen, 1974).

There is great variability in how the dimensions of access have been addressed. The Andersen model describes population and health system characteristics as factors which serve as facilitators or barriers to access or health action (Andersen & Newman, 1973; Aday & Andersen, 1974). It has been suggested that access flows from health policy goals through the population and health system.
characteristics to utilization and consumer satisfaction (Aday & Andersen, 1974). This popular, comprehensive model has been tested and adapted on an ongoing basis.

Characteristics of the process of gaining access are given more attention in other work (Kronenfeld, 1980); often utilization is used as the outcome indicator in those studies as well. Such significant variability in how access is treated makes evaluation of the concept difficult. Criticism of those studies which place heavy emphasis on utilization stems from the lack of a measure of quality. Also, potential access variables are considered of consequence only if they result in a significant utilization effect, regardless of any inequality among groups on process indicators (Daniels, 1982). Other differences in utilization may be the result of differences in unmeasured variables such as attitude, and not the result of access issues (Daniels, 1982).

Another approach to explaining access has been to focus more on process variables. Supporters of this emphasis view process indicators as dealing with the quality of care, not just whether some care is received (Vladeck, 1981). Additionally, a stronger focus on patient perception (satisfaction) is seen as an "important determinant" of behavior (Thomas & Penchansky, 1984, p. 553). Most studies of access, regardless of the model used, have focused on utilization of, and/or satisfaction with physician services, hospitals, ambulatory care, emergency services, and
preventive care (Aday & Andersen, 1974; Andersen, Giachello & Aday, 1986; Patrick, Stein, Porta, Porter & Ricketts, 1988; Petchers & Milligan, 1988; Schlesinger, Bentkover, Blumenthal, Mushacchio & Willer, 1987; and Taube & Rupp, 1986).

**Statement of the Problem**

While the provision of organized home care is nearly a century old, the emphasis on home care as a means of ensuring post-hospital acute care services is a more recent development. New York's Montefiore Hospital, a pioneer in this area, instituted post-discharge services for its patients in 1946 (Mundinger, 1983).

Significant growth in home health services occurred following the enactment of the Medicare and Medicaid legislation in 1965. This legislation, which was intended to increase access to a variety of health services including home health, provided for reimbursement of acute services delivered in lieu of costly extended inpatient stays (Senate, 1965). Accompanying this change in focus was the need to facilitate the transfer of patients and patient care from one care setting to another.

Though discharge planning was an important part of this scenario, its need has been intensified as a result of the prospective payment system (PPS) of the 1980s (Phillips & Cloonan, 1987; Kleffel, 1988; Wolock, Schlesinger, Dinerman & Seaton, 1987). This form of payment, linked to the
diagnostic category of the hospitalized patient, pressures hospitals to deliver care in an expeditious manner to remain fiscally solvent. At the same time, the patient population is growing older, and is suffering from increasingly complex health problems (Stone, 1986; Harris, 1988; Shaughnessy & Kramer, 1990; Staebler, 1988), leaving hospitals to deal with older, sicker patients who are more likely to have extended inpatient stays.

As a result of the post-PPS changes, patients are being discharged as soon as they are stable, leaving the hospital sicker and quicker (Kleffel, 1988; Staebler, 1988). Now, the term "hospital without walls," coined so many years before, has never been more appropriate. Many of these patients require continuation of services in their homes to promote recovery. The assessment of post-hospital needs is conducted during discharge planning, a process defined by McKeehan (1981, p. 3) as the "activities that involve the patient and a team of individuals from various disciplines working together to facilitate the transition of that patient from one environment to another." Such a task is made difficult in an environment where patient needs and resources vary widely, and where professional resources may be marginal.

Support for the need for discharge planning as an integral part of hospitalization is found throughout the literature. The discharge planning process is geared to providing continuity of care, and to promoting cost-
effectiveness (McKeahan, 1981; Rossen, 1984; Shine, 1983). This process of anticipating post-discharge needs, and of coordinating necessary post-discharge services must begin early in hospitalization (Corkey, 1989).

It is during the process of discharge planning that the decision is made regarding whether or not to refer the patient for post-discharge home care. The actual referral to home health services is frequently carried out by a nurse. Whether the staff nurse or a nurse specialist (continuity of care) actually makes the referral is dependant upon the particular hospital facility and how the roles of the nurses are defined. The referral itself usually involves a telephone call to the home health agency intake coordinator, followed by the transmission of physician orders for the service. Decisions regarding acceptance are then made by nursing personnel (staff or administrative) at the home health agency.

Limited data are available regarding the need for home health. Utilization data assist in constructing a profile of the likely candidate for home health care. While the home health client belongs to a diverse group (Pasquale, 1988; Starrett, Rogers & Walters, 1988), the most likely profile is of an older woman with at least moderate functional impairment, likely to have been hospitalized, and more likely to live alone (Gornick & Hall, 1985; Shaughnessy & Kramer, 1990; Pasquale, 1988). Additionally, Meiners and Coffey (1985) found patients discharged to home health care
from the hospital to be in diagnostic categories requiring long-term management, e.g., diabetes.

Many suggestions are found in the literature for evaluating patients before discharge; few are supported by empirical data. Clearly, a challenge exists for hospitals to ensure that those patients who require continuing care following discharge receive it. It is important for nurses, often instrumental in the discharge planning process, to be skilled at determining which patients need continuing care and to be knowledgeable about those factors which facilitate or inhibit access to post-discharge home health services.

Research Question

For the purpose of this study, the main question of interest is:

What personal and policy-related factors are predictors of which hospitalized patients gain access to post-discharge home health services?

a. What personal and policy-related factors are predictors of which hospitalized patients are referred for post-discharge home health services?

b. What personal and policy-related factors are predictors of which hospitalized patients are accepted for post-discharge home health services following referral?
Consistent with the Andersen model, characteristics of the population that would reflect potential access to care are addressed. Predisposing characteristics of age, gender, marital status, living arrangements, and previous hospitalizations are examined. The availability of health insurance is expected to play a role in enabling individuals to gain access to home health services. Finally, the issue of need is examined to determine its role in gaining access to home health care following hospital discharge.

Significance of the Study

Although federal health policy of the 1960s and 1970s was designed to improve access to care, cost containment strategies of the 1980s have threatened to impede that progress. Most studies of access focus on those presumed to be at risk, namely the poor and minorities. Variables such as income, insurance, and demographic characteristics are often those chosen as indicators of potential access. Utilization and satisfaction are commonly chosen as indicators of realized access.

In answering the question, "access to what?", visits to clinics, physicians, and hospitals are the most frequently chosen outcomes. Very little data have been published concerning home health care, an area that has undergone much growth over the past decade. Approaches to examining utilization of home health services vary. No study has been conducted that uses a broad sociopolitical framework to
predict which hospitalized patients are referred and accepted for home health care.

Examining the issue of access to home health care for the population of patients with diabetes is important because of the prevalence of this health problem in the United States population, which ranges from 11.9 per 1,000 in the group 18 to 44 years of age to 98.2 per 1,000 in the group aged 75 years and over (U.S. Department of Commerce, 1990). Also, as previously mentioned, Meiners and Coffey (1985) have identified diabetics as a group which is likely to need long-term management.

Unlike access to other segments of the health care delivery system, where the patient initiates the health-seeking behavior, post-hospital home health care is accessed predominantly by referral from a health professional. Patients are not likely to initiate referral on their own (Wolock et al., 1987). It is critical, then, for nurses who play a pivotal role in discharge planning and evaluation of patient needs, to be concerned with ensuring access to home health for this patient group. In addition, because care of the patient with diabetes requires a multidisciplinary approach to be effective (Donnelly & Anderson, 1990), the study should be of interest to a variety of health care providers. Social workers, who are likely to play a role in acquiring post-discharge resources for patients, need reliable assessment parameters to assist them. Health care providers concerned with continuity of care and maximizing
quality in the care process may be interested in the determinants of access to home health services. Administrators, who must find a balance between cost constraints and ethical concerns of patient care, are likely to find the study of interest as well.

Data on the characteristics that are predictive of access to home health care have implications for local institutional policy regarding discharge planning, use of professional resources in the discharge planning process, as well as the development of assessment criteria to be used in the discharge planning process. In addition to policy on a local level, the evaluation of equity in access may illustrate whether or not inequity exists, and may give direction to health policy on the state and national levels in the areas of finance and organization, two policy arenas that have undergone substantial change during the past decade.

Theoretical Framework

The Andersen model of access to care is used as the framework for this study. This approach is a multidimensional one which defines access as the "dimensions which describe the potential and actual entry of a given population group to the health care delivery system" (Aday et al., 1980, p. 26).

The major elements of the model are health policy, potential access indicators, and realized access indicators.
Figure 1 depicts the major elements of the model (Aday & Andersen, 1984). Health policy is viewed as the "starting point" for the access model (Aday et al., 1980), as most often, the goal of health policy is to improve access to care for population groups who have limited access. Potential access indicators are comprised of characteristics of the health care delivery system and those of the population concerned. Realized access indicators are those factors that are reflective of the actual entry into the system (Aday et al., 1980).

Health care delivery system characteristics are thought to encompass both the availability, that is the volume and distribution of resources, and the organization of resources. Resource organization includes process variables dealing with entry into the health care system, such as travel time, and variables dealing with structure which identify how the patient is treated once in the system (Aday & Andersen, 1974).

Population characteristics are defined as predisposing, enabling and need variables that determine utilization of services (Andersen & Newman, 1973). Predisposing characteristics, such as age, are those that describe the likelihood that an individual will use the service. The enabling component identifies the resources, like health insurance, that promote the use of services. The need variable is the professionally-evaluated or subjectively felt level of illness. Indicators of realized access are
Figure 1: The Andersen Model

Aday and Andersen, 1984

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those elements which validate entry into the system. Actual utilization of health services and consumer satisfaction are the measures used by Aday and colleagues (1980).

Regarding the relationships among the variables, health policy is said to affect either the health system or population characteristics. The delivery system may affect utilization and satisfaction, independent of population characteristics, or may affect mutable population characteristics which, in turn, affect utilization and satisfaction. Population characteristics may also affect utilization and satisfaction directly, independent of delivery system characteristics. Finally, utilization of services may directly affect consumer satisfaction (Aday et al., 1980).

The focus of this study is the relationship between the population characteristics as potential access indicators, and the realized access indicators of referral and acceptance to the home health care system.

Limitations of the Study

The Andersen model (Aday, Fleming & Andersen, 1984) provides a comprehensive framework for the study of access. While this research effort provides for the examination of population characteristics as indicators of potential access, the use of an ex post facto survey design that relies on data available in the hospital record, limits the variables addressed.
Structural indicators of potential access, those dealing with the availability and organization of health care delivery system characteristics, are not addressed in this study. The use of only three short-term hospital facilities in the Washington, D.C. metropolitan area limits the study of health system characteristics. The fact that the facilities are located in the same region makes it likely, but does not guarantee, that patients from all three hospitals have potential access to the same amount and type of home health resources. In addition, as a condition of access imposed by the study sites, hospital data were aggregated, eliminating the opportunity to examine results by facility.

It is acknowledged that some variability in organization did exist within the three hospital sample. There is intraorganizational and interorganizational difference in the structure and process of discharge planning which could not be controlled for in this study due to sample constraints and dispersion of diabetic patients throughout each facility. An additional limitation of the study is the lack of data regarding patients who were not referred to home health care while hospitalized, and who might have been referred following discharge through some mechanism in the community. Although it is of interest to have these data regarding whether patients are referred once discharged, there is literature support for the fact that patients and family have limited knowledge of community
resources, and that they are not likely to initiate referral once at home (Wolock et al., 1987).

The lack of randomization in selecting sites, and the choice of one metropolitan region limits generalizability of the results. Also, the selection process for the "not referred" group was chosen to minimize the effects of history, and because the time necessary to select and review a random sample of medical records would have seriously affected the feasibility of the study. While it is possible that the selection of the "not-referred" group resulted in a biased sample, there is no evidence that is the case.

Summary

Escalating expenditures in health care since the advent of Medicare and Medicaid spawned significant cost containment initiatives during the last decade that threaten to decrease access to care. Limited research has been done in the area of home health care utilization, and only one study has used a comprehensive framework to examine access to home health service, although not for hospitalized patients. In contrast to previous research, this study utilized the Andersen model to examine hospitalized patients' access to home health care.

Chapter I presented an overview and rationale for this study. The literature review, presented in Chapter II, includes an analysis of the literature examining the areas of access to care and utilization of home health services.
The Andersen model of access to care is further delineated, and the use of this model in studying access to home health care following hospital discharge is described. Chapter III focuses on the research methodology and procedures utilized in this work. Chapter IV details the findings of the research. Finally, research results are discussed, and the implications for nursing and further research are addressed in Chapter V.
Chapter II: Review of the Literature

The concept of access is multidimensional (Daniels, 1982; Salkever, 1976; Wan, 1982). Its complexity becomes evident when one examines the treatment of access in the literature. Studies vary in focus, scope, and the parameters used to indicate access. Regardless of the particular study, utilization, which Donabedian (1972, p. 111) described as the "proof of access," is often used as the measure of realized access. In this chapter, literature dealing with utilization of health services as well as that dealing with the construct access will be presented. In addition, the Andersen model (Aday et al., 1984), used as the conceptual framework for this study, is discussed and analyzed with special attention given to its application to home health care.

Shortell (1980) specified six models developed to explain health services utilization: the demographic, social-structural, economic, organizational, social-psychological, and systems models. While many of the studies found in the literature do not represent "pure" examples of these models, they can be categorized in one class or another depending upon their primary focus.

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Models of Health Services Utilization

The demographic model is described by Shortell (1980) as one which focuses on variables such as age, marital status, and gender. By itself, the demographic model yields little in terms of directing policy to improve access. As a result, such a model is not likely to be used as a framework to study access to care, except in basic descriptive research, such as that conducted by Waldo and Lazenby (1984).

The social-structural model, however, offers more utility in explaining differences in access to health services. This approach takes into consideration variables such as social class, ethnicity, education and occupation (Shortell, 1980). Using a sociocultural approach, Blendon, Aiken, Freeman and Corey (1989), found significant differences among black and white Americans in the access indicators of type of care, number of contacts, payment source, economic impact of care, and satisfaction.

Studies using the social-psychological approach have dealt with the role of attitudes, values, norms and culture in determining health services behavior (Shortell, 1980). Dealing frequently with preventive health behavior and less often with illness behavior, the Health Belief Model is a commonly used example of the social-psychological approach to health services utilization (Rosenstock, 1974; Kirscht, 1974).
There is likely to be some overlap between the social-structural and economic models because of the link between financial resources and social class, education, and the like. Economic models, however, are apt to focus on supply and demand issues, such as income, health insurance, and the volume of health care resources available. A number of studies have focused on the differences in access between the poor and non-poor. The poor were found to have more financial barriers to commonly recommended care, even when seen in a community clinic geared toward indigent care (Hubbell, Waitzkin, Rucker, Akin & Heide, 1989), and to experience lengthy time gaps between physician contacts, even in the presence of chronic illness (Newacheck, 1989).

In addition to income, health insurance has been shown, in most cases, to be positively correlated with utilization. The impact of Medicaid coverage in fostering access to ambulatory services is illustrated in the similarity of utilization between insured poor and non-poor adolescents (Newacheck, 1989); the increased physician utilization of Medicaid-covered children compared to poor children with private or no insurance (Rosenbach, 1989); and the significant increase in ambulatory mental health visits when financial barriers were removed (Taube & Rupp, 1986).

Hayward, Shapiro, Freeman & Corey (1988, p. 1507) found insured persons to have increased access to a regular source of care, needed medications, supplies and other "supportive care." Within the population of insureds, however, they
found that the elderly had greater access than working age adults, who were nearly four times as likely to report financial barriers to regular care.

The insurance effect on access to preventive care was found by Salkever (1976) to have limited significance. Utilization of preventive physical examinations was increased only when persons were required to pay between 0 and 50% of the cost of the visit; this increase was not present when they were required to pay either more than 50% of the cost or nothing at all. Salkever described this finding as the substitution of curative for preventive services when patients experienced no out-of-pocket costs.

Organizational models have been used to explain utilization by examining process variables, such as referral patterns, practice patterns, or structural differences in the delivery system. These models are most likely to focus on patients once they are in the system. In a Medicaid case management demonstration, Hohlen et al. (1990), found that when compared to the regular Medicaid program, children in the "augmented-fee-for-service" program were more likely to receive the quantity of physician contacts recommended for their age groups. The visit rate for children in the capitation program was less than that of the augmented fee group, but was no different than the regular Medicaid group. This study, which essentially measured the impact of physician risk (financial) on utilization, was affected by
an estimated 10% underreporting of visits in the capitation group.

Schlesinger et al. (1987) looked at the impact of hospital ownership and market variables on physician-reported discouraging of admissions for the Medicaid and uninsured populations. They found that greater competition among area hospitals was associated with decreased access for persons with Medicaid or no insurance. The relationship of ownership to access was complicated. Private hospitals were more likely to restrict access, a finding that was more pronounced when the private hospital was part of a multihospital system. Public hospitals, however, were less likely to discourage admissions, especially if they were part of a multihospital group. A cautious interpretation of these data is warranted as physician perceptions of hospital admission practice, rather than actual admission rates, were used to indicate realized access.

Newhouse (1989) studied the post-PPS admission and transfer of patients in diagnosis-related groups (DRGs) that are likely to be "unprofitable." The findings did not support the expectation that more interhospital transfers of unprofitable patients would be from non-public hospitals, to hospitals of last resort, i.e., city or county hospitals. Patients in "unprofitable" DRGs were found to be transferred less frequently than other patients. Last resort hospitals were found, however, to have a significantly greater percentage of "unprofitable" patients than other hospitals,
suggesting that some selection of patients associated with profitability had occurred.

While cost containment initiatives have generated interest in the organizational and economic issues inherent in access, the more comprehensive systems approach has also been a very popular framework for examining access to care. This model uses many factors associated with other models in an attempt to provide a comprehensive basis for explaining utilization/access. Andersen's model of access is a commonly used example of the systems approach. As illustrated in Figure 2, this framework recognizes health policy as the "starting point" for studying access. The political climate and the initiatives it generates are likely to direct the organization and delivery of health services.

Describing their model as parallel to Donabedian's structure-process-outcome framework, Aday and colleagues (1980) identify structure and process variables as potential access indicators. They describe structure and process variables as those factors that "may ultimately influence whether or not some other outcomes of interest are realized" (Aday et al., 1980, p. 25). They use the "more immediate" outcomes of access, namely consumer satisfaction and utilization as measures of realized access rather than the health status measures often part of the structure-process-outcome model.
Figure 2: Framework for the Study of Access
Aday and Andersen, 1974
A primary assumption of the Andersen model is that populations are likely to have more or less access depending on the characteristics of their community. Aday et al. (1980) discuss a special interest in the ability of persons to access services when needed. Consistent with that idea, they identify equity of access as occurring when need, rather than other factors, determines use of services.

The Andersen model has been used as the framework for many studies of access conducted during the past two decades. Various approaches have been used to assess access to numerous types of health services. Studies conducted by the developers have utilized large national data sets to examine use of hospital, ambulatory care, and preventive services (Aday, 1975; Aday & Andersen, 1978; Aday et al., 1980; Aday et al., 1984; Andersen & Aday, 1978; Andersen & Aday, 1984). In reviewing the literature, the findings of these studies are compared with others using similar systems frameworks, and the literature is organized according to the variables examined.

Characteristics of the Health Care Delivery System

Aday and colleagues (1984) identified availability and organization as the two major health system characteristics. Data about these characteristics were obtained by examining the population's regular source of care, and by determining the convenience of care.
Regular Source of Care

Having a regular source of care has been shown to contribute significantly to the explanation of health service use and satisfaction. In their examination of data from a 1975-1976 national survey, Aday et al. (1980) found that persons with a regular source of care had greater physician contacts than those without a regular provider, supporting findings from previous work (Aday, 1975; Andersen & Aday, 1978). The old and the young were most likely to have a regular source of care, while minorities were least likely to see a regular provider. Insurance also played a role in who received care from a regular person or site; the uninsured were least likely to have a regular source when need arose (Aday, 1975).

Regarding site of care, 96% of those with a regular source of care were seen in a private office or clinic (Aday, Andersen & Fleming, 1980). This contrasts with Wan's (1982) findings that in an elderly, low-income population, only 47.9% of persons saw a private physician as their regular source of care. Wan's data, collected in 1975, are consistent with a change in regular source of care later reported by Aday and Andersen (1984). Their study, based on 1982 data, supported an increase in the proportion of people receiving care at a regular site, but not with one physician. This change was most likely to be seen in persons 55 to 64 years old, those who were rural farm dwellers, and those without insurance.
In addition to utilization, the outcome measure, satisfaction was also found to be related to having a regular source of care. Individuals who had a regular source were more content with their care than individuals without a regular source of care. For those persons with a regular source of care, using the emergency room as the regular source of care had the opposite effect on satisfaction. This group was found by Aday et al. (1980) to be the least satisfied.

Kronenfeld (1980), who thought the provider dimensions of the Andersen model needed additional attention, elaborated on the variable regular source of care. In examining data from a 1974 household survey of Rhode Island residents (N = 1,314 individuals), she used the notion of affiliation, i.e. "a person or place where a consumer went for health care in the previous year, or where he or she has gone for health care in the past and might again in the future" (Kronenfeld, 1980, p. 6), to explain utilization of health services. As was found previously, affiliation explained utilization (40.3% of the variance explained). In general, health service use was increased by older persons, women, those with greater need, and those with public insurance.

