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Relationships among nursing care requirements, selected patient factors, selected nurse factors, and nursing resource consumption in home health care

Hays, Bevely J., Ph.D.

Case Western Reserve University (Health Sciences), 1990

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RELATIONSHIPS AMONG NURSING CARE REQUIREMENTS,
SELECTED PATIENT FACTORS, SELECTED NURSE FACTORS, AND NURSING
RESOURCE CONSUMPTION IN HOME HEALTH CARE

by
BEVELY J. HAYS

Submitted in partial fulfillment of the requirements
for the Degree of Doctor of Philosophy

Thesis Advisor: Dr. Patricia Flatley Brennan

Frances Payne Bolton School of Nursing
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May, 1990
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GRADUATE STUDIES

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RELATIONSHIPS AMONG NURSING CARE REQUIREMENTS, SELECTED PATIENT FACTORS, SELECTED NURSE FACTORS, AND NURSING RESOURCE CONSUMPTION IN HOME HEALTH CARE

Abstract

by

BEVELY J. HAYS

Nursing care requirements and nursing resource consumption are essential data for programming and staffing decisions made by nurse administrators in home health care. However, it is not known how nursing needs of home health care patients relate to the amount of nursing care consumed.

This retrospective exploratory study examined nursing care requirements and nursing resource consumption within a systems framework in the home health setting. The input variable of interest was nurse expertise. Throughput was the identification of nursing care requirements and was assessed using two measures: (a) patient classification, and (b) patient factors that do not produce a classification. The output measure was hours of direct care provided by the nurse and the home health aide.

The findings indicate that nursing care requirements explained a significant but limited amount of variation in hours of direct nursing care but not in hours of direct care by the home health aide. Nursing diagnosis as a patient factor explained a significant amount
of variation in hours of direct nursing care provided. The patient factors referral source and initial payment source did not add to the variation explained. The test of whether patient factors explain variation in hours of home health aide care was not significant but lacked sufficient power to be an adequate test.

Nursing diagnosis explained a significant amount of variation in the nursing care requirements. The nurse factor expertise did not relate significantly to either nursing care requirements or nursing resource consumption.

The findings support the importance of the nurse-patient interaction in home health care but indicate that further study is needed to refine measures of nursing care requirements. The use of nursing diagnosis holds promise as a means for predicting nursing resource consumption, with further work needed to develop techniques for grouping and weighting the various diagnoses. Additional work is needed in defining measures of resource consumption both for use in agency management and for reimbursement. Further work is also needed to understand what nurse factors influence the nurse-patient interaction in regard to nursing care requirements and nursing resource consumption.
DEDICATION

To Tom, who was always there even when he wasn't;

To Jeff, who said 'go for it' even though he wasn't sure why
   I'd want to;

To my mother, and my mother-in-law and father-in-law, who cared
   and were patient with my preoccupation; and

To LaDonna, who was a good friend as well as expert typist.
ACKNOWLEDGMENTS

I would like to thank my dissertation committee for the direction and encouragement provided for this study. I am especially appreciative of the guidance and insight provided by my two chairpersons: Dr. Marylou Kiley who nurtured a beginning idea and guided me through candidacy; and Dr. Patricia Brennan who became my chairperson with the study in progress and helped me stretch my thinking and reach for more. I also appreciate Dr. Karen Murray’s steady insistence on clarity and precision and Dr. J.B. Silvers’ willingness to provide an alternate perspective.

The cooperation of the staff and administration at the agency where the study was conducted is very much appreciated. Additional thanks go to Tom Reardon, who accepted the challenge of converting a clinical data computer tape to a useable research data set. And thanks also go to the many colleagues, friends, and supporters who offered their interest and encouragement.

Finally, I am appreciative of the partial funding provided by the Frances Payne Bolton Alumni Association, Alpha Mu Chapter of Sigma Theta Tau, Gamma Pi Chapter of Sigma Theta Tau, and a Post-baccalaureate Faculty Fellowship awarded by the Division of Nursing, Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services, Grant #2 A23 N400013-02.
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CHAPTER 1  INTRODUCTION

Home health care is of particular relevance not only to patients but to the nursing profession as well. Not only is nursing the major service provided (Ballard & McNamara, 1983; Pasquale, 1987), nursing is also the discipline primarily involved in administration and management of home health agencies (O'Malley, 1986). However, it is not known how nursing needs of patients relate to the amount of nursing care consumed.

Studies have examined specific attributes of the patient and/or activities of the nurse that correlate with the amount of care provided in the home health setting (Ballard & McNamara, 1983; Churness, Kleffel, Jacobson, & Onodera, 1986; Glick, 1987; Hardy, 1984; Pasquale, 1987; Sienkiewicz, 1984). No one has examined the nursing care requirements of the home health patient in relation to nursing resources consumed beyond the validation study that Peters (1987) performed for the Community Health Intensity Rating Scale (CHIRS). No reported work has examined nurse factors such as expertise in relationship to nursing care requirements and nursing resource consumption in home health care. Since nursing care requirements have not been systematically studied in home health care, there have been no studies that examine whether nursing care requirements or patient factors explain greater variation in nursing resource consumption.
Nursing care requirements and nursing resource consumption are essential data for programming and staffing decisions. The study reported here provides new knowledge about nursing care requirements and nursing resource consumption in home health care.