The amount and type of provider affiliations played a role in explaining use of service. Only 42.8% of the sample reported just one affiliation. Persons with a complex pattern of affiliation (2 or more), and those whose prime
affiliation was a place, rather than a person, had greater utilization. The highest utilization existed for those whose prime affiliation was with a specialist. Prime affiliation with a general practitioner or family practitioner was associated with the lowest service use. Consistent with other research studying persons with and without a regular source of care, Kronenfeld's (1980) work found that need was the best predictor of utilization, accounting for 21.4% of the variance explained; provider characteristics ranked second.

In summary, the presence of a regular source of care, and the type of regular source of care have been important predictors in explaining utilization of health services, i.e., the number of provider contacts, and the degree of satisfaction with care.

Convenience

The convenience of care has been shown to affect utilization. When dealt with in other models as part of accessibility, availability, or accommodation (Thomas & Penchansky, 1984; Petchers & Milligan, 1988), factors such as waiting time and travel time, ease of obtaining transportation, availability of services during off-hours and availability in an emergency are often considered. Most studies support the notion that the more convenient the care, the greater the utilization.
Aday (1975) found that, in most cases, the closer the source of care, the more likely people were to avail themselves of the resource when needed. Travel time and office waiting time were not, however, as important for the non-poor insured, who utilized sources when needed regardless of travel/waiting time. Convenience variables, e.g., travel time, waiting time to get an appointment, and office waiting time, made little difference to the poor uninsured, the group that demonstrated the lowest use relative to need. Most likely, by the time services were sought, these persons were so needy that convenience was no longer an issue. As might be expected, persons with travel times greater than 30 minutes to a regular source of care, and longer wait once there, had increased dissatisfaction with care (Aday et al., 1980). Additionally, Thomas and Penchansky (1984) found that for the group of white persons in their study, scheduling problems and office waiting time created the greatest access concerns.

Population Characteristics

In addition to health system factors, predisposing, enabling and need characteristics of the population have been shown to explain access to care.

Predisposing Factors

Predisposing factors are characteristics that describe the likelihood that an individual will use health services
(Aday et al., 1980). While concern does exist regarding the role played by predisposing characteristics in access, many of these factors are unchangeable, and so serve primarily as control variables (Aday et al., 1980). Examination of these variables illustrates where inequities are found, and may assist in guiding health policy initiatives to provide services to underserved groups.

Andersen and Aday (1978), in attempting a causal explanation of access behavior, found age to exert an indirect effect on access through need. Regarding patterns of utilization, Long and Settle (1984) found that the elderly used more inpatient services and fewer outpatient services as they aged. Others (Wolinsky, 1978; Thomas & Penchansky, 1984) have criticized such examination, and contend that need is the crucial factor. Age is believed to contribute little additional explanatory or predictive information. Some change in age-related access behavior is most likely the result of health policy changes in other areas. For example, since the advent of Medicare, the elderly are more likely to see a physician at least once per year (Aday et al., 1980).

In addition to age, other predisposing characteristics have been included in studies of access. It was found that women, in general, use more health services than men (Kronenfeld, 1980; Wan, 1982). When the symptoms-response ratio, a measure of appropriateness of care, was used as a measure of need, however, women were found to utilize care
as often as necessary; men were found to underutilize care (Aday et al., 1980).

Race has been shown to help explain health service use. Consistently, minorities were found to have less access to service than the white majority. In his study of low-income elderly, Wan (1982) found blacks twice as likely to use hospital ambulatory care settings for regular care, and four to five times as likely as whites to use a neighborhood health center for care. Elderly whites had greater utilization than elderly blacks. Additionally, when predictors of hospital use were examined by Wan, significant differences were found between whites and blacks. While episodic illness proved most predictive of use among elderly whites, chronic disability was most predictive of use for elderly blacks.

Regarding satisfaction with care, Aday et al. (1980) found race to be predictive of this subjective measure of access. Twenty percent more blacks than whites were below the median on satisfaction with convenience and availability of care. Rural southern blacks were the most dissatisfied with care, 86% of that group falling below the median on satisfaction with availability (Aday et al., 1980; Blendon et al., 1989). This finding of dissatisfaction with care was not unexpected, considering that rural blacks experience many more barriers than other care recipients (Blendon et al., 1989).
Of the predisposing characteristics used in explanations of access, education was found to be the most predictive of use of preventive health care. Wolinsky (1978) found visits to the dentist was associated with increased education, as did Aday et al. (1980). Likewise, Aday and colleagues (1980) found having a preventive annual exam was positively correlated with years of education. In addition, the reason for securing an annual exam differed among persons with varying degrees of education. Persons with a college education were more likely to have a preventive annual exam, while others sought an annual exam for treatment of symptoms.

In summary, while the role played by predisposing characteristics was supported in some studies, no consensus exists regarding the importance of these factors in explaining health services utilization.

Enabling Characteristics

The enabling component was defined by Andersen as "the 'means' individuals have available to them for the use of services" (Aday et al., 1980, p. 31). In examining the role of enabling characteristics, variables often included are those dealing with affordability of care. Some of those using the systems approach conceptualize availability as part of this group.

The role played by insurance and income has varied among the studies of access to care. In her study of
economic barriers to care, Aday (1975) found that poor individuals had less access to care relative to need, a finding supported again in her later work (Aday, 1976). The insured poor saw their physician more than the non-insured indigent population. While utilization of the insured poor was similar to the use of the insured non-poor, their use still lagged behind the latter group. Of significance is the fact that 41% of persons with incomes below the poverty level have Medicaid (Brecht, 1990), a problem associated with state-to-state variation in eligibility requirements (Curtis, 1986). So, while the introduction of public insurance for the indigent did improve access somewhat, the coverage is far from universal.

The income effect among the aged remained following the introduction of Medicare (Aday et al., 1980; Long and Settle, 1984). This is most likely the result of the continued presence of co-insurance and deductibles, which keep out-of-pocket cost for health services high in the elderly (Harrington, 1983). In their study of black, urban elderly, Petchers and Milligan (1988) found that although 90.2% of their sample was insured, and nearly 32% had a private supplemental policy, one-half (50.7%) reported trouble with medical expenses and nearly 29% said their insurance did not cover expenses.

Research support for the income effect has not been consistent. In their causal approach to access, Andersen and Aday (1978) found that income was not significantly
related to utilization; only a small direct effect on the number of visits was determined to be due to insurance coverage. For the most part, use of hospital services did not demonstrate significant insurance or income effects (Wan, 1982; Wolinsky, 1978; Aday et al., 1980). Aday and colleagues (1980) suggest that this lack of inequity is probably the result of widespread insurance coverage for hospitalization among the United States population. Satisfaction with care among those under 65 years old showed a strong insurance effect. Those persons with private insurance were significantly more satisfied with convenience and quality of care than were persons with Medicaid coverage (Aday & Andersen, 1978).

Region and character of one's residence were shown to be related to access to care. Aday and colleagues (1980) found that persons living in rural areas were the least likely to utilize health services, and while some patterns of utilization have changed for the better due to health insurance, the access of rural residents has become more limited. In fact, the pre-Medicare differences in utilization by region have intensified with rural elderly receiving highly "inpatient-intensive" care (Long & Settle, 1984). Additionally, studies of access have documented the South as the region with the greatest number of potential access problems (Aday et al., 1980; Blendon et al., 1989; Settle & Long, 1984).
To summarize, while the enabling characteristics of insurance, and location of residence were found to relate to access to health services, support for an income effect on health service use has not been consistently demonstrated.

**Need Characteristics**

Consistently, need has been shown to be the best predictor of health services utilization (Aday et al., 1980; Andersen & Aday, 1978; Berki & Kobashigawa, 1976; Kronenfeld, 1980; Thomas & Penchansky, 1984; Wan & Odell, 1981; Wolinsky, 1978). Measures of need have included health status evaluated by health professionals, as well as that evaluated by patients. Additionally, need related to both acute and chronic health problems has been examined.

The variable perceived health status has been used frequently as an indicator of need. This measure is usually expressed on an ordinal scale from excellent to poor (5 categories) or good to poor (3 categories). When persons compared their health status to those of others their age, a number of factors were found to be correlated with utilization. Andersen and Aday (1978) found a causal relationship between need and number of physician visits when perceived health status and symptoms reported were indicators of need.

Long and Settle (1984) discovered that for persons who had not been hospitalized, lower perceived levels of health were associated with a lower rate of initial physician
contact. Once contact was made, however, increased need was associated with increased utilization. They also found that the influence of health status on utilization differed according to region, supporting the work of Aday et al. (1980).

Often, perceived health status incorporates subjective measures along with a measure of activity restriction. While Kronenfeld (1980) found persons with disability days or chronic health problems had increased utilization of ambulatory care, others found the effect of restricted activity on utilization to vary among groups. Kleinman, Gold and Makuc (1981) found that blacks and those with low income reported fair to poor health more frequently, and demonstrated higher utilization than whites and persons with higher income. After adjustment for need, using the use-bed disability ratio, the differences were in the opposite direction (Kleinman et al., 1981; Aday, 1976). This finding was supported by Newacheck (1988) in his analysis of the 1982 National Health Interview Survey. When health status was controlled, persons above the poverty level had significantly more physician contacts than those below the poverty level.

Thomas and Penchansky (1984) found education and age to mediate the impact of need on utilization. For white subjects with greater than 12 years of education, need accounted for 47.7% variation in ambulatory utilization, while it accounted for only 35.2% among the less well-
educated. For those older than 40, need was responsible for 50% of the variance explained, while for younger subjects it accounted for only 16% of the variance explained.

Wan (1982) found chronic disability most predictive of hospital utilization among elderly blacks, and episodic illness most predictive of hospitalization among whites. In addition to utilization rates, patterns of use were associated with type of need. Those with severe disability had the longest length of stay, while those with frequent illnesses utilized the greatest number of hospital days (Wan, 1982).

Although need is the potential access variable most predictive of utilization, its treatment is not consistent across studies. Need has been operationalized in a number of ways, making the interpretation of findings complicated. This issue will be further discussed in the critique of access research.

Evaluation of Access Research

While the Andersen model of access has been used to guide numerous studies during the past 20 years, criticisms have been found that bear discussion. Penchansky (1976) described the model as too inclusive and nonspecific. Aday and colleagues (1980) respond to this critique by stating that their model provides a global approach to studying access, which was found lacking in other access frameworks.
A related criticism is that the predisposing and enabling factors included in the model play a minimal role in predicting utilization of health services, as need consistently explains most of the variance. Wolinsky (1978) and Thomas and Penchansky (1984) have thus questioned the role of additional variables. The issue that studies of access have explained limited variance in health services utilization is surely a crucial one. It is conceivable, however, that they have a potential explanatory role when access to other services is studied, or when changing health policy initiatives serve to alter the impact of predisposing and enabling variables. In fact, changes in the organization and financing of health services, combined with societal influences, such as unemployment and recession are likely to alter the impact of predisposing and enabling factors.

Newacheck (1988) criticized the choice of the use-disability ratio as the measure of need, suggesting that only one dimension of health need is measured. This focus on illness, by only including persons with disability days, is likely to limit analysis of preventive behaviors, or may eliminate persons whose pattern of seeking care is different. Additionally, among those who have measured need via use-disability, the ratio has been operationalized in more than one way (Aday et al., 1980; Kleinman et al., 1981). In an attempt to better explain need, Wan (1982) used two types of measures: disability and health status,
which he thought would capture the impact of both acute and chronic conditions.

Some critics (Kronenfeld, 1980; Vladeck, 1981) have suggested that more attention should be paid to provider/process issues. Others (Nesbitt, Connell, Hart & Rosenblatt, 1990; Patrick et al., 1988) have suggested that outcomes of health status should be emphasized to provide adequate direction for health policy in this country. In fact, the improvement in variance explained by process studies, such as Kronenfeld's (1980) is considerable, and lends credence to such positions.

Limitations also exist with the Andersen model that hamper comparative analysis of access studies, and suggest use of caution in the interpretation of study results. The use of large data sets in access research may be viewed as both a strength and a weakness. These large samples offer researchers an opportunity to examine an important dimension of health care, using cross-sectional, random samples that may give a more representative picture of health services use. Large data sets, however, offer the likelihood of significant findings in the absence of substantive explanation of utilization behavior. It is not uncommon to find variables which are significant predictors of use, yet account for very little variance in utilization.

While changes in access are likely to be compared over time, attention must be given to how variables are defined and operationalized. For example, some more recent national
data sets (Aday et al., 1984) cued patients differently regarding the use of physician visits. Most recent data include visits to nurses and other staff within the office; previous studies asked only for physician visits (Aday et al., 1980). Other studies vary according to whether individual or proxy data are collected, whether patients who have been hospitalized are included or not, and whether a 2 week or 12 month recall is required of patients. In addition, some very poor response rates are reported (Andersen et al., 1986). While Andersen et al. (1986) use weighting to assist in decreasing bias, one must consider a possible selection bias on factors that may be unrelated to variables used to determine weighting. Others do not report response rates at all (Petchers & Milligan, 1988).

Continued study of access offers the advantage of ongoing refinement of instruments and approaches to this type of research, in addition to the examination of health utilization behavior in a variety of settings and in other population groups.

Utilization Research in Home Health Care

While numerous studies of access have been conducted in the areas of ambulatory and inpatient care, less work has been done in the home health arena. This is most likely the result of two factors: 1) home health services make up a very small proportion of total health services and expenditures, i.e., 3% of the total Medicare and Medicaid...
expenditures are for home health services (Spiegel, 1987), and 2) the major growth of home health services has occurred during a time when concerns of equality of access were replaced by concerns of cost containment. The shift in emphasis spawned a large body of cost-effectiveness research which often emphasized substitution of home services for those delivered in a nursing home setting, an emphasis which continues today (Amado, Cronk & Mileo, 1979; Branch, Callahan & Jette, 1981; Gaumer, Birnbaum, Pratter, Burke, Franklin & Ellingson-Otto, 1986; Kemper, Applebaum & Harrigan, 1987; Kramer, Shaughnessy & Pettigrew, 1985; Schwartz, Blumenfield & Simon, 1990; Skellie, Mobley & Coan, 1982; Taber, Anderson & Rogers, 1980).

As previously mentioned, when costs are viewed as high, changes are often initiated which serve to limit access to various services. Because home health services are not immune to such cost-containment effects, the study of access to home health care is indeed timely. The following review serves to examine the research conducted in this area, and will conclude by presenting an adaptation of the Andersen model used as the framework for this research study.

Characteristics of the Health Care System

Only one study of utilization was found that focused on health system characteristics as a major source of explanation for use of home health services. Using the state as the unit of analysis, Benjamin (1986) found that
72% of the variance explained in home health use among 50 states and the District of Columbia was related to 7 state characteristics. When use was measured as the "total users of care per 1,000 Medicare enrollees," Benjamin (1986, p. 542) found that percent of the aged who were married, state tax capacity (i.e., the resource base for the service structure) and female participation in the workforce were inversely related to service use. The number of available home health agencies, and the percentage of Visiting Nurse Association home health agencies were directly related to use, as were the supply of physicians and the percent of Title XX homemaker funds available. While comparative studies were not found, this research lends support for the notion that health system characteristics, and location of residence may significantly impact access to home health.

Characteristics of the Home Health Care Population

A variety of descriptive studies have been conducted which provide a profile of the users of home health services. These studies often compare the home health population to other service groups with long-term care needs. Stone (1986) analyzed national data from the 1984 Supplement on Aging to describe the community service utilization rates among the elderly. While 22% of this population used any of the available community services, only 3% used professional home health services. Among those persons living alone, 4.2% used home health services. In
the group that lived alone, 13.2% of persons with moderate to severe activity limitations used home health services. Among those living with others, 8.2% of the elderly with moderate to severe impairment used home health services.

Meiners and Coffey (1985) analyzed data from the 1980 Maryland discharge abstracts to study the characteristics of hospitalized elderly (N = 103,635), who were discharged to nursing homes (8%), home health care (2%), or self-care (90%). Patients in diagnostic categories likely needing skilled rehabilitation services (e.g., stroke) were commonly referred to nursing homes, as were patients in groups reflecting "frailty of old age," such as pneumonia with complication. Home health referrals were more likely for patients requiring long-term management, without severe disability (e.g., those with diabetes or cancer). Patients with greater than average length of stay were frequently referred to nursing homes or home health care, and so, although these "outliers" represented 10% of all patients, 29% of those discharged to nursing homes or home health care were "outliers."

In describing the characteristics of a random sample of all Medicare patients discharged from acute care hospitals during 1981, Neu and Harrison (1986) found that 9% of the sample (N = 1,928,834) used home health services during an episode of care, nearly 2.5% used skilled nursing facility (SNF) care, and 0.5% used both. Relatively few DRGs accounted for post-hospital care among all users, supporting
Meiners and Coffey's (1985) work. Within DRGs, however, home health care users were younger than SNF users, but older than those who used no post-hospital care. Consistent with Benjamin's (1986) work, significant variation in use existed from state to state in utilization of post-hospital care.

Focusing on cost of post-hospital care in the Medicare population, Gornick and Hall (1988) examined a 20% random sample of hospital discharges for the pre-and post-DRG periods. They found the percent of patients who used home health services following discharge had increased from 9% in 1981 to nearly 18% in 1985. Not all the increase could be linked to prospective payment, however, as the greatest increase (55%) occurred during the 1981 to 1983 period, a phenomenon that has been identified by others as well (Coleman & Smith, 1984). It has been suggested that this period of growth may be due, in part, to a change in Medicare policy allowing for reimbursement of services delivered by proprietary home health agencies (Gornick & Hall, 1988).

Shaughnessy and Kramer (1990) examined the clinical profiles of 500 randomly-selected patients from each of traditional nursing homes, nursing homes with a large proportion of Medicare patients, and home health agencies, for the years 1982 and 1986 in an effort to evaluate the results of Medicare prospective payment and Medicaid pre-admission regulation. They found that patients in
traditional nursing homes increased in functional disability from 1982 to 1986; no changes were found regarding problems requiring skilled nursing.

Patients in Medicare nursing homes had significant increases in problems requiring skilled nursing, notably, tube feedings, use of oxygen, and the presence of diastolic hypertension, and urinary tract infection; no significant changes in functional disability were found. When Medicare and non-Medicare patients were compared, the Medicare group experienced significant increases in functional care needs, especially bathing, dressing, and eating. A significant increase in skilled nursing needs was found during that time period, with the need for tube feedings, and the presence of urinary catheters and skin ulcers increasing significantly. The non-Medicare group showed a significantly increased independence in bathing from 1982 to 1986 (Shaughnessy & Kramer, 1990).

In a pilot study of pre- and post-DRG referrals from one community hospital to a public home health agency, Kornblatt, Fisher and MacMillan (1985) found a non-significant trend toward increased skilled care needs of home health care patients, as reflected in the increased frequency and duration of visits required. Their small sample size (N = 27; N = 12) precluded statistical significance. The subsequent study (Kornblatt Phillips et al., 1988) compared referrals at 6 month pre-DRG, and 6 month, 18 month and 30 month post-DRG times. Significant
differences were found in length of care, frequency of visits, and the increase in patients requiring rehabilitative services. Post-hospital referrals reached a high at the 18 month post-DRG time (n = 23); this time also showed the longest duration of service (81.9 days), and the greatest proportion of patients requiring rehabilitative services (82.6%). These changes are likely to be the reflection of an alteration in case-mix, occurring during that time.

Rogers (1989) also analyzed pre- and post-DRG utilization of home health services by the Medicare elderly following examination of the activity logs and records in one Visiting Nurse Association. A random sample including 75 pre-PPS patients and 92 post-PPS patients was drawn. A statistically significant 22% increase in referral numbers post-PPS was found, along with increases in the level of care required at admission, and the number of procedures performed by all disciplines during the first week of service, both indicative of need status at and around discharge. Increases in two nursing procedures, "restorative nursing," and "other teaching" point to a change in patients being seen post-PPS, consistent with the findings of Kornblatt Phillips et al. (1988). No significant changes were found in initial assessment time, visit time for all disciplines, total number of visits, and length of stay. It has been suggested that these are areas
where concerns of reimbursement have necessitated more expeditious care by all disciplines (Rogers, 1989).

More recently, Pasquale (1988) conducted a descriptive study to identify characteristics of Medicare-eligible home health care clients. Following the random selection and review of 100 client records in one voluntary home health agency, Pasquale found the majority (67%) of the group had been referred from an acute care hospital. Forty-five percent of the sample fell into 8 DRGs, the most commonly found DRG being diabetes (n = 11). The study supported previous profiles that found this group to be older, mostly female and functionally impaired.

More than half the sample were female (59%), and were likely to be without an available caretaker (n = 30). Regarding need, most of the men (n = 34) had a willing and able caretaker, most often a spouse. Only 7 (younger) persons were unimpaired functionally; 59% were at least moderately impaired. Of interest is this similarity between men and women with regard to impairment, in contrast to the prevailing finding that older women are more impaired (Ballard & McNamara, 1983). When this finding is viewed along with the increased likelihood of having an unwilling or unavailable caretaker, one might suspect that the female cohort with significant impairment resides in skilled nursing facilities rather than at home (Pasquale, 1988).
Utilization in the Community-at-Large

A number of studies of home health care utilization have focused on the elderly community. Taking a systems approach to utilization, Rie Day viewed use "within a context of prior conditions and follow-up needs" (1984, p. 6). Measuring personal and contextual variables, Rie Day examined utilization and discharge status among elderly home care recipients at a metropolitan San Francisco agency. The records of 2,436 cases were reviewed representing all recipients of care from 1968 through 1974. No significant relationship was found among personal characteristics and utilization.

Regarding contextual variables, payment source was the best predictor of utilization. State funded care was significantly longer in duration (13.4 versus 8.7 months), and had significantly less skilled care visits (12% versus 26% of total visits) than Medicare or privately-insured care. Persons discharged to self or informal care were younger, Medicare-insured, previously hospitalized, and medically referred. Those discharged to formal care were older, and had service of longer duration. Of interest is the fact that need, the primary predictor of service use in most studies, was not included as a variable (Rie Day, 1984).

While Soldo (1985) hypothesized that economic factors would play a significant role in demand for home health services among the dependent elderly, data from the 1979
National Health Interview Survey did not support this position. In examining formal service use, Soldo used needing assistance with activities of daily living (ADL) and instrumental activities of daily living (IADL), medical needs, incontinence of bowel and bladder, and need for supervision as measures of patient need.

"Conditioning variables" (Soldo, 1985, p. 288) were those similar to Andersen's predisposing and enabling factors: gender, race, marital status, place of residence, living arrangements, income, Medicaid-insured, and receipt of informal services. Patients likely to receive home services were those with "extreme" ADL dependencies, and with a need for treatments and procedures. Other weaker relationships were found for those who had IADL (housekeeping) needs, were incontinent, or needed limited supervision. Most home service recipients were never-married, lived alone or with non-relatives, and were not receiving informal services. Neither income nor insurance was predictive of service use (Soldo, 1985).

Branch et al. (1988) conducted a prospective community-based study to predict contact utilization (entry) of home health services provided by a neighborhood health center in East Boston. Baseline interviews, conducted during 1982 and 1983 among 3,812 elderly provided demographic, health and baseline utilization information. Approximately 3% of the participants enrolled in the home care program within 24 months of the initial interview. The home care group was
older; the 85 and older group used home care 12 times more than those 65 to 74 years of age. Additionally, home care recipients were likely to have no social group memberships, have children within a 30 minute trip, have more errors on mental status questions, report more depressive symptoms, and report their health status as poor. Previous hospitalization and usual source of medical care were not predictive of entry into the program.

Multivariate analysis supported the role of need in predicting home health care use. Those most likely to use home care had significant limitations in physical, cognitive, and social function. Demographic factors were not significant. In contrast with other studies, living alone was not a contributing factor. A limitation of this study was the absence of determining whether home health services provided by the neighboring Visiting Nurse Association had been obtained by any of the participants (Branch et al., 1988).

In contrast to the previously mentioned studies of home health use, Ballard and McNamara (1983) examined utilization among clients of all ages, diagnosed with cardiac disease or cancer, and discharged from a home health agency during 1979 and 1980. A stratified random sample of nine agencies was chosen from one state, and a systematic random sample of client records was examined (N = 397; 212 = cancer; 185 = cardiac). Seventy-nine percent of the sample had been admitted to home health care following hospitalization.
Cancer patients have significantly more serious health problems, and significantly greater nursing and total agency visits per day.

Consistent with most studies of access, need (health status score) was the best predictor of service use, for both nursing and total agency visits. Regardless of diagnosis, however, need accounted for little explained variance in nursing visits per day (7.7% for cardiac patients, and 8% for cancer patients). Regarding total agency visits per day, need accounted for 11% of the explained variance for cardiac patients, and 26% of the explained variance for cancer patients. Following need, the agency delivering care was the next best predictor of service use, especially for cardiac patients. This finding lends support for the need to include organizational variables in the measurement of access, suggested by Kronenfeld (1980).

A limitation in this and other studies of utilization continues to be the limited amount of total variance explained by the model, even when personal and organizational variables are considered. When nursing visits per day was examined, the model accounted for only 19.5% of the explained variance among cancer patients, and 32% of the explained variance among cardiac patients. Regarding total agency visits per day, the model accounted for 32% of the explained variance among cancer patients, and
30% of the explained variance for cardiac patients (Ballard & McNamara, 1983).

**Utilization of Post-Hospital Services**

In addition to studies examining home health use among the community-at-large, there has been interest in explaining home health utilization in the group of patients with acute or post-acute care needs. In studying 69 patients identified as having serious illness, Wolock et al. (1987) assessed the post-discharge needs of the group. While 64% of these patients experienced some activity limitation, only 52% of the sample received any type of formal post-discharge services. Thirty-nine percent received nursing service, the most commonly obtained resource in the study. Although this percentage is clearly greater than that reported elsewhere, this sample was purposely chosen because of its potential need.

Wolock et al. (1987) found older age and poorer functional status to be significantly associated with receipt of service. Living situation, education, income, presence of other health problems, and length of stay were not significantly related to use. Regarding satisfaction, 96% of those receiving nursing (n = 27) found the service helpful, compared to 78% of those receiving homemaker service (n = 12). Interestingly, while 30% of the sample thought they needed services but did not receive them, only 1/3 had tried to obtain service once at home.
Use of the Andersen Model in Home Health Care

The most comprehensive study of home health care use was conducted by Starrett et al. (1988). In testing a causal model of home health service utilization among a stratified random sample of 400 elderly in one Ohio county, an adaptation of Andersen's framework was used. Perceived need for care was the best predictor of home health care use (path coefficient = .29). Other indicators of need followed: limitation due to recent illness (.18), and employment of health aids (.16). Age (.16) and knowledge of resources (.16) were also predictive of use. Insurance coverage and employment status (disabled) demonstrated an indirect effect through use of appliances. Additionally, being black was negatively correlated with insurance coverage. Consistent with previous studies of the Andersen model, limited variance in utilization was explained (22%). Unlike previous research, however, predisposing (age) and enabling (knowledge of resources) variables had a direct effect on use.

Starrett and colleagues' (1988) study offers support for the utility of the Andersen model in examining home health utilization. Their focus on the community elderly represents an important segment of the home health population. Changes in the financing of hospital services, however, contributed to the vulnerability of the hospitalized population, promoting early discharge of more needy patients (Kornblatt Phillips et al., 1988; Shaughnessy
& Kramer, 1990). Previous work (Wolock et al., 1987) among patients following hospital discharge provided preliminary data regarding access to care. Serious problems of sample size ($N = 69$) and response rate (54%) were found in that study, however, necessitating additional research in this area.

In an effort to study, in a comprehensive way, the access to home health services post-discharge, the Andersen model was adapted and used as the conceptual framework for this research. Figure 3 illustrates the framework and variables chosen for inclusion in the model.

### Conceptual Framework

The Andersen model is based on the premise that individual and societal determinants influence the utilization of health services (Andersen & Newman, 1973). That is as likely in home health care as in other health services. Some differences do exist between home health care and other services, however, which guided the choice of variables in this study.

### Potential Access: Population Characteristics

**Predisposing Factors**

The predisposing component suggests that certain characteristics of an individual's physical and social
CHARACTERISTICS OF POPULATION AT RISK

Predisposing:
- Age
- Gender
- Race
- Living Arrangements
- Marital Status
- Previous Hospitalizations

Enabling:
- Insurance Coverage

Need:
- Hospital Length of Stay
- Number of Secondary Diagnoses
- Dependency at Discharge

CONTACT UTILIZATION:
ADMISSION TO
HOME HEALTH SERVICE

Figure 3: Framework for the Study of Access to Post-discharge Home Health Service
environment, present before an illness episode, are predictive of service use.

**Age.** While age itself, Andersen asserts, may not be the reason for seeking care, the link between certain types of illness and age is acknowledged. These variations among age groups are likely to result in different patterns of care received (Andersen & Newman, 1973). Age has been shown to have an indirect effect on use through need (Andersen & Aday, 1978). As our society ages, and health care employs more sophisticated treatment of disease, the average hospitalized patient will be older (Long & Settle, 1984), and suffer more complex health problems. This demographic change, in conjunction with reimbursement policy and its accompanying decreased length of stay, suggests an increase in the use of home health services by the elderly (Mariano, 1989). Previous research has shown home health care recipients to be older than their no-service community cohort (Neu & Harrison, 1981; Wolock et al., 1987; Branch et al., 1988; Starrett et al., 1988).

**Gender.** Research detailing the role of gender is not conclusive. Some support exists for the premise that women use more health services than men (Kronenfeld, 1980; Wan, 1982), while other studies have found that women utilize services appropriate for need, and men underutilize services (Aday et al., 1980). Women do live longer than men, and are
more likely to need and use health services, including post-hospital home health, more frequently than men (Ballard & McNamara, 1983; Pasquale, 1988; Soldo, 1985).

**Marital Status.** Although not included in most studies of health services, marital status is likely to play a role in use of home health services post-discharge (Caro & Blank, 1988). The presence of an able caretaker, often a spouse, may contribute to meeting the health needs of the individual. Without such assistance in the home, the patient is likely to be viewed as more vulnerable, and so would be more likely to be referred for home health care (Soldo, 1985; Pasquale, 1988).

**Living Arrangements.** The data regarding living arrangements are not conclusive. Branch et al. (1988) found that living alone was not predictive of service use in one agency. In contrast, Stone (1986) identified that 4% of persons living alone used professional home health services versus 3% of the overall elderly cohort. Likewise, Soldo (1985) found home health care recipients were more likely to be never-married, and more likely to be living alone, or with non-relatives. As mentioned previously, it is thought that the lack of an available caretaker is likely to contribute to use of home health services. The increasing incidence of patients being discharged with technical needs,
many of which require some assistance, makes home health service a condition for managing alone at home.

**Race.** Minority status has been associated with decreased access to a variety of health services (Wan, 1982; Blendon et al., 1988). While some improvement has been shown over time, blacks (Aday et al., 1984) and Hispanics (Andersen et al., 1986) are still less well-off than the white majority. In addition, Long and Settle (1984) have suggested that, because average income of blacks is lower than that of whites, concern of inequity relative to income may be viewed as an "implicit concern" about inequity related to racial differences. Race has not been measured as a variable in home health utilization, but its role in access to other types of service is great enough to warrant examination in this area.

**Number of Previous Hospitalizations.** Andersen and Newman (1973) consider previous illness to be a predisposing condition which is predictive of service use, i.e., clients who have experienced health problems in the past are more likely to use health services in the future. Some support does exist for the fact that elderly individuals who have been hospitalized within the previous one to two years are more likely to be readmitted to the hospital (Fethke, Smith & Johnson, 1986; Jones, Densen & Brown, 1989). In their study of access, however, Branch et al. (1988) found
previous hospitalization was not predictive of entry into a home care program.

It has been suggested that, from a cost-effectiveness standpoint, home health services may substitute for acute care at the end of a stay in the hospital, and may prevent rehospitalization (Kramer, Shaughnessy & Pettigrew, 1985). Therefore, while research support is not conclusive, it is expected that patients who have been hospitalized within the previous two years are at greater risk for rehospitalization, and would more likely be referred for home care.

Enabling Factors

Andersen recognized that while individuals may be predisposed to use health services, certain enabling factors must be available to support their utilization of services.

Insurance. Health insurance, which would decrease the price of services to the individual, is expected to lead to an increase in the use of services by those covered (Andersen & Newman, 1973). Overall, having private insurance serves to promote access to preventive care (Aday et al., 1984), and having insurance increases access to ambulatory services (Aday et al., 1980). Lack of insurance has not been found to affect hospital visits (Wolinsky, 1978; Aday et al., 1980; Wan, 1982).
Regarding home health service use, however, Rie Day (1984) found that payment source, a contextual variable, was a significant predictor of type and duration of care received at home. Additionally, research data on state-to-state variation in the use of post-hospital care (Neu & Harrison, 1986) and in Medicaid expenditures (Benjamin, 1986) lend support for the inclusion of insurance as a variable. Conversely, Soldo (1985) found insurance to lack significant predictive ability. The potential for insurance to affect access to home health services is great, considering the atmosphere of cost containment that prevails in the health care marketplace. Therefore, while the impact is uncertain, the effect of insurance on access to home health care needs further investigation.

*Need Factors*

Besides the identification of predisposing and enabling conditions, Andersen recognized that the individual must have a need for care. While perceived need for care, and self-assessed activity limitation have been used most frequently in studies of access, it is thought that the study of home health utilization warrants a different approach. Unlike most other situations of health service use, post-hospital home health services are accessed through a professional referral system. Nurses, physicians, and social workers determine which patients are likely to need health services at home, and a referral is made. Since
professional evaluation determines who is referred for post-discharge home health services, it is thought that professionally-evaluated need would be a valid potential access variable. While it is conceivable that patients might refuse service, there is no evidence to support that occurrence on a regular basis.

Length of stay was chosen as another indicator of need. Meiners and Coffey (1985) found that patients whose length of stay was greater than average were frequently discharged to home health care. Likewise, the number of secondary diagnoses is a measure of complexity which may represent need. While Wolock et al. (1987) found the presence of other health problems was not significantly related to home health service use, problems of small sample size may have precluded finding significance.

Realized Access: Referral and Admission to Home Health

Most studies of access use utilization and/or satisfaction with health services as the measure of realized access. Measurement of the specific type and amount of service has been geared toward the research questions and hypotheses. As discussed previously, the process of access to home health care for the hospitalized patient is somewhat different than access to other health services. As such, the process has an intermediate step, that of professional referral, and a final step, acceptance for service in the home.
The two steps are carried out in two agencies, or departments in the case of hospital-based home health services. And so, while Donabedian (1972) might consider the final step to be the "proof of access," it is thought that examination of both phases of the process is crucial. Referral is conducted by the agency with the incentive to discharge as soon as possible, and acceptance, or not, is determined by the group providing the service. Clearly, barriers to access could occur at either point.

Home health utilization has followed the mainstream regarding use of visits or cost of service as realized access. In their study, Branch et al. (1988) used what Andersen has described as contact utilization, i.e., admission to the program. While it is possible that changes in home situation, insurance and need could conceivably cause patients to be denied service, the expectation is that such an occurrence is not commonplace. Contact utilization then, the admission to a home health services program, was viewed as an appropriate measure of realized access, and was used in this study.

Summary

The literature review presented an analysis of the research conducted in the area of access to health services. Special emphasis was placed on previous studies that used the Andersen model as a framework, and on studies conducted on home health services utilization. Chapter III details
the research methodology, and further discusses the variables and measurement tools used in this study.
Chapter III: Study Methods

This chapter provides a description of the methodology used in this research study. The design, settings, population, and sample are described, procedures for data collection are detailed, and variables are defined operationally. In addition, psychometric properties of the measurement instrument are discussed, along with the results of pilot work done. Last, the plan for data analysis is presented.

Study Design

This ex post facto descriptive study was designed to examine the predictors of hospitalized patients' access to home health services following discharge. Use of such a design is appropriate in situations where variables cannot be manipulated, and where it is not possible to randomly assign subjects to groups (Kerlinger, 1979). Of interest in this research study was the examination of non-manipulable patient characteristics that were predictive of membership in one of two intact groups, namely those patients referred and accepted to home health care, and those patients who were not. As a result, an ex post facto design was chosen for this research study.

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Research Settings

The research was conducted in three acute, short-term hospitals in the metropolitan Washington, D.C. area. Hospital A is a 656 bed suburban teaching facility with 12 medical and surgical units, a 36 bed progressive coronary care unit, and a full complement of specialty services. The hospital serves as a referral center for a large suburban population of primarily middle to upper socioeconomic level. Primary nursing is utilized on all the units. Discharge planning is viewed as a shared responsibility of nursing and social work. The actual mechanism by which the discharge planning process occurs varies by hospital unit, and according to the needs of the patients. Additionally, a liaison nurse from one home health agency does some of the in-hospital evaluation of need for home health care.

Hospital B is a 500+ bed university medical center facility located in an affluent section of a large urban area. The institution serves a population of diverse socioeconomic background. It has 7 medical and surgical units, an 18 bed progressive care unit, and many specialty services. Primary nursing is utilized on most of the units; the differentiated case management model is being tested on two of the units. The discharge planning process guidelines are incorporated into the written policies of the facility. Functions of both nurses and social workers are specified within those guidelines. There is a continuing care
coordinator, who is a nurse at the facility, and serves in a consultative role.

Hospital C is a 450 bed community hospital located in an economically depressed section of a large urban area. This facility serves primarily a minority population of diminished financial means. It has medical, surgical, and specialty units, which combine for a total of 14 units. The discharge planning function involves assessment by nurses on the units, social workers, and nurses from the continuing care department.

Population and Sample

The study population consisted of all adult patients 35 years of age and older, with a primary diagnosis of diabetes, who were hospitalized at one of the three study sites for three days or more during the period January 1, 1986 through December 31, 1989. Patients had to have been discharged to a temporary or permanent home in the community following hospitalization.

While prevalence of diabetes and concerns of access extend across the lifespan, it was thought that the examination of the access phenomenon was most efficiently studied using a biased sample of older adults whose potential for referral to home health care was great. Sudman (1976) has discussed the value of using biased samples for beginning study when the directions of the biases are known. Additionally, in order to ensure adequate
variability in patient characteristics, such as living arrangements and insurance, the population age was broadened to include middle and older adults.

It is acknowledged that significant variability is likely to exist regarding the type of problem necessitating admission, even though all had been attributed to the primary diagnosis, diabetes. This variability connected to factors such as whether there was a need for insulin, and the presence or absence of wounds, could potentially affect the research study. The differences, however, were expected to be reflected in need, and so would be accounted for by variables of interest.

The accessible population consisted of all patients who met the criteria for inclusion in the study, and had medical records that were complete and available. The problem of data missing from medical records has been documented (Patterson, Coe, & Wilkinson, 1987). In this case, a chart was considered complete if it contained information about the major areas of interest, namely, demographic data, notes from nursing, medicine and related disciplines, and treatment, activity, and medication schedules.

The sample for this study consisted of patients who had been referred for home health services, and a non-random portion of the group that was not referred. Although random selection of patients from the not referred group would have given some assurance of their representativeness of the total not referred group, the consideration of time, and the
potential problem of local history were thought to be more significant. As the referred patients were hospitalized during varying periods over a four year time frame, it was thought that choosing patients who were not referred and were hospitalized during those same periods, thereby matching patients on discharge date, would help control for some potential threats inherent in the study design, that were related to time of hospitalization.

A sample size of 300 was sought for the study: 150 patients referred for post-discharge home health services, and 150 patients who were not referred. As a minimum, 10 patients per cell is suggested by Polit and Hungler (1983) to assure adequate sample size. As 26 cells were planned into the design, a target sample size of 300 would provide sufficient power, and would help ensure adequate cell sizes for each category.

Procedures
Protection of Human Rights

The proposed research was submitted to, and approved by the Human Volunteers Research Committee of the University of Maryland. In addition, each of the hospitals serving as a study site received copies of the protocol and data collection instrument. The nursing research committee and hospital research group in each facility approved the study. Legal review was also conducted at one of the hospital sites. Each home agency received a letter describing the
purpose of the study (Appendix A), and a formal proposal review was conducted at the agency that received the largest number of referrals.

As patient contact was not required for this study, no statement of informed consent was required. Patients' rights were protected, however. Confidentiality was strictly maintained, and data sheets were coded such that, at no time, were all the data together with patient names.

Data Collection Procedures

Using discharge data from each facility, the population of diabetic patients who met the study criteria was identified. If present in the facility, referral logs were consulted to identify the patients who had been referred to home health care after discharge. Where that was not possible, all charts were reviewed to separate patients into referred or not referred groups. Data were collected from the available charts of all patients who had been referred. Charts that were unavailable upon request were requested a second time, and then were tracked and found by medical records personnel. With few exceptions, charts were available following a second request. Only one record was identified as incomplete, due to absence of nurses' notes.

As each record was obtained, identifying information was screened to validate that the patient stay met the study criteria. Data were collected on predisposing and enabling characteristics followed by the need variables of length of
stay and number of secondary diagnoses (Appendix B).
Finally, data were collected pertaining to the dependency at discharge score. Relevant data were written at the bottom of the tool in order to promote accuracy in dependency. After thorough examination of the record, the score and dependency level were calculated. Fifteen to 30 minutes were required to review each record.

Following the review of all records for the referred group discharged during a particular year, a sample of patients who were not referred was chosen by obtaining patients whose discharge dates were closest to the discharge dates of the referred group. The data collection procedure was the same as previously detailed. Patients were selected in this way, year by year, until the sample size was obtained. Data were collected for a total of 308 records. One case was dropped due to missing data, and 2 referred cases were dropped at random. Five not referred cases were dropped at random, leaving two groups of 150 patients each.

Data from the 150 referred patients were examined, and patients were classified according to the home health agency to which each was referred. Letters were then sent to those agencies requesting follow-up information concerning patient status. Agencies were given up to 1 month to respond. If no response was received during that time, a telephone call was made requesting participation.
Operationalization of the Variables

As previously mentioned, variables were selected representing the predisposing, enabling, and need factors consistent with the potential access indicators of the Andersen model (Aday et al., 1980). Realized access variables were also included. The following sections describe how each variable was operationalized.

I. Potential Access Indicators are the predisposing, enabling, and need factors that affect the probability that an individual will gain entry into the home health care system (Aday et al., 1980)

A. Predisposing Factors were defined by Andersen and Aday (1974) as those population characteristics that describe the likelihood that an individual will use the service, in this case, home health services post-discharge.