Purpose

The purpose of this study is to explore the relationship between nursing care requirements and nursing resource consumption in home health care, and to examine the relationship of selected patient factors and selected nurse factors to both these variables.

Significance

Mundinger (1983) has described home health care as perhaps the most promising arena in which to demonstrate the value and cost effectiveness of nursing. If nurse administrators in home health care are to provide needed services and demonstrate the cost effectiveness of the care provided by their agencies, they must have adequate data to select programs and to recruit appropriate staff.

Home health care is a vital option in the range of health care services. Both post-acute and chronic care are provided. Patients who can receive regular home visits are sometimes able to maintain their independence and avoid moving into an institution. Ability to remain in one's own home is viewed as an indicator of quality of life for persons of all ages, but is particularly important to the
elderly. Quality of life, as well as cost of care, is an important consideration in describing the impact of home health care.

With the advent of prospective payment in acute care settings, nurse administrators in those settings are seeking information about nursing intensity, patient acuity, and patient classification (Henry, et al, 1987). Nurse administrators in home health care are anticipating prospective payment in that delivery arena, too. They must have information about the care requirements and resource consumption of those receiving care at home in order to deal with cost and reimbursement issues (Peters, 1987). Future payment systems must not simply reflect care as it is currently provided, but should also include the element of patient need.

Efforts to identify nursing care requirements have been documented. In hospitals, nursing care requirements are most commonly identified through use of patient classification schemes (Adams & Duchene, 1985; Aydelotte, 1973; Giovanetti, 1978). Patient classification procedures have been proposed in home health care to improve the delivery and description of patient care (Martin, 1982), to assess patient outcomes (Daubert, 1979), and to explore differences in home care visits (Sienkiewicz, 1984). Peters (1988b) developed a community health intensity rating index that correlates with measures of resource consumption. None of these investigations, however, have examined patient factors and nurse factors in relation to nursing care requirements or resource consumption. Because nursing care involves the interaction of the nurse and patient (King,
1981), both nurse factors and patient factors must be included in the study of nursing care requirements and nursing resource consumption.

Cost-effective alternatives to traditional health care modalities are of tremendous interest in today's health care delivery systems. Policy makers, health care administrators, and the public are concerned as the proportion of the gross national product committed to health expenditures has continued to rise steadily, reaching 11% by 1986 (National Center for Health Statistics, 1989). Medicare, a substantial reimbursement source for the home health care industry, reflects the trend of increasing commitment of public funds. Data from the Health Care Financing Administration indicate increases in the number of persons enrolled in Medicare (28.2 million in 1986 compared with 23.8 million in 1977), the proportion of enrollees being served (732 per 1000 enrollees in 1986 compared with 570 served per 1000 enrollees in 1977), and the amount of reimbursement per person served ($2,870 per person in 1986 compared with $1,332 per person in 1977) (National Center for Health Statistics, 1989).

Health care administrators and policy makers are seeking to identify delivery methods that maximize the finite monies allocated for health care. The importance of home care as a health delivery method is apparent in its increasing role in both postacute care and chronic care. All ages are served through home care, but the elderly consume a substantial portion of the home health care provided. The percentage of Medicare expenditures in the category "other health
services," which includes home health services, has increased steadily since 1980. At the same time the percentage of total Medicare expenditures for hospital care and nursing home care has declined (National Center for Health Statistics, 1987). One National Health Interview Survey found that about 3 million adults 45 years of age and over living in the community need help in at least one basic physical activity, such as walking or bathing, because of prolonged disease and disability (National Center for Health Statistics, 1986). Almost one-half million young adults aged 18-44 years and an estimated 114,000 children aged 6-17 years living in the community need help because of a chronic health problem (National Center for Health Statistics, 1986).

The availability of potential caregivers has been altered by the "aging" of the aged, by geographic mobility of families, and by the increased participation of women in the labor force (National Center for Health Statistics, 1986). In a society which values living with maximum independence, home health care is an important component of the range of services needed to avoid inappropriate institutionalization.

Even though professional nursing is the discipline primarily involved in the administration and management of home health agencies (O'Malley, 1986), administration in acute care settings has been the predominant focus in the nursing literature; little information has been published about differences in administration among acute, long-term, and home care settings (Simms, Price, & Pfoutz, 1985).
Studies such as this one are needed to provide information to assist nurse administrators in home health care who make planning and controlling decisions about programs of care. With information on the nursing care requirements of home care patients and the relationship of these requirements to resource consumption, nurse administrators in home care can target programs for specific patient populations and hire staff prepared to meet patient needs.