1. **Age**: recorded age in years at time of admission to the hospital.
2. **Gender**: recorded at the time of admission.
3. **Race**: recorded at the time of admission; classified as white or minority.
4. **Marital status**: recorded at the time of admission.
5. **Previous hospitalization**: the number of recorded hospital admissions in the 24 months prior to the admission being studied.
6. **Living arrangements**: the recorded living arrangement at the time of discharge,
including the relationship of potential participant in care.

B. **Enabling Factors** were defined by Aday and colleagues (1980) as those factors which support an individual's use of service.

1. **Type of health insurance**: the primary group or individual responsible for payment of health care, as recorded.

C. **Need Factors** were defined by Andersen and Newman (1973) as those characteristics representative of illness level.

1. **Length of stay**: the number of hospital days from admission to discharge.

2. **Secondary diagnoses**: the number of diagnoses, other than the primary diagnosis, recorded on the hospital admission sheet.

3. **Dependency at discharge**: the summary score obtained by classifying recorded needs in areas of activity and mobility, bathing and hygiene, procedures, and signs and symptoms (Patterson et al., 1987).

II. **Realized Access Indicators** are factors that are reflective of the actual entry into the system.

A. **Referral**: the documentation of intent to refer the patient for post-discharge home health services.

B. **Admission (contact utilization)**: the acceptance of a patient by home health agency for home health services
post-discharge; admission status was validated by the home health agency.

Research Hypotheses

Consistent with the literature, and the Andersen model (Aday et al., 1980), the following hypotheses were derived:

1. Older patients are more likely to be referred to home health services than younger patients.
2. Women are more likely to be referred to home health services than are men.
3. Patients who live alone are more likely to be referred to home health care than those patients who do not live alone.
4. Patients who have been hospitalized within the prior 24 months are more likely to be referred to home health care than those who have not been hospitalized within the prior 24 months.
5. Patients with health insurance coverage are more likely to be referred to home health care than those who are not insured.
6. Patients who belong to HMOs or other managed care systems are likely to be referred less frequently than those patients who do not belong to such systems of care, but more frequently than those patients who have no health insurance coverage.
7. Patients who have longer length of stay are more likely to be referred to home health care than those with a shorter length of stay.

8. Patients who have a higher score on the dependency at discharge instrument will be referred more often than those patients with a lower dependency score.

9. Patients with a greater number of secondary diagnoses will be referred to home health care more often than those with fewer secondary diagnoses.

Development and Use of the Dependency at Discharge Instrument

The Dependency at Discharge Instrument was developed for the purpose of determining whether or not patients were leaving the acute care setting in "worse condition" post-DRG than in the pre-DRG period (Patterson et al., 1987, p. 352). In planning to compare those two periods, the developers recognized the need to use a tool suitable for obtaining information from medical records. An additional requirement of the tool was that it allow the user to sort out discharge status from patient status during the remainder of the hospitalization. Following examination of a variety of classification tools, in particular, the Severity of Illness Index (Horn, 1983) which had been used to measure in-patient resource use, Patterson and colleagues (1987) determined
that the concept of dependency would be useful in identifying potential resource need at hospital discharge.

The developers conceptualized dependency as the "amount of intensity of indicators that could signal a patient's need for support services" (Patterson et al., 1987, p. 354). This notion of dependency was thought of as a continuum of need with the most dependent person being at one end, and the least dependent person occupying the other end. Using the patient classification literature as a base, the developers identified six major areas as representative of the need for nursing supervision: activity and mobility, bathing and hygiene, procedures, signs and symptoms, medications, and age.

Content validation was conducted by a panel of nurses with expertise in inpatient care, home health care, and discharge planning. Next, 3 to 7 raters reviewed each of 162 randomly-selected records. Regarding the tool items, 36% of the interpair correlations fell between .80 and 1.00. The interrater reliability of the total dependency score fared better; 93% of the interpair correlations ranged between .80 and 1.00 (Patterson et al., 1987).

In addition to interrater reliability, internal consistency reliability was assessed on combinations of scales. While the alpha coefficient was .79 for the total scale, some improvement was shown when the medication scale was removed (α = .82), and when the age scale was omitted (α = .86). The developers removed both medication and age
scales, and found the intraclass correlation $r$ to be .88 (Patterson et al., 1987).

As part of tool development, a factor analysis was conducted that resulted in loadings of .89 for activity and mobility, .86 for bathing and hygiene, .76 for signs and symptoms, .62 for procedures, .26 for age, and .14 for medications. Two of the original six scales, medication and age, were then removed. The remaining four scales, activity and mobility, bathing and hygiene, procedures, and signs and symptoms, comprised the final dependency tool.

An interrupted time series design was used to test the final measure. A sample of 2,622 Medicare patient records in four hospitals, representing pre and post-DRG periods was chosen. Patterson and colleagues (1987) found dependency needs to be higher post-DRG in older patients, and in three of five DRGs examined: pneumonia, heart failure, and hip replacement. No significant differences were found in the other two DRGs: stroke, and major joint pinning. Significant dependency class (I to IV) differences were also found, the post-DRG group having a larger high dependency (class III and IV) level: 33% versus 28.4% in the pre-DRG group.

Follow-up testing of tool validity was conducted by the developers (Coe, Patterson, Wilkinson, & Koren, 1987). Cases were chosen from 3 hospitals that represented 5 DRG categories ($N = 224$) Observer ratings for the immediate pre-discharge period (within 24 hours) were conducted by
hospital nurses, and record ratings were done by nurses who were not hospital-based. Correlations were calculated between observer and record ratings for each item: activity and mobility ($r = .85$), bathing and hygiene ($r = .85$), procedures ($r = .74$), and signs and symptoms ($r = .71$). Validity coefficients on activity and mobility, and bathing and hygiene differed significantly ($p = .01$) from coefficients on procedures, and signs and symptoms (Coe et al., 1987).

Validity across hospitals was more consistent on the activity item and the bathing item, and more variable in procedures and symptoms. Coe and colleagues (1987) found that alpha coefficients demonstrated high internal consistency reliability for both record items ($\alpha = .89$) and observer items ($\alpha = .90$). In determining validity by DRG, two of the DRGs (hip replacement and major joint pinning) showed lower validity coefficients, especially for procedures ($r = .45$ for hip replacements, $r = .75$ for major joint pinning), and signs and symptoms ($r = .55$ for both DRGs), suggesting some difficulty in using those items across all DRGs (Coe et al., 1987).

When dependency class was examined, using the chi square statistic, no significant differences were found between record reviews and observations. Coe and associates (1987) also compared dependency class distribution between this and their previous study (Patterson et al., 1986). A significant increase ($p < .01$) in class III and IV dependency
was found. Reliability coefficients were high ($r = .95$) when calculated using intraclass correlations. When items were examined for reliability, however, the coefficients for procedures ($r = .58$ for record reviews and $r = .79$ for observer ratings) were remarkably lower than for the other items, suggesting that the procedures scale may need some additional refinement.

In evaluating their work, Patterson et al. (1987) cited ease of use, inclusion of patient indicators, and limited cost as strengths of the dependency measure. Weaknesses described include less than discrete levels, reliance on professional judgement, and potential problems with chart documentation. They recommended additional testing of the measure, suggesting comparison with other acuity measures at discharge, and at entry into other care systems. This research study offered an opportunity to test further the Dependency at Discharge Instrument, results of which are presented in the section on pilot testing, and in Chapter IV.

Pilot Test

A pilot study was conducted at the three study sites to estimate reliability, and evaluate the utility of the Dependency at Discharge Instrument, as well as to identify potential flaws in the design and data collection procedures of the study. A convenience sample of 50 medical records of diabetic patients was drawn from the study sites. Using
this number in piloting allowed adequate sampling from each facility, in addition to a sufficient group overall. Shelley (1984) suggests using five to ten times as many subjects as items in piloting an instrument; subjects and conditions should reflect those expected in the overall research study. In this study, sampling from each hospital was particularly important as the data management varied greatly among the three facilities, as discussed in Appendix C.

A primary concern during the pilot phase, was how to access the necessary data in a way that was effective, yet expedient. Preliminary discussions with key individuals were conducted by the investigator. In each facility, the persons responsible for coordinating discharge planning were consulted. This group, identified primarily by the coordinator of nursing research in each hospital, included directors of social service, continuity of care and discharge planning, as well as a home health agency liaison nurse in one institution. Information from this knowledgeable group led to the determination of how data could be obtained in each facility.

Considerable variability in the hospital data management systems necessitated some changes in methods identified prior to the pilot study. Not all hospitals used DRG codes. Therefore, while use of a DRG code was originally planned as a means to provide some homogeneity in the sample, it was thought that the time required to
translate ICD codes to DRGs was a drawback that far outweighed the use of DRGs as a classification system.

Patients who were identified as having diabetes as a primary diagnosis were assigned various DRGs, depending on the way in which the diabetes manifested itself. Using the patient ICD codes as identifiers allowed for the study of one patient group with potentially variable post-discharge needs, provided an adequate sample size in a four year time frame, and removed some time and hospital personnel costs generated by the need to translate codes to DRGs.

The medical records systems varied among the study sites. During the pilot phase, the investigator was able to determine usual lag time between request and retrieval of charts, in addition to the process for tracking lost medical records. Variability also existed in hospital chart format, and the use of narrative and flow chart recording. Pilot testing provided an opportunity for the investigator to become familiar with each system of charting, and locate the various types of data required for the study. Most paper charts took 15 to 20 minutes for review. Medical records stored on microfiche, and those of patients with complicated admissions and extended lengths of stay took longer to review.

Reliability

Pilot testing served to evaluate the psychometric properties of the measurement tool, in addition to assessing
the feasibility of the design and procedures. One of the major concerns in research is the introduction of random error into a study. While it is acknowledged that error cannot be eliminated, the goal is to reduce random error as much as possible. Reliability relates to the degree to which random error is present. A measure is said to be reliable when it demonstrates stability and consistency across measurements (Nunnally, 1978).

In estimating reliability of the Dependency at Discharge Instrument, two considerations determined the approach taken. The first concerned the internal consistency of the dependency measure, that is how well the items measured the same construct. Cronbach's alpha was used in this study as the estimate of internal consistency. Nunnally (1978) suggests that coefficient alpha is useful in determining internal consistency reliability in most circumstances, as the sampling of content is the primary origin of measurement error.

The pilot group of 50 resulted in 47 hospital stays for which complete charts were available. Data were collected, the dependency score was obtained, and a reliability analysis was conducted on the Dependency at Discharge Instrument. Table 1 presents the summary statistics for the measurement tool. The tool contains four items with a possible score of 0 to 6 for each item. Possible total scores range from 0 to 24, with 24 being the most dependent. Scores in the pilot study ranged from 0 to 22. The mean

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dependency score was 7.32, the standard deviation was 4.26, and the variance 18.14.

Cronbach’s alpha was calculated for the dependency measure as an estimate of internal consistency reliability. The four item tool demonstrated an alpha of .53. While this is a very modest alpha coefficient, Nunnally (1978) noted that the internal consistency reliability of an instrument is a reflection of the internal consistency and the total number of items. Reliability of a four item tool, such as the Dependency at Discharge Instrument, then, is likely to be low. In fact, Shelly (1984) discussed a reliability standard of .50 as adequate when few items are available, as in this case.

An item analysis was conducted for the Dependency of Discharge Instrument, as illustrated in Table 2. Corrected item-total correlations were calculated for the analysis.
Table 2

**Cronbach's Alpha Reliability and Item Analysis (Pilot)**

Dependency at Discharge Instrument

\( N = 47 \)

<table>
<thead>
<tr>
<th>Item</th>
<th>Activity/Mobility</th>
<th>Bathing/Hygiene</th>
<th>Procedures</th>
<th>Signs/ Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale Mean If Item Deleted</td>
<td>6.26</td>
<td>6.72</td>
<td>3.74</td>
<td>5.23</td>
</tr>
<tr>
<td>Scale Variance If Item Deleted</td>
<td>10.19</td>
<td>12.60</td>
<td>12.63</td>
<td>11.75</td>
</tr>
<tr>
<td>Corrected Item-Total Correlation</td>
<td>.60</td>
<td>.37</td>
<td>.09</td>
<td>.34</td>
</tr>
<tr>
<td>Alpha If Item Deleted</td>
<td>.23</td>
<td>.43</td>
<td>.70</td>
<td>.44</td>
</tr>
</tbody>
</table>

Scale Statistics

- \( M = 7.32 \)
- \( SD = 4.26 \)
- Variance = 18.14
- alpha = .53
The corrected correlation removes the inflated effects of including the item in the total score when the total number of items is small (Shelley, 1984). The activity and mobility item demonstrated the strongest corrected correlation ($r = .60$) with the instrument, followed by the bathing and hygiene item ($r = .37$), and the signs and symptoms item ($r = .34$). The correlation of the procedures item to the total is the weakest ($r = .09$), supported by the fact that the overall instrument alpha would be .70 if that item was deleted.

Shelley (1984) suggests retaining items that correlate at the level of .20 or greater. As the number of subjects in the pilot group was limited ($N = 47$), and previous analysis of the procedures item showed it had the lowest correlation of the four items (Coe et al., 1987), it was decided to provisionally retain all four items for study. The decision whether to exclude the procedure item would be based on the results for internal consistency reliability and item analysis for the total sample.

In addition to internal consistency reliability, the nature of the design and data collection procedures combined with the fact that the investigator was the only person collecting the data, prompted a concern for measurement consistency over time. Shelley (1984, p. 344) identified "observer drift" as the primary reason to assess intrarater reliability when observations extend over a
period of time. In this study, data were collected over a few months time, and were gathered from varied medical record formats, including charts and microfiche. A sample was drawn which consisted of reviews from three time periods: early, middle, and late in the study. In addition, repeat chart reviews represented all three facilities, plus both paper chart and microfiche formats.

An attempt was made to collect 30 medical records for rating a second time. Following a number of requests, 26 medical records were obtained. The Dependency at Discharge Instrument was used for a second review. The 26 dependency scores calculated at time 1 and time 2 were significantly correlated ($r = .97, p < .0001$). Perfect intrarater agreement was demonstrated 73% of the time. While that figure is low, most of the scores were off by 2 points only. In an effort to identify how close the group of disagreements were, a rating of dependency class at time 1 and time 2 was evaluated, yielding a dependency class agreement of 92%.

Validity

Validity refers to the extent to which an instrument measures what it is purported to measure. The types of validity usually considered in assessing measurement tools are: content validity, criterion-related validity, and construct validity.
Content Validity

Content validity relates to the degree to which an instrument represents the domain of interest. Nunnally (1978) makes the point that content validity is best supported by the way in which a measure is developed, rather than a test following the instrument's construction. As previously discussed, the developers of the Dependency at Discharge Instrument utilized the patient classification literature, and content available in medical records as preliminary guides for construction of the prototype instrument. A five member panel of nurse experts were then consulted for the purpose of evaluating the measure regarding its adequacy in representing dependency at discharge. Panel suggestions were incorporated into the instrument and protocols (Patterson et al., 1987).

Criterion-related Validity

Criterion-related validity is a method used to examine the association between the performance on one instrument, and the performance on some other measure of the same variable. It is referred to as predictive validity when the purpose of the exercise is to estimate some independent behavior (criterion) that follows, based on the performance on the first measure (Polit & Hungler, 1983). In contrast to other types of validity, predictive validity does not ascertain how well an instrument measures a theoretical
attribute. The validity of the instrument is supported by virtue of the correlation obtained between the two measures.

The Dependency at Discharge Instrument was purported to be a potential indicator of the support services needed by a patient following discharge (Patterson et al., 1987). An appropriate examination of predictive validity, in this case, would be to determine whether the dependency measure could predict the number of nursing visits that are prescribed for a patient in the first week of home health service. The prescribed visits were chosen, rather than total services actually received in an attempt to limit the influence of confounding variables once in the home. The process of admission to the home health agency involves a nursing assessment which looks at many of the same need indicators as the dependency instrument. On the basis of those findings, a plan is established, and a prescribed number of nursing visits is identified as necessary to meet the patient's needs.

In an effort to assess predictive validity, the home health records were sought for 25 patients who had been admitted to a particular home health agency, from one of the three hospital study sites. Eighteen records were obtained: 11 from service units of the agency, and 7 from a central storage depot. Seven records could not be located. For each of the records obtained, the plan of treatment was consulted which identified how many times the patient needed
nursing visits during the initial week of service, as judged by the home health nurse.

The correlation between the dependency at hospital discharge, and the number of nursing visits prescribed for the first week was weak and not significant ($r = .10$, $p > .05$). A number of factors were likely contributors to the lack of significant findings. First, the limited sample makes finding significance difficult in the absence of a moderately strong correlation. Power was less than .10 (i.e., the probability of type II error was $>.90$) for the procedure, making it highly improbable that significance would be obtained.

In addition to the problem of limited power, the conceptualization of dependency at discharge predicting the number of nursing visits may be faulty. While dependency was conceptualized as an indicator of potential service need, the services could be performed by persons other than the home health nurses. Other health professionals may be called upon to assist in the provision of care. This determination is not always made during the initial assessment.

Of greater consequence is likely to be the involvement of what are termed informal services. These are performed by non-paid persons, e.g. friends, family, and community volunteers. It has been established that these persons play a significant role in home health care (Christianson, 1988). Patients, who have at their disposal the services of these
non-paid providers, may have significant dependency needs which are met in this way. Hence, the contribution that informal providers make could influence whether or not predictive validity is established.

In addition to the issues discussed thus far, another consideration is that of the relationship between dependency at hospital discharge and dependency at admission to home health care (when the prescription for the number of visits is determined). To examine this issue, the instrument was used to measure dependency at admission to home health, and the scores on the measure at time 1 (hospital discharge) and time 2 (home health admission) were compared. The correlation between the two measurement scores was .34, but not significant. As mentioned before, this is very likely due to the limited power (in this instance less that .25). A correlation of .468 is required to find significance (p = .05, two-tailed) in a sample of this size.

Additionally, variables not measured may potentially influence the correlation between these scores. Patients may respond differently to being home, some increasing their independence in a familiar environment, and others becoming more dependent following discharge (Waters, 1987).

While the lack of a significant correlation between time 1 (hospital discharge) and time 2 (home health admission) is likely to influence whether or not the dependency at discharge instrument can be used to predict the number of nursing visits, it is also possible that use
of the measure, at any time, to predict nursing visits is not appropriate. Since the nursing admission data are used to establish a plan for the number of nursing visits needed, the dependency scores obtained at admission were correlated with the prescribed nursing visits. While the correlation was still weak and not statistically significant \( (r = .28, p > .05) \), it was an improvement over the hospital discharge/nursing visits correlation. While the weak and non-significant correlations may be interpreted as a lack of support for predictive validity, it is likely that (because of the low power involved) the procedure conducted was not an adequate test of the relationship.

Data Analysis

In this study, data were obtained that represented both nominal and interval levels of measurement. Variables resulting in nominal level data included race, gender, marital status, type of insurance, living arrangement, referral and acceptance status. Interval level data are reported for variables: age, previous hospitalizations, number of secondary diagnoses, hospital length of stay, and dependency.

Descriptive statistics were obtained for all interval level patient characteristics by group. Group classification included the total sample, patients not referred to home health, patients referred to home health, patients accepted for home health services, and patients not
accepted for home health services. Summarizing patient characteristics in this way provides an opportunity to synthesize data in a meaningful way (Polit & Hungler, 1983).

Access to home health services, based on the Andersen model, is a multidimensional concept best examined using multivariate statistical techniques. Discriminate analysis, which may be used to determine the combination of predictors that separate groups from one another (Tabachnick & Fidell, 1989), was chosen as the method of multivariate analysis for this study. This type of analysis produces a discriminant function, essentially a regression equation, for a criterion variable that is categorical, and predictor variables that are continuous (Klecka, 1980).

Answering the Research Question

The goal of discriminant analysis in this study was to identify the factors which predicted who gained access to home health services following hospital discharge. As previously discussed, access for hospitalized patients is conceptualized as having two facets, that of referral, and that of acceptance. Discriminant analysis was used to examine the differences among the predictors to understand how those patients who were referred to home health differed from those patients not referred to home health services post-discharge. In addition, for the group referred to home health care, this multivariate technique was employed to document the differences between those patients accepted and
not accepted for home health services after hospital discharge.

**Hypothesis Testing**

A series of correlations and the chi square analytic technique were used to test the significance of the nine hypotheses derived from the Andersen model (Aday & Andersen, 1984). The chi square statistic provides the means to examine how observed frequencies compare to expected frequencies in the population. Used in situations where categorical data are involved, the test is appropriately used in this study (Kachigan, 1989).

**Summary**

Chapter III presented the methodology employed in this research study. The research design was detailed, and the setting and sample were described. Discussion of the data collection procedures, and measurement issues was presented. Results from the pilot study were presented, including tests of reliability and validity of the measurement instrument as used in this study. The plan for data analysis was also presented.

The following chapter presents the research findings. A profile of the sample is included, along with reliability testing conducted on the study sample. Finally, results of the data analysis are detailed.
Chapter IV: Research Findings

Description of the Sample

A sample of 308 adult patients, with the primary diagnosis of diabetes, hospitalized for three days or more during the period January 1, 1986 through December 31, 1989, and discharged to the community, was obtained from the three study sites. One case was dropped due to missing data; 7 were dropped at random, 2 from the referred group, and 5 from the group not referred for home health services. Of the remaining 300, one-half (n = 150) the study group had been referred for post-discharge home health services, and one-half (n = 150) had not been referred for post-discharge services in the home. Among those who were referred to home health care, follow-up data were collected on 136. The remaining cases were distributed in the following way: referred to a home health agency no longer in business (n = 8), and referred to an agency that did not respond to request for data (n = 6).

Predisposing characteristics of the sample are presented in Table 3. The mean age of the study group was 60.20 years, the referred group was almost 10 years older than the not referred group.

Minority patients outnumbered caucasian patients in the overall sample 2:1, a reflection of the Washington, DC
Table 3

Distribution of Predisposing Characteristics by Sample Group

N = 300 (150 Referred; 150 Not-referred)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Sample</th>
<th>Referred Group</th>
<th>Not Referred Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>35-100</td>
<td>35-89</td>
<td>35-100</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>99 (33%)</td>
<td>42 (42.4%)</td>
<td>57 (57.6%)</td>
</tr>
<tr>
<td>Minority</td>
<td>201 (67%)</td>
<td>108 (53.7%)</td>
<td>93 (46.3%)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>127 (42.3%)</td>
<td>53 (41.7%)</td>
<td>74 (58.3%)</td>
</tr>
<tr>
<td>Female</td>
<td>173 (57.7%)</td>
<td>97 (56.1%)</td>
<td>76 (43.9%)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>125 (41.7%)</td>
<td>47 (37.5%)</td>
<td>78 (62.4%)</td>
</tr>
<tr>
<td>Single</td>
<td>63 (21%)</td>
<td>26 (41.3%)</td>
<td>37 (58.7%)</td>
</tr>
<tr>
<td>Separated/Divorced</td>
<td>43 (14.3%)</td>
<td>26 (60.5%)</td>
<td>17 (39.5%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>69 (23%)</td>
<td>51 (73.9%)</td>
<td>18 (26.1%)</td>
</tr>
<tr>
<td><strong>Living Arrangements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td>114 (38%)</td>
<td>41 (36%)</td>
<td>73 (64%)</td>
</tr>
<tr>
<td>Other Relative or Friend</td>
<td>94 (31.3%)</td>
<td>56 (59.6%)</td>
<td>38 (40.4%)</td>
</tr>
<tr>
<td>Alone</td>
<td>92 (30.7%)</td>
<td>53 (57.6%)</td>
<td>39 (42.4%)</td>
</tr>
<tr>
<td><strong>Previous Hospitalizations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0-7</td>
<td>0-7</td>
<td>0-3</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>0.62</td>
<td>0.72</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>0.90</td>
<td>1.03</td>
<td>0.72</td>
</tr>
</tbody>
</table>
population. Minorities comprised 72% of the referral group, and 62% of the group not referred for home health care.

Women slightly outnumbered men, making up nearly 58% of the sample; women comprised 65% of the group referred to home health services and 51% of those not referred.

Married persons comprised 42% of the total sample, but represented only 31% of the referred group. In the not referred group, 52% were married.

Of the 69% of persons living with someone, more than half lived with a spouse (n = 114).

While all patients in the sample had a primary diagnosis of diabetes, variability existed regarding level of need. More than half the sample (n = 167) had not been hospitalized within the two years prior to the study. The mean number of secondary diagnoses was 4, and the mean hospital length of stay was 12 days.

Insurance coverage was held by 93% of the sample. Of those patients with insurance, 54% had public insurance, while 46% were covered by private insurance.

Table 4 presents the distribution of insurance across the sample.

Regarding identification of need for home health services, one-half (n = 75) of the referrals were made by nurses. Physicians initiated 58 of the referrals, and the remaining 17 were initiated by social workers and other health professionals.
Table 4

**Distribution of Insurance by Type and Group**

\[ N = 300 \text{ (150 Referred; 150 Not-referred)} \]

<table>
<thead>
<tr>
<th>Type of Insurance</th>
<th>Total Sample</th>
<th>Referred</th>
<th>Not-Referred</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>HMO</td>
<td>48</td>
<td>(16)</td>
<td>20 (41.7)</td>
</tr>
<tr>
<td>Commercial</td>
<td>82</td>
<td>(27.3)</td>
<td>22 (26.8)</td>
</tr>
<tr>
<td>Medicare</td>
<td>112</td>
<td>(37.3)</td>
<td>73 (65.2)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>38</td>
<td>(12.7)</td>
<td>26 (68.4)</td>
</tr>
<tr>
<td>Uninsured</td>
<td>20</td>
<td>(6.7)</td>
<td>9 (45)</td>
</tr>
</tbody>
</table>
The Dependency at Discharge Instrument, developed by Patterson and colleagues (1986) was utilized as a measure of patient need. Descriptive statistics for the dependency measure are presented in Table 5. The mean dependency score in this sample was 8.63, corresponding to the category identified by Patterson et al. (1987) as "somewhat dependent." The referred group was more likely than the not referred group to be "moderately" to "severely dependent" (48% vs. 8%), while the not referred group was more likely than the referred group to be "minimally dependent" (47.3% vs. 10.7%).

Table 6 contains descriptive statistics for the dependency items. Each item has a possible range of scores from 0 - 6. Scores are summed for a possible dependency score range of 0 - 24. As can be seen, scores on the procedures item were the highest, and scores on bathing and hygiene were the lowest.

Dependency at Discharge Instrument

An item analysis was conducted on the Dependency at Discharge Instrument. Data are presented in Table 7. The alpha coefficient for the Dependency at Discharge Instrument was .70 when used in this sample of 300, demonstrating an improvement over the coefficient (a = .53) derived from the pilot sample. In addition, an improvement was shown in the corrected item-total correlation for each dependency item. While the procedures item continues to have the lowest
Table 5

**Descriptive Statistics: Dependency at Discharge by Group**

\( N = 300 \) (150 Referred; 150 Not Referred)

<table>
<thead>
<tr>
<th>Dependency Class</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score Range</td>
<td>0-5</td>
<td>6-11</td>
<td>12-17</td>
<td>18-24</td>
<td></td>
</tr>
<tr>
<td>Dependency</td>
<td>Minimal Dependently</td>
<td>Somewhat Dependent</td>
<td>Moderately Dependent</td>
<td>Severely Dependent</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Sample</th>
<th>n</th>
<th>87</th>
<th>129</th>
<th>60</th>
<th>24</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row %</td>
<td></td>
<td>29.0</td>
<td>43.0</td>
<td>20.0</td>
<td>8.0</td>
<td>100</td>
</tr>
<tr>
<td>(Column %)</td>
<td></td>
<td>(100.0)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Referred</th>
<th>n</th>
<th>16</th>
<th>62</th>
<th>51</th>
<th>21</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row %</td>
<td></td>
<td>10.7</td>
<td>41.3</td>
<td>34.0</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td>(Column %)</td>
<td></td>
<td>(18.4)</td>
<td>(48.1)</td>
<td>(85)</td>
<td>(87.5)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not Referred</th>
<th>n</th>
<th>71</th>
<th>67</th>
<th>9</th>
<th>3</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referred Row %</td>
<td></td>
<td>47.3</td>
<td>44.7</td>
<td>6</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>(Column %)</td>
<td></td>
<td>(81.6)</td>
<td>(51.9)</td>
<td>(15)</td>
<td>(12.5)</td>
<td></td>
</tr>
</tbody>
</table>

**Total Sample**

<table>
<thead>
<tr>
<th>N</th>
<th>8.63</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>5.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Referred</th>
<th>11.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>5.31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not Referred</th>
<th>6.11</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>3.48</td>
</tr>
</tbody>
</table>
Table 6

Descriptive Statistics for Dependency at Discharge Instrument
Total Sample (N = 300)

<table>
<thead>
<tr>
<th>Possible Range</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Scale</td>
<td>8.63</td>
<td>5.14</td>
</tr>
<tr>
<td>Activity/Mobility</td>
<td>1.43</td>
<td>1.67</td>
</tr>
<tr>
<td>Bathing/Hygiene</td>
<td>1.06</td>
<td>1.78</td>
</tr>
<tr>
<td>Procedures</td>
<td>4.02</td>
<td>1.61</td>
</tr>
<tr>
<td>Signs/Symptoms</td>
<td>2.15</td>
<td>2.01</td>
</tr>
</tbody>
</table>
Table 7

Cronbach's Alpha Reliability and Item Analysis (Total Sample)
Dependency at Discharge Instrument

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean If Item Deleted</th>
<th>Scale Variance If Item Deleted</th>
<th>Corrected Item - Total Correlation</th>
<th>Alpha If Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity/Mobility</td>
<td>7.23</td>
<td>15.53</td>
<td>.61</td>
<td>.56</td>
</tr>
<tr>
<td>Bathing/Hygiene</td>
<td>7.60</td>
<td>14.58</td>
<td>.64</td>
<td>.53</td>
</tr>
<tr>
<td>Procedures</td>
<td>4.64</td>
<td>20.22</td>
<td>.25</td>
<td>.76</td>
</tr>
<tr>
<td>Signs/Symptoms</td>
<td>6.51</td>
<td>15.13</td>
<td>.47</td>
<td>.65</td>
</tr>
</tbody>
</table>

Scale Statistics

M = 8.66  SD = 5.14  Variance = 26.44  alpha = .70
corrected item-total correlation \( (r = .25) \), it meets the minimum inclusion criterion of \( r = .20 \), recommended by Shelley (1984). However, coefficient alpha would improve if the procedures item were deleted \( (\alpha = .76) \). This finding is consistent with some concerns expressed by the developers (Coe et al., 1987) related to use of the tool among various patient groups. Although the alpha for the four-item dependency composite shows only moderate internal consistency reliability, the size of the correlation is limited by the small number of items. All items were retained, as the item analysis supports the assumption that all four items are measuring the same attribute. A cautious acceptance of the tool is warranted in view of the fact that limited data are available regarding use of the instrument across patient groups.

Answering the Research Question

The Statistical Package for the Social Sciences (SPSS, Version X), was used to perform statistical functions necessary to answer the research question, and test the hypotheses generated for this study. Descriptive data were summarized, reliability estimates and correlation coefficients were calculated, and chi square and discriminant analyses were conducted. The case with the missing data was deleted, therefore, no additional approach for handling missing data was needed.
Discriminant analysis is useful in determining the "dimensions along which groups differ" (Tabachnick & Fidell, 1989, p. 507). Often used when the criterion variable is a dichotomous one, predictor variables are examined to determine their relationship to the categorical criterion variables. A combination of predictors is selected that maximizes the differences between or among the groups. This combination or dimension is called the discriminant function, and is derived by weighting the numerous values of the predictors (Kachigan, 1982).

As with other statistical tests, a variety of assumptions are held that protect the integrity of the analysis. Possible threats to multivariate analysis, using this technique, will be discussed with specific reference to each segment of this research. According to Tabachnick and Fidell (1989), discriminant analysis is a rather robust analytic technique. Concerns of unequal sample size and missing data, which may pose threats to analysis, are not problematic in the first study analysis dealing with referral to home health.

The issue of multivariate normality is discussed by Tabachnick and Fidell (1989). They assert that discriminant analysis is robust to violations of normality resulting from skewness. The likelihood of robustness is increased by large samples of equal size. It is thought that because violations of normality in this study are due primarily to
skewness, and that the sample groups are large and equal, the use of this test is appropriate.

Concerns related to multicollinearity, and singularity are also discussed by Tabachnick and Fidell (1989) as limitations to discriminant analysis. While this limitation may be a problem in some research, the use of the SPSS program, DISCRIM guards against this threat by testing tolerance, i.e., "the proportion of within-groups variance not accounted for by other variables in the analysis" (Hull and Nie, 1981, p. 453). The DISCRIM program omits predictors that do not meet the set minimum tolerance.

The most consistently discussed threat to multivariate analysis using DISCRIM is the violation of homogeneity of variance-covariance matrices (Kachigan, 1982; Tabachnick & Fidell, 1989). Tabachnick and Fidell (1989) do assert that when the focus of the discriminant analysis is inference, rather than classification, and the sample sizes are equal and large, that the technique is robust to violations of homogeneity. Therefore, while the Box's M test of homogeneity supports the significant heterogeneity of the groups, as shown in Table 8, the expectation is that the robustness of the analytic technique is promoted by the focus on inference and the large, equal sample sizes.

The Research Question

The research question of interest dealt with the relationship between the population characteristics
Table 8

Test of Equality of Group Covariance Matrices
Using Box's M

<table>
<thead>
<tr>
<th>Group Label</th>
<th>Rank</th>
<th>Log Determinant</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Referral</td>
<td>10</td>
<td>2.052881</td>
</tr>
<tr>
<td>Referral</td>
<td>10</td>
<td>6.475221</td>
</tr>
<tr>
<td>Pooled Within Groups</td>
<td>10</td>
<td>5.483031</td>
</tr>
<tr>
<td>Covariance Matrix</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Box's M</th>
<th>Approximate F</th>
<th>DF</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>363.26</td>
<td>6.3723</td>
<td>55, 28675.5</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Note. The ranks and natural logarithms of determinants shown are those of the group covariance matrices.
(predictors), and access to home health services (criterion) following hospital discharge:

1. What personal and policy-related factors are predictors of which hospitalized patients gain access to post-discharge home health services?
   a. What personal and policy-related factors are predictors of which hospitalized patients are referred for post-discharge home health services?
   b. What personal and policy-related factors are predictors of which hospitalized patients are accepted for post-discharge home health services following referral?

Consistent with the Andersen model (Aday et al., 1984), predisposing, enabling, and need variables were chosen as predictors. Table 9 lists the predictors by category, and Table 10 presents the correlation matrix for predictors and criterion variables. Two separate analyses were conducted for each criterion and the set of predictors. The first analysis examined the relationship of the predictors and the criterion variable, referral for home health services following discharge. The second analysis was conducted on the referred group, and examined the relationship between the predictors and the criterion variable, acceptance for home health services. Each will be presented separately.
Table 9

**Study Predictors Listed by Category**

**Predisposing Characteristics**

- Age
- Gender
- Race
- Marital Status
- Living Arrangements
- Previous Hospitalizations

**Enabling Characteristic**

- Insurance Coverage

**Need Characteristics**

- Hospital Length of Stay
- Number of Secondary Diagnoses
- Dependency at Discharge
Table 10

**Correlation Matrix: Predictor and Criterion Variables**

<table>
<thead>
<tr>
<th></th>
<th>Referral</th>
<th>Age</th>
<th>Previous Hospitalization</th>
<th>Length of Stay</th>
<th>Number of Secondary Diagnoses</th>
<th>Dependency</th>
<th>Gender</th>
<th>Race</th>
<th>Marital Status</th>
<th>Living Arrangement</th>
<th>Insurance</th>
<th>Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral</td>
<td>1.00</td>
<td>0.32 (.001)</td>
<td>0.12 (.023)</td>
<td>0.33 (.001)</td>
<td>0.21 (.001)</td>
<td>0.49 (.001)</td>
<td>0.14 (.007)</td>
<td>0.11 (.033)</td>
<td>0.21 (.001)</td>
<td>0.10 (.040)</td>
<td>-0.03 (.322)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.00</td>
<td>0.02 (.34)</td>
<td>0.13 (.014)</td>
<td>0.33 (.001)</td>
<td>0.23 (.001)</td>
<td>0.38 (.001)</td>
<td>0.23 (.001)</td>
<td>0.17 (.017)</td>
<td>0.12 (.017)</td>
<td>0.04 (.272)</td>
<td>-0.17 (.001)</td>
<td></td>
</tr>
<tr>
<td>Previous Hospitalization</td>
<td>1.00</td>
<td>0.06 (.156)</td>
<td>0.10 (.045)</td>
<td>0.35 (.001)</td>
<td>0.19 (.001)</td>
<td>0.10 (.001)</td>
<td>0.10 (.001)</td>
<td>0.08 (.001)</td>
<td>0.08 (.001)</td>
<td>0.05 (.195)</td>
<td>-0.09 (.125)</td>
<td></td>
</tr>
<tr>
<td>Length of Stay</td>
<td>1.00</td>
<td>0.37 (.001)</td>
<td>0.35 (.258)</td>
<td>0.36 (.001)</td>
<td>0.35 (.001)</td>
<td>0.10 (.001)</td>
<td>0.10 (.001)</td>
<td>0.08 (.001)</td>
<td>0.08 (.001)</td>
<td>0.03 (.312)</td>
<td>-0.01 (.475)</td>
<td></td>
</tr>
<tr>
<td>Secondary Diagnoses</td>
<td>1.00</td>
<td>0.26 (.001)</td>
<td>0.01 (.398)</td>
<td>0.13 (.001)</td>
<td>0.01 (.001)</td>
<td>0.01 (.001)</td>
<td>0.01 (.001)</td>
<td>0.01 (.001)</td>
<td>0.01 (.001)</td>
<td>0.01 (.102)</td>
<td>0.11 (.120)</td>
<td></td>
</tr>
<tr>
<td>Dependency</td>
<td>1.00</td>
<td>0.13 (.015)</td>
<td>-0.05 (.209)</td>
<td>-0.07 (.126)</td>
<td>-0.09 (.096)</td>
<td>-0.01 (.060)</td>
<td>0.09 (.060)</td>
<td>-0.01 (.060)</td>
<td>-0.01 (.060)</td>
<td>-0.03 (.372)</td>
<td>0.13 (.071)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1.00</td>
<td>0.10 (.019)</td>
<td>0.07 (.001)</td>
<td>0.09 (.001)</td>
<td>0.06 (.001)</td>
<td>0.06 (.001)</td>
<td>0.06 (.001)</td>
<td>0.12 (.001)</td>
<td>0.12 (.001)</td>
<td>0.06 (.137)</td>
<td>-0.10 (.119)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>1.00</td>
<td>0.21 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td>0.13 (.001)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td>1.00</td>
<td>0.47 (.001)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td>0.06 (.137)</td>
<td></td>
</tr>
<tr>
<td>Living Arrangement</td>
<td>1.00</td>
<td>0.03 (.032)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td>0.02 (.140)</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>1.00</td>
<td>0.21 (.001)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td>0.10 (.036)</td>
<td></td>
</tr>
<tr>
<td>Acceptance</td>
<td>1.00</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td>1.00 (-----)</td>
<td></td>
</tr>
</tbody>
</table>
Direct Discriminant Analysis (Total Group)

A direct (standard) discriminant function analysis was performed, with 10 predictors entered together: age, gender, race, marital status, living arrangement, previous hospitalizations, insurance, length of stay, secondary diagnoses, and dependency at discharge, and the criterion variable, referral for home health services following discharge.

Univariate F-ratios and levels of significance for the 10 predictors are presented in Table 11. Nominal level data were treated as dichotomies. As can be seen, significant differences among referred and not referred groups were found for seven of the 10 variables. The seven significant variables, listed in descending order of F-ratio were dependency (p < .00001), length of stay (p < .00001), age (p < .00001), marital status (p = .0003), secondary diagnoses (p = .0003), gender (p = .014), and previous hospitalizations (p = .046). Race, living arrangements, and insurance were not significant predictors.

Table 12 presents the summary of the overall test of discrimination. One discriminant function was derived, the maximum possible in this study of two criterion groups (Kachigan, 1982; Klecka, 1980; Tabachnick & Fidell, 1989). A chi square of 119.504 was calculated, supporting a highly significant (p < .00001) difference between the groups. Squaring the canonical correlation of .5787, provides the
Table 11

**Discriminant Analysis: Univariate F-ratios for Predictors**

*N = 300*

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependency</td>
<td>94.48</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>37.13</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Age</td>
<td>34.91</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Marital Status&lt;sup&gt;a&lt;/sup&gt;</td>
<td>13.69</td>
<td>.0003</td>
</tr>
<tr>
<td>Secondary Diagnoses</td>
<td>13.56</td>
<td>.0003</td>
</tr>
<tr>
<td>Gender&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.10</td>
<td>.0140</td>
</tr>
<tr>
<td>Previous Hospitalizations</td>
<td>4.02</td>
<td>.0460</td>
</tr>
<tr>
<td>Race&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.41</td>
<td>.0659</td>
</tr>
<tr>
<td>Living Arrangement</td>
<td>3.08</td>
<td>.0801</td>
</tr>
<tr>
<td>Insurance&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.21</td>
<td>.6448</td>
</tr>
</tbody>
</table>

*Note.* The Criterion is referral.

<sup>a</sup>These predictors were entered as dichotomous variables.
Table 12

**Discriminant Analysis: Canonical Discriminant Function**

<table>
<thead>
<tr>
<th>Function</th>
<th>Eigenvalue</th>
<th>%Variance</th>
<th>Canonical Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.5036</td>
<td>100.</td>
<td>.5787</td>
</tr>
<tr>
<td>After Function</td>
<td>Wilks' Lambda</td>
<td>Chi square</td>
<td>DF</td>
</tr>
<tr>
<td></td>
<td>.6651</td>
<td>119.504</td>
<td>10</td>
</tr>
</tbody>
</table>

*Note.* The criterion is referral; maximum number of functions is 1.
information that 33.5% of the variance is accounted for by the predictors.

Examination of the standardized canonical discriminant function coefficients, presented in Table 13, reveals that dependency at discharge makes the strongest contribution to the function, followed by length of stay, age, race, living arrangement, marital status, previous hospitalization, gender, secondary diagnoses and insurance.

The pooled-within groups correlations between the function and the discriminating variables are also shown in Table 13. The dependency variable is by far the best measure of the composite variable with a correlation of .79, supporting the role of dependency in discriminating between those referred for home health services and those not referred for home health care. Tabachnick and Fidell (1989) state that no consensus exists regarding standards for how strong correlations in the loading matrix must be for interpretation to be meaningful. They suggest, however, that a primary predictor is one with a loading of .50 or greater, and that predictors with loadings of .30 or above may be considered interpretable. Based on that guideline, and the dependency loading of .79, dependency at discharge (a measure of need) is the primary predictor of referral to home health care. Length of stay, and secondary diagnoses (also measures of need) as well as age, and marital status show moderate correlations with the function (i.e., loadings
Table 13

**Discriminant Analysis: Standardized Canonical Discriminant Function Coefficients and Pooled-Within-Groups Correlations Between Discriminating Variables and Canonical Discriminant Functions**  
\(N = 300\)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependency</td>
<td>.66751</td>
<td>.79344</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>.33193</td>
<td>.49739</td>
</tr>
<tr>
<td>Age</td>
<td>.32844</td>
<td>.48228</td>
</tr>
<tr>
<td>Race</td>
<td>.22686</td>
<td>.15070</td>
</tr>
<tr>
<td>Living Arrangement</td>
<td>.18668</td>
<td>.14335</td>
</tr>
<tr>
<td>Marital Status</td>
<td>.15351</td>
<td>.30206</td>
</tr>
<tr>
<td>Previous Hospitalizations</td>
<td>.08768</td>
<td>.16358</td>
</tr>
<tr>
<td>Gender</td>
<td>.05506</td>
<td>.20168</td>
</tr>
<tr>
<td>Secondary Diagnoses</td>
<td>.05031</td>
<td>.30064</td>
</tr>
<tr>
<td>Insurance</td>
<td>.02700</td>
<td>-.03767</td>
</tr>
</tbody>
</table>

**Note.** The criterion is referral.
above .30) and so are interpretable regarding discrimination between the groups.  

Once the composite variable was derived from the data, group centroids were identified (not referred = -.70728; referred = .70728). Classification of groups on the criterion variable was then estimated, based on the predictor values given. Table 14 demonstrates that the two groups in the study were correctly classified in 77.3% of the cases, compared to a prior probability of 50% on the basis of chance alone.

Stepwise Discriminant Analysis (Total Group)  

Following the direct method, a stepwise discriminant analysis was performed. In this procedure, variables were entered on the basis of their ability to discriminate between groups (Klecka, 1975). As expected, dependency was included in step 1 of the analysis, as the variable best able to discriminate between the groups. Of interest is the fact that marital status, in conjunction with dependency, contributed most (p<.0001) in step 2. Length of stay was added next, significant at p<.0001 level, followed by age, race and living arrangements, each significant at the p<.0001 level. Following step 6, the F level was too small to continue the procedure. The optimal (Klecka, 1975) set of variables contains the above six predictors; the canonical discriminant functions of the set are shown in Table 15.
Table 14

Discriminant Analysis: Results of Group Classification

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Predicted</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Referred</td>
<td>Referred</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Not Referred</td>
<td>150</td>
<td>128</td>
</tr>
<tr>
<td>Referred</td>
<td>150</td>
<td>46</td>
</tr>
</tbody>
</table>

Percent of "grouped" cases correctly classified: 77.3%
Table 15

**Stepwise Discriminant Analysis: Summary of Optimal Set of Predictors**

\( N = 300 \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step Entered</th>
<th>Wilks' Lambda</th>
<th>Significance</th>
<th>Standardized Discriminant Function Coefficients</th>
<th>Pooled-Within-Groups Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependency</td>
<td>1</td>
<td>.75928</td>
<td>&lt;.0001</td>
<td>.69246</td>
<td>.79984</td>
</tr>
<tr>
<td>Marital Status(^a)</td>
<td>2</td>
<td>.72778</td>
<td>&lt;.0001</td>
<td>.18764</td>
<td>.30412</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>3</td>
<td>.70142</td>
<td>&lt;.0001</td>
<td>.34191</td>
<td>.50077</td>
</tr>
<tr>
<td>Age</td>
<td>4</td>
<td>.68361</td>
<td>&lt;.0001</td>
<td>.33000</td>
<td>.48557</td>
</tr>
<tr>
<td>Race(^a)</td>
<td>5</td>
<td>.67302</td>
<td>&lt;.0001</td>
<td>.22193</td>
<td>.15172</td>
</tr>
<tr>
<td>Living Arrangement</td>
<td>6</td>
<td>.66809</td>
<td>&lt;.0001</td>
<td>.17074</td>
<td>.14432</td>
</tr>
</tbody>
</table>

**Note.** The criterion is referral.

\(^a\)These variables were entered as dichotomies.
Direct Discriminant Analysis: 
Acceptance for Home Health Services

The second direct discriminant analysis was performed to determine what set of variables predicted who was accepted for home health services. In this analysis, the group of patients who had been referred for home health care, and for whom follow-up data were collected ($N = 136$), were classified into two groups, those who were accepted for services ($n = 85$), and those who were not accepted ($n = 51$). Of note is the fact that, in most cases, where patients were classified as not accepted to home health, there was no record of the individual at the agency. It is not possible, then, to determine if any of the referrals documented in the hospital chart were not made, resulting in an absence of records, or if the patient was assessed for service and not accepted, resulting in an absence of records. As copies of referral sheets were identified in patient hospital records, the assumption is held that referrals were made.

Follow-up with the largest two agencies did not increase substantially the information available. At one agency, the marketing and intake departments were able to contribute information on one patient, who had not been accepted due to staffing constraints at the unit where the patient was referred.

Regarding limitations to multivariate analysis in the second analysis, i.e., between the predictors and the criterion variable acceptance for home health services, some
threats to analysis did exist. The violation of normality in this situation was also the result of skewness, hence the procedure was expected to be robust. A consideration with these groups, however, was the unequal sample size. Tabachnick and Fidell (1989) suggest that the test is likely to be robust when the smallest group has a minimum of 20 cases, and exceeds the number of predictors. Both criteria were met in this analysis, and so the test was expected to be robust to this violation.

Unlike the previous direct discriminant analysis, this subsample was homogeneous in its variance-covariance matrices, as demonstrated when the Box's M test found non-significant differences between groups, as presented in Table 16. Threats to analysis, based on concerns of homogeneity of variance-covariance are not present. Therefore, since, 1) the focus of the analysis is inference, not classification, 2) the smallest group is larger than 20, and has five times the number of subjects as predictors, and 3) the threats to normality are the result of skewness, not outliers, the test is expected to be robust to violations.

Univariate F-ratios on the predictors showed a lack of significant differences between the groups accepted, and not accepted for home health services as shown in Table 17. No significant differences were found when correlations were examined. The only correlation that even approached significance ($r_{pb} = .13, p = .07$) was between dependency and acceptance. A series of chi square analyses demonstrated
Table 16

**Test of Equality of Group Covariance Matrices Using Box's M**

<table>
<thead>
<tr>
<th>Group Label</th>
<th>Rank</th>
<th>Log Determinant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Accepted</td>
<td>10</td>
<td>6.001399</td>
</tr>
<tr>
<td>Accepted</td>
<td>10</td>
<td>6.101252</td>
</tr>
<tr>
<td>Pooled Within Groups Covariance Matrix</td>
<td>10</td>
<td>6.538083</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Box's M</th>
<th>Approximate F</th>
<th>DF</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>63.528</td>
<td>1.0554</td>
<td>55, 36622.7</td>
<td>.3639</td>
</tr>
</tbody>
</table>

Note. The ranks and natural logarithms of determinants shown are those of the group covariance matrices.
Table 17

**Discriminant Analysis: Univariate F-ratios for Predictors**

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>F-ratio</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependency</td>
<td>2.19</td>
<td>.1416</td>
</tr>
<tr>
<td>Secondary Diagnoses</td>
<td>1.52</td>
<td>.2193</td>
</tr>
<tr>
<td>Marital Status</td>
<td>1.41</td>
<td>.2370</td>
</tr>
<tr>
<td>Previous Hospitalization</td>
<td>1.06</td>
<td>.3051</td>
</tr>
<tr>
<td>Race</td>
<td>.12</td>
<td>.7300</td>
</tr>
<tr>
<td>Age</td>
<td>.11</td>
<td>.7424</td>
</tr>
<tr>
<td>Gender</td>
<td>.11</td>
<td>.7441</td>
</tr>
<tr>
<td>Living Arrangement</td>
<td>.05</td>
<td>.8193</td>
</tr>
<tr>
<td>Insurance</td>
<td>.07</td>
<td>.7912</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>.00</td>
<td>.9503</td>
</tr>
</tbody>
</table>

*Note.* The criterion is acceptable.

*These variables were entered as dichotomies.*
a lack of significant differences among each of the 10 predictors and the acceptance criterion.

The summary of overall discriminant analysis is presented in Table 18, which shows a lack of significant discrimination between those patients who were referred and accepted for home health, and those patients who were referred and not accepted for home health services following discharge.

Stepwise Discriminant Analysis: Acceptance for Home Health Services

Like direct discriminant analysis, stepwise discriminant analysis also showed a complete lack of significant discrimination when variables were selected by virtue of their strength in discriminating between groups. Results of the stepwise analysis are shown in Table 19.

In addition to the population characteristics, one health system characteristic was entered into the analysis examining acceptance to post-discharge home health. Referrals were initiated by nurses (50%), physicians (38.7%), and social workers and other health professionals (11.3%). As shown in Table 20, no significant differences in acceptance to home health were associated with which health professional initiated the referral.
Table 18

**Discriminant Analysis: Canonical Discriminant Function**

<table>
<thead>
<tr>
<th>Function</th>
<th>Eigenvalue</th>
<th>% Variance</th>
<th>Canonical Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0604</td>
<td>100.00</td>
<td>0.2388</td>
</tr>
</tbody>
</table>

After Wilks' Function

<table>
<thead>
<tr>
<th>Lambda</th>
<th>Chi square</th>
<th>DF</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9430</td>
<td>7.571</td>
<td>10</td>
<td>0.6706</td>
</tr>
</tbody>
</table>

**Note.** The criterion is acceptance; maximum number of functions is 1.
Table 19

Stepwise Discriminant Analysis: Summary of Optimal Set of Predictors

n = 136

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step Entered</th>
<th>Wilks' Lambda</th>
<th>Significance</th>
<th>Standardized Discriminant Function Coefficients</th>
<th>Pooled-Within Groups Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependency</td>
<td>1</td>
<td>.98395</td>
<td>.1416</td>
<td>.56855</td>
<td>.56636</td>
</tr>
<tr>
<td>Previous Hospitalization</td>
<td>2</td>
<td>.97176</td>
<td>.1489</td>
<td>-.51742</td>
<td>-.39432</td>
</tr>
<tr>
<td>Secondary Diagnosis</td>
<td>3</td>
<td>.96230</td>
<td>.1652</td>
<td>.53321</td>
<td>.47274</td>
</tr>
<tr>
<td>Marital Statusa</td>
<td>4</td>
<td>.95160</td>
<td>.1618</td>
<td>-.48771</td>
<td>-.45498</td>
</tr>
</tbody>
</table>

Note. The criterion is acceptance.

aThis variable was entered as a dichotomy.
Table 20

Relationship Between Acceptance by Home Health Agency and Initiator of Referral

\( n = 136 \)

Referral Initiated By:

<table>
<thead>
<tr>
<th>Status</th>
<th>MD</th>
<th>Social Worker</th>
<th>RN</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Accepted</td>
<td>n</td>
<td>20</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Row %</td>
<td>39.2</td>
<td>9.8</td>
<td>51.0</td>
</tr>
<tr>
<td></td>
<td>(Column %)</td>
<td>(37.0)</td>
<td>(33.3)</td>
<td>(38.8)</td>
</tr>
<tr>
<td>Accepted</td>
<td>n</td>
<td>34</td>
<td>10</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Row %</td>
<td>40.0</td>
<td>11.8</td>
<td>48.2</td>
</tr>
<tr>
<td></td>
<td>(Column %)</td>
<td>(63.0)</td>
<td>(66.7)</td>
<td>(61.2)</td>
</tr>
<tr>
<td>Column total</td>
<td></td>
<td>54</td>
<td>15</td>
<td>67</td>
</tr>
<tr>
<td>% (all cases)</td>
<td></td>
<td>(39.7)</td>
<td>(11.0)</td>
<td>(49.3)</td>
</tr>
</tbody>
</table>

Chi square: \( .16481 \)

DF: 2

Significance: \( .9209 \)
Summary: Results of Discriminant Analyses

In summary, a discriminant analysis was performed in an effort to answer the research question posed:

What personal and policy-related factors are predictors of which hospitalized patients gain access to post-discharge home health services?

As gaining access was conceptualized as a two phase phenomenon, that of referral, and that of acceptance for service, two separate analyses were conducted. First, direct discriminant analysis was performed to determine the set of predictors that best discriminated between the groups referred, and not referred for home health services. A discriminant function, strongly related to dependency was found to maximize the differences between those referred, and those not referred, with the discriminating variables accounting for 33.5% of the variance between the groups. Variables length of stay, secondary diagnoses, age and marital status showed moderate association with the function, but were not considered primary predictors. Stepwise discriminant analysis identified a six variable function that significantly discriminated between the two groups. Dependency, again, was the primary predictor.

Non-significant differences between groups accepted and not accepted were found in univariate testing. Discriminant function analysis, performed in an effort to explain acceptance to home health following referral, lacked significance on both direct and stepwise procedures. And
so, while significant predictors were found which explain referral to home health following discharge, no significant predictors were found to discriminate between those patients accepted and not accepted for home health services following referral for service.

**Evaluating the Research Hypotheses**

Nine research hypotheses were generated for this study, consistent with the available literature, and the predictions of the Andersen model. These hypotheses were tested for significance using correlations and chi square technique.

1. **Hypothesis Number 1.** The first hypothesis addressed the relationship between the predictor variable, age, and the criterion variable, referral to home health care:

   Older patients are more likely to be referred to home health services than younger patients.

As shown in Table 10, age was found to be positively correlated ($r^2 = .32$) with referral to home health services. While a correlation of moderate strength was found, it was significant at the $p<.0001$ level, hence supporting the hypothesis that older patients are more likely than younger patients to be referred for post-discharge home health services.

In light of the moderate ($r^2 = .23$) and significant correlation of age with gender, a chi square analysis was
conducted to examine the relationship between age and referral, controlling for gender (Tables 21 and 22). As can be seen, 82% of the non referred male group was under 65 years of age, while 18% of the non referred group of males was over 65. Among males who were referred, 43% were under 65 years of age and 57% were over 65 (p<.0001).

When the female group was examined, 66% of those not referred were under 65 of age, compared to 34% over 65. Of those females who were referred for home health services, 44% were under 65 years of age, and 56% were over 65 (p = .008).

2. Hypothesis Number 2. This hypothesis dealt with the relationship of gender, and referral to home health services:

Women are more likely to be referred to home health services than are men.

The crosstabulation for gender by referral is presented in Table 23. Forty-two percent of males in the sample were referred for home health services, while 56% of women in the sample were referred for post-discharge home health services, an association which was significant (p = .019), supporting the hypothesis that women are more likely to be referred than men.

An examination was conducted of the relationship between gender and referral, controlling for age. The crosstabulation for this analysis is presented in Tables 24 and 25. In the under 65 age group, 73% of the males were
Table 21

**Relationship Between Age and Referral, Controlling for Gender: Male (n = 127)**

<table>
<thead>
<tr>
<th>Status</th>
<th>Under 65</th>
<th>Over 65</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Referred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>61</td>
<td>13</td>
<td>74</td>
</tr>
<tr>
<td>Row %</td>
<td>82.4</td>
<td>17.6</td>
<td>58.3</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(72.6)</td>
<td>(30.2)</td>
<td></td>
</tr>
<tr>
<td>Referred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>23</td>
<td>30</td>
<td>53</td>
</tr>
<tr>
<td>Row %</td>
<td>43.4</td>
<td>56.6</td>
<td>41.7</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(27.4)</td>
<td>(69.8)</td>
<td></td>
</tr>
<tr>
<td>Column Total</td>
<td>84</td>
<td>43</td>
<td>127</td>
</tr>
<tr>
<td>% (all cases)</td>
<td>(66.1)</td>
<td>(33.9)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

Chi square 19.30655
DF 1
Significance <.0001
Table 22

**Relationship Between Age and Referral, Controlling for Gender: Female (n = 173)**

<table>
<thead>
<tr>
<th></th>
<th>Under 65</th>
<th>Over 65</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Not Referred</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>50</td>
<td>26</td>
<td>76</td>
</tr>
<tr>
<td>Row %</td>
<td>65.8</td>
<td>34.2</td>
<td>43.9</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(53.8)</td>
<td>(32.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Referred</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>43</td>
<td>54</td>
<td>97</td>
</tr>
<tr>
<td>Row %</td>
<td>44.3</td>
<td>55.7</td>
<td>56.1</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(46.2)</td>
<td>(67.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Column Total</strong></td>
<td>93</td>
<td>80</td>
<td>173</td>
</tr>
<tr>
<td>% (all cases)</td>
<td>(53.8)</td>
<td>(46.2)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

**Chi square** 7.05441  
**DF** 1  
**Significance** .0079
### Table 23

**Relationship Between Referral and Gender**

\[ N = 300 \]

<table>
<thead>
<tr>
<th></th>
<th>Not Referred</th>
<th>Referred</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>74</td>
<td>53</td>
<td>127</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>58.3</td>
<td>41.7</td>
<td>42.3</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(49.3)</td>
<td>(35.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>43.9</td>
<td>56.1</td>
<td>57.7</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(50.7)</td>
<td>(64.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Column Total</strong></td>
<td>150</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>% (all cases)</td>
<td>(50.0)</td>
<td>(50.0)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Chi square</strong></th>
<th><strong>DF</strong></th>
<th><strong>Significance</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.46175</td>
<td>1</td>
<td>.0194</td>
</tr>
</tbody>
</table>
Table 24

Relationship Between Gender and Referral, Controlling for Age: Under 65 (n = 177)

<table>
<thead>
<tr>
<th></th>
<th>Not Referred</th>
<th>Referred</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>61</td>
<td>23</td>
<td>84</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>72.6</td>
<td>27.4</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>(55.0)</td>
<td>(34.8)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>53.8</td>
<td>46.2</td>
<td>52.5</td>
</tr>
<tr>
<td></td>
<td>(45.0)</td>
<td>(65.2)</td>
<td></td>
</tr>
<tr>
<td>Column Total</td>
<td>111</td>
<td>66</td>
<td>177</td>
</tr>
<tr>
<td>% (all cases)</td>
<td>(62.7)</td>
<td>(37.3)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

Chi square  
5.92830

DF  
1

Significance  
.0149
Table 25

**Relationship Between Gender and Referral, Controlling for Age: Over 65 (n = 123)**

<table>
<thead>
<tr>
<th></th>
<th>Not Referred</th>
<th>Referred</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td>13</td>
<td>30</td>
<td>43</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>30.2</td>
<td>69.8</td>
<td>35.0</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(33.3)</td>
<td>(35.7)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>32.5</td>
<td>67.5</td>
<td>65.0</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(66.7)</td>
<td>(64.3)</td>
<td></td>
</tr>
<tr>
<td>Column Total</td>
<td>39</td>
<td>84</td>
<td>123</td>
</tr>
<tr>
<td>% (all cases)</td>
<td>(31.7)</td>
<td>(68.3)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

**Chi square**

<table>
<thead>
<tr>
<th>DF</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00297</td>
<td>.9565</td>
</tr>
</tbody>
</table>
not referred, and 27% of the males were referred for home health services. A significant \( (p = .01) \) difference was seen for females; 54% were not referred, and 46% were referred for post-discharge home health services.

When the over 65 group was examined, no significant differences were seen relative to gender. Both males and females were more likely to be referred for home health services (70% of males were referred; nearly 68% of females were referred).

3. **Hypothesis Number 3.** The third hypothesis addressed the relationship between living arrangements and referral for home health services:

   Patients who live alone are more likely to be referred to home health services than those patients who do not live alone.

   The crosstabulation for living arrangements by referral is presented in Table 26. The referral pattern for patients significantly differs \( (p = .0007) \) depending on living arrangements. However, contrary to expectation, it appears that the referral patterns of those who either live alone or with someone other than a spouse are similar (i.e., nearly 60% of those in each of these two groups were referred). On the other hand, only 36% of those living with a spouse were referred.

4. **Hypothesis Number 4.** This hypothesis assessed the relationship between the need variable, prior hospitalization, and referral for home health services:
Table 26

<table>
<thead>
<tr>
<th>Relationship Between Referral and Living Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N = 300 )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Not Referred</th>
<th>Referred</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n )</td>
<td>73</td>
<td>41</td>
<td>114</td>
</tr>
<tr>
<td><strong>Spouse</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>64.0</td>
<td>36.0</td>
<td>38</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(48.7)</td>
<td>(27.3)</td>
<td></td>
</tr>
<tr>
<td>( n )</td>
<td>38</td>
<td>56</td>
<td>94</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>40.4</td>
<td>59.6</td>
<td>31.3</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(25.3)</td>
<td>(37.3)</td>
<td></td>
</tr>
<tr>
<td>( n )</td>
<td>39</td>
<td>53</td>
<td>92</td>
</tr>
<tr>
<td><strong>Alone</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Row %</td>
<td>42.4</td>
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<td>(Column %)</td>
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<tr>
<td>% (all cases)</td>
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<td>300</td>
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**Chi square**

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>Significance</th>
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<tbody>
<tr>
<td>14.55970</td>
<td>2</td>
<td>.0007</td>
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</table>
Patients who have been hospitalized within the prior 24 months are more likely to be referred to home health care than those who have not been hospitalized within the prior 24 months.

A weak, but significant ($r^2 = .12, p = .023$) association was found between the number of previous hospitalizations within 24 months and the likelihood of referral for home health services.

5. **Hypotheses Number 5 and 6.** The relationship between insurance coverage, and referral to home health services is the focus of hypotheses numbers 5 and 6:

Patients with health insurance coverage are more likely to be referred than those who are not insured; and Patients who belong to HMOs or other managed care systems are likely to be referred less frequently than those patients who do not belong to such systems of care, but more frequently than those patients who have no health insurance coverage.

The crosstabulations for insurance coverage by referral are presented in Table 27. Patients who have public insurance (Medicare and Medicaid) are a) more likely to be referred than patients who have no insurance and b) more likely to be referred than patients who have private insurance. Not being insured is associated with a referral pattern much like that of having coverage through an HMO.

Regarding coverage by HMO, persons who belong to these and other managed care systems are less likely to be
Table 27

**Relationship Between Referral and Insurance Type**

<table>
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<tr>
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<tr>
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<td>112</td>
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<tr>
<td>Row %</td>
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<td>65.2</td>
<td>37.3</td>
</tr>
<tr>
<td>(Column %)</td>
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<tr>
<td>Row %</td>
<td>31.6</td>
<td>68.4</td>
<td>12.7</td>
</tr>
<tr>
<td><strong>Medicaid</strong></td>
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<td>(48.7)</td>
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</tr>
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<td>(45)</td>
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<tr>
<td>Uninsured</td>
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<tr>
<td>% (all cases)</td>
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<td>(100)</td>
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</tbody>
</table>

**Chi Square**

- DF = 4
- Significance = <.0001

136

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referred, than not referred for post-hospital care (42% vs.
58%). In addition, a higher percentage are referred than
patients with other types of private insurance coverage (42%
vs. 27%). These differences related to insurance coverage
are significant (p<.001).

When age was controlled, 37% of the under 65 HMO group
(Table 28) and 60% of the over 65 HMO group (Table 29) were
referred for home health service. This age-related referral
rate does not differ significantly from that of the non-HMO
group.

6. **Hypothesis Number 7.** This hypothesis addresses
the relationship between the predictor length of stay, and
the criterion, referral to home health:

Patients who have a longer length of stay are more
likely to be referred to home health than those with a
shorter length of stay.

The variable length of stay shows a positive correlation of
moderate strength (r_{pb} = .33) with the criterion of referral
as presented in Table 10. This significant correlation
(p<.0001) supports the hypothesis that persons who are
hospitalized for a longer duration are more likely to be
referred for post-discharge home health services than those
patients who experience shorter hospital stays.

7. **Hypothesis Number 8.** The association between
dependency at discharge and referral for post-discharge home
health services was addressed in this hypothesis:
Table 28

Relationship Between Insurance Type and Referral,
Controlling for Age: Under 65 (n = 177)

<table>
<thead>
<tr>
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<th>Referred</th>
<th>Row Total</th>
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</thead>
<tbody>
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</tr>
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<td>Row %</td>
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<tr>
<td>Not HMO</td>
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<td>Row %</td>
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<td>37.4</td>
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<td>Column Total</td>
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<td>177</td>
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<tr>
<td>% (all cases)</td>
<td>(62.7)</td>
<td>(37.3)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

Chi square: .000000  DF: 1  Significance: 1.0000

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Table 29

Relationship Between Insurance Type and Referral, Controlling for Age: Over 65 (n = 123)

<table>
<thead>
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<th>Referred</th>
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<tbody>
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<td>10</td>
</tr>
<tr>
<td>Row %</td>
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<td>(Column %)</td>
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</tr>
<tr>
<td>Not HMO</td>
<td>n 35</td>
<td>78</td>
<td>113</td>
</tr>
<tr>
<td>Row %</td>
<td>31.0</td>
<td>69.0</td>
<td>91.9</td>
</tr>
<tr>
<td>(Column %)</td>
<td>(89.7)</td>
<td>(92.9)</td>
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</tbody>
</table>

Column Total 39   84   123
% (all cases)     (31.7) (68.3) (100.0)

Chi square .05450  DF 1  Significance .8154
Patients who have a higher score on the Dependency at Discharge Instrument will be referred more often than those patients with a lower dependency score.

As in the multivariate analysis, dependency demonstrated the strongest correlation with the criterion of referral. This moderately strong ($r^2 = .49$) correlation was significant at the $p < .0001$ level, and supports the premise that patients who are more dependent at the time of hospital discharge, are more likely to be referred for post-discharge home health services.

**8. Hypothesis Number 9.** This hypothesis dealt with the relationship between the number of secondary diagnoses and referral:

Patients with a greater number of secondary diseases will be referred to home health care more often than those with fewer secondary diagnoses.

The association between the number of secondary diagnoses and referral to home health care was shown to be a significant one ($p < .0001$), although the correlation itself was relatively weak ($r^2 = .21$). The data supported the association as specified in the hypothesis.

In addition to the predicted relationships already discussed, some significant correlations were found among the predictors. Regarding dependency, age was significantly correlated with dependency ($r = .38$), as were length of stay ($r = .35$), and the number of secondary diagnoses ($r = .37$), $p < .001$ two-tailed test in all cases. Number of secondary
diagnoses and length of stay were also significantly correlated with one another ($r = .37$).

In summary, support was found for a number of hypothesized relationships. Patients who were more likely to be referred were those who were older, female, lived alone or with a friend or family member, other than a spouse, were covered by Medicare or Medicaid, had a longer hospital stay, had more secondary diagnoses, and were more dependent at discharge. Weaker support, inviting cautious interpretation, was found for the variable of hospitalization within the prior 24 months. Additionally, significant correlations among predictors were found for dependency with age, length of stay and secondary diagnoses. Secondary diagnoses was also found to correlate significantly with length of stay.

Chapter Summary

Research findings were addressed in this chapter. Descriptive statistics were presented, along with analytic techniques for answering the research question, and testing the research hypotheses. Discriminant analysis, both direct and stepwise methods, was performed that provided an overall, plus a parsimonious set of predictors of referral for post-discharge home health services. No significant predictors were found to explain acceptance for home health. Finally, hypotheses were tested by means of correlations and chi square techniques. Chapter V will present the study...
summary, interpretation, conclusions, and recommendations for further study.
Chapter V: Summary, Conclusions and Recommendations

Introduction

This study was designed to identify the personal and policy-related factors that predict which hospitalized diabetic patients gain access to post-discharge home health services. Access was conceptualized as a two phase process, and so, was examined with respect to referral for home health services, and acceptance for post-hospital services in the home. The Andersen model (Aday et al., 1984) of access was used as the theoretical framework for this research. As such, it directed the choice of predictor variables used to explain access to home health services.

Predisposing population characteristics of age, gender, race, marital status, living arrangements, and previous hospitalizations were examined, as well as the enabling characteristic of insurance coverage. Finally, need characteristics of hospital length of stay, number of secondary diagnoses, and dependency at discharge were addressed. Data from hospitalization were collected through retrospective medical record review, and validation of acceptance for service was obtained by questionnaire from the home health agencies.

This research emphasized the population characteristics as predictors of access to home health services. One health
system characteristic, initiator of referral, was examined for its association with acceptance for home health services. The design and scope of the study precluded examination of other health system characteristics, also a part of the Andersen model.

While the Andersen model (Aday et al., 1984) has been used in many studies of access, these studies often examine utilization in hospital, ambulatory, and emergency care. Studies of home health utilization have rarely focused specifically on the hospitalized population, and have emphasized utilization by the elderly cohort. Research conducted on the post-hospital care of hospitalized populations suffers from small sample size, and inadequate response rate (Wolock et al., 1987). In an effort to add to the knowledge base, this study was designed to examine a broader population, whose need for home health services after discharge was likely. Additionally, a larger sample, comprised of those who did gain access, and those who did not was drawn from the population. This chapter presents a summary of the study findings, a discussion of the results, and recommendations for further study.

Summary of Findings

As mentioned previously, the aim of this study was to identify the characteristics which were predictive of referral and acceptance to home health services following hospital discharge. As in many studies of access, variables
of need (dependency and length of stay) contributed greatly to the predictive ability of the model as it relates to home health care. Predisposing characteristics of age, living arrangements, marital status, race and gender, also played a role in explaining access to home health care. The enabling characteristic of insurance coverage, while not significant in the multivariate analysis, added data of importance in explaining patterns of referral consistent with those reported in the literature. No significant discriminant function or predictor was found which explained acceptance to home health care following referral. Discussion and interpretation of the results are presented in the following sections.

Discussion

The complexity of the access phenomenon has been addressed in the literature, and is supported by the findings of this research study. A variety of predisposing, enabling, and need factors were found to be associated with whether or not patients were referred for home health services. The patterns were not apparent, however, for acceptance to home health care. Each of these phases of access is addressed separately, and is organized according to the Andersen model.
Relationship Between Predictors and Referral

The research question, and a series of hypotheses addressed the relationship between the 10 predictors and the criterion variable, referral for post-discharge home health services. The predictors will be addressed using the Andersen model as an organizing framework.

Predisposing Characteristics

Age. Age was expected to demonstrate a positive correlation with referral to home health care. Since the advent of prospective payment in the 1980s, many discussions have taken place regarding the greying of America, and the change in health policy dealing with the financing of care. Support exists for the increase in the population considered frail, i.e., the old-old, those over age 85. In fact, while the Medicare population overall has been increasing at a rate of 2.1% yearly, the annual rate for the over-85 group has been 4.6% (Mariano, 1989). As functional impairment and chronic illness often accompany advancing age, this population has the potential for being more vulnerable.

Regarding health care financing for the elderly, as hospitals attempt to decrease the length of stay for their Medicare clientele, and health professionals become more attuned to the need for continuing care in the home for this sicker, more vulnerable population, referral to home health care should reflect an older population than the non-referred counterpart.
The empirical influence of age on utilization, however, has not always been so clear cut. Long and Settle (1984) found that the utilization of inpatient services increases with advancing age, but not the use of ambulatory services. Starrett et al. (1988) found age to exert a direct effect on use when path analysis was conducted. Andersen and Aday (1978) found age to have an indirect effect on use through need. Thomas and Penchansky (1984) and Wolinsky (1978) have criticized the use of age as a predictor, contending that need is the more salient variable.

In addition to the conceptualization of post-discharge home health care as a continuation of hospital care, this type of care may be promoted as a preventive measure regarding readmission to the hospital for a group at risk, namely the elderly. Holloway and Thomas (1989) found in their examination of readmission to the hospital within 31 days of discharge (N = 2946), that those persons readmitted were 8 years older on average (p<.0001), than those not readmitted within that period.

This research study found age to be significantly related to referral (p<.0001) for home health services in both univariate and multivariate analyses. When discriminant analysis was performed, age was the most important predisposing discriminant variable. Its role in the interpretation of the function was second only to the need variables of dependency and length of stay. In the stepwise discriminant analysis, age followed dependency,
marital status, and length of stay into the analysis, demonstrating significant discrimination (p<.0001) between the groups.

Age was also found to correlate significantly (p<.0001) with the variable, dependency, giving some credence to the argument that age, in and of itself, is not a major predictor of referral. While the two predictors are significantly correlated, an advantage of using discriminant analysis over univariate techniques is its ability to assign to each predictor the "unique association" (Tabachnick & Fidell, 1989) it has with the criterion. The unique association, then, of age with the criterion referral (as shown by the discriminant analysis) provides support for the role of age as a predictor that discriminates between those referred and not referred for post-discharge home health services. From a practical perspective, however, it is very difficult to sort out these two variables. Hence, no simple answer exists to the issue as raised. The clinician who initiates the referral is likely to see an older adult with functional dependency, and make a referral based on that composite.

Gender. The role of gender in explaining referral to home health care is less clearly identified. Empirical data are not consistent in specifying the role. While some previous work has supported increased utilization by women (Kronenfeld, 1980; Wan, 1982), other investigators have
found women's utilization to be appropriately related to need (Aday et al., 1980). Women do tend to live longer than men, and as a result, are more likely to be at home alone following hospitalization. Gender was found in this research, to be significantly correlated with dependency ($p=.015$), age ($p<.0001$), and marital status ($p<.0001$). Women were more likely to be older, more dependent, and not married.

Chi square analysis of the data in this study, found gender to be significantly associated ($p=.019$) with referral to home health services. When age was controlled for, some interesting differences were seen. Men under 65 were less likely to be referred than those over 65 (27% vs. 70%). Among the under 65 females, 46% were referred, compared to 68% of those over 65 years. And so, while in the under 65 group men were less likely than women to be referred, no significant differences were seen in the over 65 group ($p=.96$).

Pasquale (1988) found older men to be more often married and living with an available caretaker, factors that one would expect to be associated with a decreased likelihood of referral. Men were more likely, in this study, to be married and live with someone, variables that may be associated with less likelihood of referral to home health care in the younger group. In older men, that does not appear to be the case.
When multivariate analysis was performed, however, the role of gender in discriminating between the groups was uninterpretable, its correlation with the discriminant function being .20. Gender was not entered into the stepwise discriminant function analysis, suggesting that it did not add to the ability of the previously entered variables to explain differences between the groups. This lack of significant "unique association" (Tabachnick & Fidell, 1989) lends support for the premise that gender, when considered with the other predictors, does not discriminate between those referred and not referred for post-discharge home health services. In addition, examined within the context of previous research findings, this finding is logical and consistent.

**Marital Status.** Marital status was likely to play a role in explaining who is referred for post-discharge home health services. While Andersen and colleagues did not use marital status as a variable in their research, other studies of utilization have examined this variable. At the state organizational level, Benjamin (1986) found that percentage of the aged who were married was inversely related to use of home health services. Soldo (1985) found home health care recipients more likely to be never-married, than married.

The findings of these previous research studies were supported in this study. Almost 64% of persons referred for
home health care were not married, compared to 48% in the not referred group; this finding was significant at the p=.0004 level. Discriminant function analysis found marital status to be one of the seven variables significantly related to the function. Additionally, it was entered at step 2 of the stepwise discriminant analysis, significant at the p<.00001 level. If one considers that the spouse is likely to assume a caretaking role (Stone et al., 1987; U.S. G.A.O., 1981), hence provide for needs unable to be met by the patient, the unmarried cohort is likely to be viewed as needy, and would more likely be referred for community services, such as home care.

Living Arrangement. Empirical support exists for the fact that persons who live alone have increased use of home health services. Stone (1986) found that older persons, who have lived alone used home health services more than those who were not alone. When moderate to severe functional limitations were present, persons living alone used even greater numbers of services. Results regarding living arrangements in this study were quite interesting.

While chi square analysis found no significant differences in referral (when the variable living arrangement was treated as a dichotomy) significant differences (p=.0007) were found among those alone, those living with a spouse, and those living with other friends or relatives. Nearly 60% of those persons who lived with
others were referred, and nearly 58% of those persons who lived alone were referred for home health services. Only 36% of patients who lived with a spouse were referred. This finding could be explained in terms of the level of commitment to the patient. A spouse may be far more likely to devote himself or herself to care for a vulnerable person, than would a friend or other relative.

Discriminant analysis, however, found living arrangements to be correlated with the function at a .14 level, and so to be uninterpretable. Therefore, while one of the chi square analyses dealing with living arrangement was significant, the multivariate analysis did not support a significant role for living arrangement apart from marital status, with which it is significantly associated (p<.0005). When stepwise analysis was performed, living arrangement (coded dichotomously) was found to significantly add to the predictors already entered: dependency, marital status, length of stay, age, and race. This supports the premise that when a parsimonious set of predictors is selected, the variable, living arrangement plays an important role.

Race. Race has been shown to assist in explaining utilization of health services (AMA, 1990; Andersen et al., 1986; Funkhouse & Moser, 1990). Wan (1982) found elderly blacks to have poorer utilization than elderly whites, and to utilize hospital ambulatory clinics and neighborhood health centers as a regular source of care more often than
whites. In addition, while acute episodes of illness were predictive of hospitalization in whites, chronic disability was most predictive of inpatient care in blacks.

In this study, minorities were found to be significantly younger than whites. Chi square analysis showed no significant differences for referral between whites and minorities. Multivariate analysis showed race to make a relatively strong contribution to the function, but the correlation with the function was judged to be uninterpretable due to its weak correlation of .151. The stepwise discriminant function does assist with the interpretation, however. Following entry of dependency, marital status, length of stay, and age, race was entered into the analysis, significant at the p<.00001 level. While race in and of itself does not demonstrate significance, it adds significantly to explanation when it is added to the prior stepwise entrants.

**Previous Hospitalizations.** The role of previous hospitalizations in predicting utilization has not been clearly defined. Andersen and Newman (1973) suggested that previous illness was a predisposing condition predictive of service use, i.e., that persons who have had health problems in the past would be more likely to use health services in the future. Limited measurement of this variable has been conducted. Branch and colleagues (1988) found that previous hospitalization was not predictive of entry into a home care
program. Fethke et al. (1986), however, found that elderly who have been hospitalized within the previous two years are more likely to be rehospitalized. It is noted that medical record information regarding previous hospitalizations may be incomplete. While it is more likely that previous admissions to the study hospital are complete, it is possible that prior admissions to other facilities may not be included in the medical record.

Univariate analysis showed that the number of hospitalizations in the prior 24 months was weakly, but significantly (p=.023) correlated with referral to home health services. Weak correlations also existed between previous hospitalizations and dependency (r=.19; p=.001). The results of discriminant analysis proved uninterpretable (r=.16), and stepwise analysis failed to enter the variable into the analysis.

Theoretically, home health care following discharge could be considered to play a preventive role regarding rehospitalization. In that case, patients who are viewed as being at risk for rehospitalization without community assistance (those who have been hospitalized twice in 24 months), might be referred by a health professional. The findings of Branch et al. (1988) suggest, however, that home health services are not thought of as a preventive measure worthy of employing. The multivariate findings suggest that prior hospitalization does not explain the differences between the groups referred, and not referred for home
health, consistent with the study by Branch and others. Considering the correlation with dependency, it is likely that any effect that might relate to prior hospitalization is shared with the dependency variable.

Enabling Characteristics

Insurance. The availability of health insurance, in terms of decreasing the price of services, has been identified as an enabling predictor in studies of access. Aday (1975; 1976) has identified significant problems of access in the uninsured. In fact, while access has improved somewhat since the enactment of Medicare, coinsurance and deductibles continue to act as insurance-related barriers (Petchers & Milligan, 1988). As most insurance covers hospitalization, hospital services do not demonstrate significant insurance effects.

Significant variation does exist, however, among insurance policies for coverage of non-acute care. Home health care is an area where such variation is likely to exist, with reimbursement criteria differing by type of insurance, and among the private sector, by specific policy. Research support for state-to-state variation in Medicaid service utilization has been discussed previously (Benjamin, 1986), and inconsistencies among Medicare intermediaries are discussed in the literature as well (Galten, 1987; Kleffel, 1988). As a result, it was anticipated that variations in
referral would be associated with differences in insurance coverage.

Univariate analysis comparing persons with and without insurance show no significant differences between the groups regarding referral to home health. When all types of insurance: commercial, HMO, Medicare and Medicaid, and no insurance were examined, the differences among the types were significant ($p=0.00001$). Persons with public insurance (i.e., Medicare and Medicaid), were referred similarly (over 65%). Persons who were uninsured, and persons who were insured through HMOs, were referred less often than the public insureds, but similarly to one another (over 40%). Last, persons with commercial insurance were least likely to be referred to home health care (27%).

It is not surprising that persons with public insurance were referred most often. Many of these persons are older (Medicare), and so would be referred more often. Medicaid coverage has been associated with increased utilization for the poor (Newacheck, 1989; Rosenbach, 1989; Taube & Raupp, 1980). The decreased referral rate among the commercially-insured patients may be associated with a number of factors. These persons are likely to be younger, employed, married, and viewed as more self-sufficient, and so, are referred less often. They are less likely to have functional disability, enabling them to have their post-hospital needs met in an ambulatory care setting. In addition, the commercial policies are likely to have coinsurance and
deductibles which may decrease the attractiveness of post-discharge home health service. The univariate findings are consistent with the work of Hayward et al. (1988) who found that insured working adults were 4 times as likely as insured elderly to report financial barriers to care.

It might be assumed that the HMO group is younger, and so would be referred less frequently for home health. As seen in Table 25, when controlling for age, no significant differences are found between the HMO group and those with other types of insurance in either the under 65 or over 65 groups, i.e., those under 65 are less likely than those over 65 to be referred for home health services.

Multivariate analysis showed insurance to play the most meager role regarding the discriminant function. Additionally, the insurance variable's low correlation with the function (.03) made it uninterpretable. The stepwise discriminant procedure did not enter insurance into the analysis. These results are consistent with the considerations discussed above. Specific types of insurance are likely to be associated with some other predictor variables, but in divergent ways, not contributing to the interpretation of the results.

Need Characteristics

Dependency at Discharge. In view of the consistency with which need has been predictive of health services utilization, it was not surprising to find that a measure of
need, i.e., dependency, demonstrated the strongest association with referral. A moderate correlation ($r = .49; p < .0001$) was found between the two variables. In addition to its correlation with referral, dependency was found to be correlated with the predisposing characteristics of age ($r = .38; p < .0001$), gender ($r = .13; p = .015$), and previous hospitalization ($r = .19; p = .001$). Correlations between dependency and other need variables were also found: length of stay ($r = .35; p < .0001$), and number of secondary diagnoses ($r = .26; p < .0001$).

Regarding the association between dependency and referral, the dependency at discharge measure was designed as a potential indicator of the need for services following discharge. Prior research has also found that the home health clientele experience activity limitations (Stone, 1986; Wolock, 1987), need long-term management of health problems (Meiners & Coffey, 1985), and demonstrate a significant increase in functional care needs (bathing, dressing and eating), as well as skilled care needs since the inception of prospective payment (Shaughnessy & Kramer, 1990).

Discriminant analysis showed dependency to be the strongest contributor to the referral function, as well as the best measure of the function, with a correlation of .79. These results support the previous research findings, and give credence to viewing the function as a measure of
dependency, with biological, psychological, and social dimensions (Klecka, 1980).

Stepwise discriminant analysis (Table 14) entered dependency at step 1 ($p<.00001$), supporting its importance in separating the groups. The standardized discriminant function coefficients derived from the stepwise procedure also show dependency as the predictor with the strongest weight relative to the six-variable function. Of interest is the fact that dependency at discharge plays about the same role in this function as in the overall discriminant function (.693 versus .668). The findings in both univariate and multivariate analyses support previous research which discusses the prominent role of need variables in utilization of health services. In this case, health professionals refer persons to home health care whose level of need, dependency, is greater than that of the patients whom they do not refer for home health services.

**Length of Stay.** Hospital length of stay was found to correlate moderately ($r=.33; p<.0001$) with referral. This association was expected as it was thought that, as a possible measure of severity, a longer length of stay would indicate greater need, resulting in an increased chance of being referred for home health services. This finding is not consistent with prior research results, which did not find length of stay to be associated with home health service use (Wolock, 1987). As previously discussed,
however, the Wolock (1987) study suffered from inadequate sample size, hence significance was unlikely.

Discriminant analysis found length of stay to contribute greatly to the function, although it was about half as important as dependency. This importance was further supported by the .497 correlation of length of stay with the function, and the fact that length of stay was entered at step 3 of the stepwise procedure ($p<.00001$).

Length of stay was also correlated with other variables of need, number of secondary diagnoses and dependency at discharge. Additionally, a significant correlation, though weak ($r=.13; p=.014$) was found with age, corroborating the research results of Andersen and Aday (1978), and Long and Settle (1984), in which they found an association between age and need.

**Number of Secondary Diagnoses.** The final measure of need to be considered is the number of secondary diagnoses. In univariate analysis, this variable was found to be significantly correlated with referral, and weakly correlated with age. As the number of secondary diagnoses increases, it is likely that a more complex health care regimen is required, including medications, treatments and the like. It would follow logically that persons who do have more secondary diagnoses would be referred more often for post-discharge home health services.
A moderate correlation (\(r=.33\)) was found between secondary diagnoses and length of stay, as previously discussed. If the number of secondary diagnoses is indicative of severity of illness, it would be expected to be associated with an increased length of stay. The same connection is likely to operate regarding the correlation between secondary diagnoses and dependency. As increasingly complex health problems result in functional limitation, increased symptomatology, and technological needs, dependency is likely to be present.

Discriminant analysis found the number of secondary diagnoses to contribute minimally to the discriminant function derived from the 10 study predictors. When the structure matrix correlations were specified (Table 13), however, secondary diagnosis was identified as meaningful in interpreting the function (correlation .30). The variable was not entered into the stepwise procedure, hence was not part of the parsimonious set of predictors identified through the stepwise discriminant analysis. Considering the correlations between secondary diagnoses and the other need variables length of stay and dependency, both of which played a major role in the discriminant analysis, secondary diagnoses may not have added any additional predictive information to the function.
Relationship Between the Predictors and Acceptance

As previously discussed, access to home health services is a two phase phenomenon. Referral, an intermediate step, takes place following assessment by professional staff, generally hospital employees. Following referral to home health care, an assessment is made by the home health nurse as to whether the patient will be accepted for service. As such, decisions regarding who gains access are made at two points in time, in the hospital, and in the home health agency. It was necessary, then to seek validation of acceptance (contact utilization) from the agencies to which the referral was made.

As presented in Chapter IV, analysis of the data for groups accepted, and not accepted for home health services was conducted using univariate and multivariate methods. No significant discriminating variables were found when discriminant analysis was performed. Additionally, univariate F-ratios were also non-significant. Examination of correlations showed that only one variable, dependency, even approached significance ($r=.1267; p=.07$), indicating a possible trend toward need as a predictor in acceptance.

While no significant associations were found between the predictors and the criterion variable acceptance, it is possible that these groups differ on some other variables which have not been addressed. In fact, while significant predictors were found for groups who were referred, and those patients who were not referred for post-discharge home
health services, only 33.5% of the variance was accounted for by the predictors. This finding of limited variance, however, is consistent with that of other studies of access (Ballard & McNamara, 1983). In as far as the Andersen model is a comprehensive one, it would be expected that its multivariate approach would result in a larger portion of variance accounted for. However, that has not been the case (Aday et al., 1980). The home health study conducted by Starrett et al. (1988) found the model predictors to account for 22% of the variance explained.

Chi square analysis demonstrated much the same results as other techniques. No differences were found between those accepted, and not accepted for post-discharge home health services, on any of the predictors. While no differences in insurance coverage were found, in contrast to the examination of referral status, some interesting changes in referral pattern were noted. When referral status was analyzed, commercially-insured patients were referred at the lowest rate (26.8% referred; 73.2% not referred), followed by the uninsured (45% referred) and members of HMOs (42% referred). Patients covered by Medicare and Medicaid were referred at the highest rate (66% referred; 34% not referred). Examination of acceptance, however, showed a very different pattern, with no significant differences found among insurance types.

Medicare and Medicaid, so similar in referral pattern were a bit more divergent in terms of acceptance. While
they were referred at a rate of 65% (Medicare), and 68% (Medicaid), these public insureds were accepted at a rate of 59% (Medicare), and 63% (Medicaid). Of particular interest is the dramatic change for those patients who were commercially-insured. Although patients with private insurance were referred at a rate of 27%, they were accepted at a rate of 70%. Only speculation is possible about why that might be the case. It is helpful, though to consider some of the health system factors which may have been associated with some of these study findings.

The home health care literature of the mid to late 1980s is replete with discussion of problems in home health care viewed as connected to the organization and financing of Medicare. Denial rates, once unheard of in home health, were experienced by many agencies (Auerbach, 1985; Harris, 1988; Omdahl, 1987; Smith, 1988). Omdahl (1987) cites a dramatic change that occurred at the same time hospitals were struggling with the prospective payment initiative. Denial rates grew from 3.5% of all Medicare cases in 1984 to 6.9% of all Medicare cases in 1987 (Omdahl, 1987). Droste (1987) attributed the change in denial rates to a change in the way fiscal intermediaries interpreted the regulations and eligibility issues. Concerns about what constituted skilled, intermittent care surfaced. Directors of home health agencies discussed not knowing which patients to accept, as they viewed the claims review process as erratic (Smith, 1988). Additionally, substantial time is required
for documentation by professional and administrative staff (Peznecker, Horn, Werner & Kenyon, 1987). These circumstances would make Medicare patients less attractive from a financial standpoint, and the commercially insured more attractive as commercial insurance was not likely to cause loss of revenue for the agency.

Other considerations may play a role in the lack of significant findings in acceptance status as well. It was previously discussed that one patient for whom an agency initially found no information, was later discovered to have been denied service due to a lack of available staff to conduct the home visits. The lack of resources in the home health arena has been documented (Peznecker et al., 1987). It is also possible that some of these patients who were not accepted did not wish home health services. This likelihood is considered minimal, as none of the hospital records had noted unwillingness on the part of the patients to accept service, nor is that sentiment found in the literature (Caro, 1984). While data were not available to substantiate whether or not these issues played a role in the lack of discriminating predictors of acceptance, it is possible that some or all of these factors (e.g., staffing inadequacies) were random occurrences contributing to insignificant findings.
Conclusions

It was concluded that a number of population characteristics, as specified in the Andersen model, are predictive of referral to post-discharge home health services. Dependency at discharge, a measure of the potential need for support services following discharge, was found to be the best predictor of whether or not diabetic patients were referred for post-discharge home health services. This variable, in conjunction with length of stay, age, marital status, and the number of secondary diagnoses explained 33.5% of the variance between the groups who were referred, and those not referred.

The findings in this research regarding referral supported previous research on access to health services, which found that need best explained the variance in utilization of health services (Aday et al., 1980; Branch et al., 1988; Starrett et al., 1988). Lack of significant findings, however, did not allow for prediction of acceptance for home health services following discharge from the hospital. In the absence of data, it was suggested that this lack of differentiation between the accepted and not accepted groups may be associated with issues of home health services organization, financing and delivery, changes in which have caused turmoil within the home health delivery system.

In view of the design and sample of this study, it is necessary to be extremely cautious in generalizing the
results to other than the study population. Sites were chosen for reasons of convenience and access, though consideration was given to the ability to obtain a reasonable cross-section of the population in terms of demographic characteristics. While the population of diabetic patients was chosen because of the likelihood of hospitalization and referral to home health care, the choice of one diagnostic category limits intra-study generalizability, as well as that outside the study environment. In addition, lack of randomization in selecting patients for the not referred group reduces confidence that those patients are representative of the not referred group hospitalized at the three study sites. On the other hand, the selection process likely reduces the influence of local historical events in differentiating between the groups.

Variation in the planning and implementation of discharge within the study sites is acknowledged. Professional practice may have been associated with specific patterns and informal guides for referral at each of the three study sites. These circumstances contribute to the limited generalizability of the research results.

Another methodological issue of concern is the adequacy of the variable choice in the study. While limited variance was accounted for, a problem which has been identified in health services studies of access (Aday et al., 1980; Starrett et al., 1988), some improvement in amount of
variance accounted for was obtained. It is clear, however, that this research, like others of its kind, has not been able to capture the overall sense of utilization (access).

At issue also is the difficulty of studying access to home health care for hospitalized patients. The implications of studying a two phase process linked to a financing system that rewards early discharge from hospitals, yet adds organizational/financing barriers at the home health agency site, are complex and serve to make measurement a challenge.

Recommendations for Future Research

Developmentally, the study of access to home health services may be considered to be in its infancy. As discussed in Chapter II, few comprehensive studies of utilization in home health care have been conducted. Many of those studies have taken a broad-based community focus, rather than focus on the access of hospitalized patients. Indeed, both types of research are needed. The significant turmoil in the area of financing, driven by Medicare regulations, increases the need for studies which direct their attention to the population caught in the throws of this access dilemma, namely those persons at risk for early discharge.

In view of this study's sampling technique, one must be extremely cautious in generalizing beyond the diabetic population in the three study sites. Therefore, additional
research is needed which looks at other patient groups within these sites, as well as at a broader cross-section of patient groups in other hospitals and regions, both urban and rural. Replications of this research utilizing those populations would certainly advance the knowledge base. Also, use of other research designs which allow for random selection would promote generalizability of the results.

Combined with the need to expand the population base and provide for generalizability of research results, studies are needed that address variables that are likely to add to the explanation of utilization behavior in home health care. The Andersen model (Aday et al., 1984) offers a vehicle for comprehensive study. Regarding access to home health services, examination of health systems variables in addition to population characteristics would likely improve the variance accounted for in this area of study.

Kronenfeld (1980) discussed the need for such research and found study of process to improve variance accounted for. It is suggested that inclusion of process variables (dealing with discharge planning) as well as population characteristics in the study of contact utilization (acceptance) to home health care might contribute to finding some differences between those persons accepted for home health services, and those not accepted. Additionally, measuring actual utilization as the realized access dimension for study might provide some explanation of value.
The utility of the Dependency at Discharge Instrument was documented in this research. Although hospital discharge dependency failed to predict admission to home health care, it was found to be a valuable predictor of referral. However, additional study directed toward comprehensive psychometric evaluation of the dependency measure in home health care is warranted.

Future studies might reconceptualize how the access indicators of referral and acceptance relate to one another and to the model in its entirety. Referral might be viewed as a characteristic of the organization, hence used as a predictor, rather than a criterion variable. While previous studies of access dealing with initial entry into the system might be of assistance in this redefinition, it must be recognized that home health patients have had, at a minimum, at least one contact with the system.

Last, studies of the processes of referral and the subsequent transition to home health need to be the focus of study. While the area of discharge planning is crucial, few empirical data are available concerning discharge planning, most focusing on the impact of policy change, in particular, prospective payment (Bull, 1988; Feather & Nichols, 1985).

Implications for Nursing Practice

As a result of health policy changes during the past decade, access to home health is a crucial concern for nursing. Home health care, an area where nursing has
traditionally played a significant role, is an increasingly
important part of the health care delivery system.
Financing initiatives, which were introduced in the 1960s to
improve access to care, have been amended in the interest of
cost containment, but at the potential expense of the
patient.

Concerns of whether cost containment has decreased
access to care have been discussed previously. The findings
of the study have provided mixed results with regard to the
issues of access. Referral to post-discharge home health
services was found to be predicted in large measure by need.
This determination of service access based on need is
consistent with both Guttman's (1981) and Daniels' (1982)
notion of equal access, in addition to that proposed by Aday
and colleagues (1984). Other demographic variables (age and
living arrangement), which contributed to referral are also
correlated with need and would most likely be deemed
acceptable by society as valid reasons for referral. In
either case, referral would appear to meet the criteria of
equity.

The finding that HMO patients were unlikely to be
referred would be of concern to the nursing profession.
While one could argue that the younger age makes it more
likely that HMO patients will not be homebound, and so, not
be viewed as candidates for home health care, the young
working population may not be receiving the post-hospital
follow-up they need. Shortened length of stay, promoted by
cost containment policy limits the amount of time available for in-hospital education about a complex care regimen, so common in the treatment of diabetes. Sequelae from uncontrolled diabetes are likely to be associated with increased morbidity and mortality in this population. These needs may be met in ambulatory care or home health care settings, but only if referrals are made by nurses or other health care providers.

It was suggested by Humphrey (1987) that HMOs may not know how to make the most of home health care, because of the physician gatekeeper's knowledge of the service. Unfortunately, home health care may be viewed as an add-on cost, contributing to the limited use. The nursing system within the HMO setting must encourage appropriate use of this service as a means of delivering quality care.

In addition to limited referral by HMOs, limited referral of the uninsured population suggests that access is still a problem for a part of this group. Rationing on the basis of insurance and economics has been addressed in the literature (Popp, 1988). The fact that the home health agencies have funding for uninsured care is hopeful, but the potential for unmet health care needs in this group is great. Nurses may find themselves in the untenable position of advocate and gatekeeper, and may be caught between the desire to deliver optimal care and the reality of delivering minimal care (Callopy, Dubler & Zuckerman, 1990). In a delivery arena where nursing personnel manage, as well as
staff the agencies, such professional conflicts are likely to occur.

In addition to referral, the question of who is accepted for service, once referred, remains largely unanswered. In this study, while a trend is seen toward dependency, no significant predictor of acceptance was found. Without support of need as a significant predictor, access is said to be inequitable. Concern exists regarding unmet need in a population which was found to be more vulnerable than its non-referred counterpart, at the time of discharge. The determination of who receives service is likely to be made by nurses, albeit not at the staff level. These health professionals are in a position to monitor the impact of health policy, and as such, have a responsibility to initiate change (at all policy levels) that promotes health. In the absence of that feedback, agency administrators, local officials and legislators may be insulated from the results of their decisions.

Regarding the process of planning during the patient hospitalization, and the execution of discharge plans, Peters (1989) has discussed the limited communication and coordination that exists between agencies. While this study did not examine process, the lack of findings regarding access might be a symptom of this problem. Inadequate staffing, among other factors is thought to play a role in who is accepted. Home health care is not immune to the effects of a shortage of nursing and other health personnel.
Organizational efforts to increase staffing levels with qualified personnel are likely to be costly, but are necessary to conduct the business of home health care. Additionally, Humphrey (1987) has suggested that nursing education does not prepare generalists, the type of practitioner necessary to deliver home health care. Recognition of the need for this type of practice and the promotion of its growth may, in the long run, add to the adequacy of staffing.

In addition to the presence of adequate personnel, improved communication and coordination are necessary to ensure continuity of care in this population. Home health agency nurses, in concert with hospital-based nurses need to pursue avenues for promoting continuity, including communication once the patient has been discharged. Data must be collected that allow home health agencies and hospitals to identify patients who have not received service, and determine why that is the case. Once that analysis has taken place, input into the policy process (to promote equitable access) may occur.

While the findings of this study support a somewhat equitable access to home health care, access as defined by acceptance to home health care (based on need) was determined to be inequitable. If the profession of nursing is to promote health and continuity of care, it needs to pursue health policy issues such as access, foster continued study in this relatively neglected area, and serve as an
advocate for patients who may be denied services in the presence of need.
Dear [Director]:

As a doctoral candidate in nursing at the University of Maryland School of Nursing, I am conducting my dissertation entitled, "Determinants of hospitalized patients' access to post-discharge home health services." As part of that study, approved by the participating hospitals, I have reviewed the medical records of a sample of patients discharged between 1986 and 1990, who were referred to home health agencies in the area.

At this time, it is necessary for me to validate whether those patients who were referred to your agency were admitted for service. Would you kindly examine the attached list of patients, and indicate whether or not they were accepted for home health services? If not accepted, kindly indicate the reason for not accepting the patient.

I have assured the participating hospitals that strict confidentiality will be upheld. I know that you will assist me in this effort to keep the names of the patients and their dates of birth confidential. The information received from your agency will be treated in the same fashion. All data will be aggregated, and individual agencies will not be identified.

Following the culmination of this research endeavor, I will send you a copy of the results. Thank you so much for your contribution and time.

Information regarding this research study may be obtained from:
Human Volunteers Research Committee
University of Maryland at Baltimore
Room 14-002
655 W. Baltimore Street
Baltimore, Maryland 21201
Phone: [redacted]

Yours truly,

Jeanne A. Matthews, R.N., M.S.
Doctoral Candidate

Ada Jacox, Ph.D., R.N.
Advisor
Data Collection Tool

Patient Unit

Patient I.D.

Predisposing characteristics:

Patient Name

AGE _____ GENDER _____ RACE _____ MARITAL STATUS _____

LIVING ARRANGEMENT ____________ Lives alone

___________ Lives with other family/friends

PREVIOUS HOSPITALIZATIONS ____________

Enabling characteristics:

TYPE OF HEALTH INSURANCE ________________________________

Illness level characteristics:

DRG _______________ LOS ________________________________

ICDA _______________ COMORBIDITIES ______________________

DEPENDENCY ON DISCHARGE ___________ CLASS ___________

Health system characteristics:

Resources: HHA REFERRED ___________ TYPE ___________

Organization: DISCHARGE INITIATED ________________________

REFERRAL _____________________________________________

ACCEPTANCE ___________________________________________

REASON FOR REJECTION _____________________________________
PLEASE NOTE

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Dependency at Discharge Classification Tool
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University Microfilms International
APPENDIX C: DESCRIPTION OF HOSPITAL DATA MANAGEMENT
As mentioned previously, Hospital A is a large suburban referral center. The discharge planning process is viewed as shared by nursing and social work. Great variability exists among units as to how the process is carried out. In addition, there is no central data management system dealing with in-hospital evaluation, and post-discharge care. Social service keeps records only for those patients they are asked to evaluate.

As a result of this lack of central or comprehensive data system, information was obtained by reviewing all the charts of diabetic patients who met the study criteria. The fact that categorization of DRGs was not a part of the permanent medical record, added to the potential time and personnel cost of the study. A medical record computer log containing names, other identifying data, and International Classification of Disease Code (ICD) was sent to patient accounts where DRGs were determined and returned. A lag time of approximately one week was required to identify the DRGs for a one year diabetic census.

Hospital B, a 500+ bed university medical center facility, kept a record of home health referrals for 1988 and 1989 in the social services department. Referrals were generated by nursing, social work, and medicine on a unit by unit basis. A continuing care coordinator, who is a nurse, is employed by the facility. Her role is primarily one of
consultation in a process which is directed by specific functions for both nurses and social workers.

Once the medical record computer log containing ICD codes, and other identifying data for a year's diabetic patient census was compiled, and patients who met the study criteria were identified, the list was checked against the copies of referrals generated by the hospital. In this way, patients were classified into groups by referral status. No referral records were kept for patients discharged during 1986 and 1987. Patient data for the years 1986 and 1987 were kept on microfiche. All medical records for patients, who were discharged during that time and met the study criteria, were scanned, sorted, and selected for inclusion.

Hospital C, a 450 bed urban community hospital with a continuing care department, had a highly formalized discharge planning process, and a fully-computerized record identification system. In addition, because referral for home health was included as a data element at discharge study inclusion criteria plus referral status provided for easy access to records. Medical records were available for 1989 and some of 1988 discharges. Most data for 1988, 1987 and 1986 were kept on microfiche. Computer and medical record data contained both DRG and ICD codes.
References


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