Experts in nursing and health care administration are concerned with establishing the costs of nursing care and examining quality of patient care within the broader context of policy analysis and delivery of health care services (Henry, et al., 1987). Four of the seven highest priority nursing administration research questions identified by Henry and colleagues in their delphi study address nursing intensity, patient acuity, and patient classification.

Another of the top 20 questions identified through Henry’s study asks whether home health care services are meeting patients’ needs and whether those services are cost effective. The present study addresses home care patients’ needs through patient classification by nursing intensity, thus providing important information.

The nurse administrator is in a unique position to influence patient care. Although removed from the direct delivery of care to patients, the nurse administrator at the executive level makes choices that influence the organization’s effectiveness in providing care. According to Daft (1983), top management makes choices that affect organization size, technology, structure, products, and human
resources, which in turn have an impact on organizational effectiveness. Top-level nurse administrators need information about their agencies' functioning to make effective choices.

Nursing service administration has been defined as "the process of setting and achieving objectives by influencing human behavior within a suitable environment" (Arndt & Huckaby, 1980, p. 21). A major function of the nurse administrator is the creation of a suitable work environment so that nurses can provide the care needed by patients (Arndt & Huckaby, 1980; Simms, Price, & Ervin, 1985). A better understanding of how nurse factors such as expertise are related to resource consumption can help the nurse administrator make more effective decisions regarding human resources.

Nurse administrators need appropriate data to make both operational and strategic decisions (Barhyte & Christman, 1987). Data about the agency's patients and their care requirements are particularly important for nurse administrators (McHugh, 1986). Such information is essential for the investigation of the use and costs of nursing resources (Werley, Lang, & Westlake, 1986b), for internal organizational decisions in such areas as improved nursing management (Werley, Lang, & Westlake, 1986a), for identification of trends and pattern analysis (Mascar, 1987; Saba & Levine, 1980), for product line development (Alfirevic, Kroman, and Ruflin, 1987), and for establishment of comparable nursing data across agencies (Devine & Werley, 1988).
With the increased emphasis on controlling costs of health care, nursing administrators must accurately measure nursing costs in a valid, reliable way (Reitz, 1985a; Riley & Schaefer, 1983; Staley & Luciano, 1984). The best means for measuring cost is not yet clear, but informed decisions about nursing care effectiveness and its cost require data describing patient care requirements and nursing allocation (Halloran, Patterson, & Kiley, 1987). The extent of patients' requirements for nursing care is as important to nursing service administration as it is to clinical management (Halloran, Patterson, & Kiley, 1987). Patient classification systems are one approach to identifying nursing care requirements and are, in fact, more of an administrative tool than an aid to clinical management (Peters, 1988a).

In the past, nurse administrators in home health care have relied on visit statistics to describe and evaluate practice (Saba & Levine, 1981). Statistics have been available by agency program and by provider but the data have not measured or determined whether the nurse affects the outcome for the patient, nor do they describe the patient or the care rendered (Saba & Levine, 1981). Nurse administrators, therefore, have been at a disadvantage in interpreting the need for home health care to policy makers and third-party payers. The present study provides data about nursing care requirements and resource consumption in home health care to help nurse administrators interpret the need for and the costs of home health care.
Conceptual Framework

This study of nursing care requirements and resource consumption is based in a systems framework in which care is the output of the system. Care is provided within a home health agency, which is a social system open to the environment. The home health agency is made up of various personal and interpersonal systems and is itself a component of several larger systems, including the health care delivery system. The nurse-patient dyad as an interpersonal system is viewed as a key component of the home health agency as a social system.

According to Churchman (1979), a system is a set of component parts which are coordinated to accomplish a set of goals. The patient and the nurse, acting as an interpersonal system, coordinate their efforts toward a set of goals involving the patient's health status. The home health agency as a social system provides resources and structure and interacts with the larger environment to facilitate the efforts of the nurse and patient interacting toward health goals for the patient.

A system is a functioning whole that exists in an environment (Churchman, 1979). The environment interacts with the system and its components, but is not controlled by the system. Patients as individual systems interact with their environments. When patients interact with the nurse as interpersonal systems, they do so within an environment. The environment for the nurse-patient interpersonal
system includes the home health agency with its resources, policies, and goals.

From the perspective of the home health agency as a social system, the patient comes from the agency's environment to interact with the nurse and participate in the care process before being dismissed again to the environment. The agency provides inputs in the form of human resources, structure, and technology, with top level management making choices regarding those inputs which have an impact on organizational effectiveness (Daft, 1983).

For the purposes of this study, nursing is defined as the process of human interactions between nurse and patient with each perceiving the other and the situation, and mutually setting goals and agreeing on means to achieve those goals (King, 1981). The interaction takes place within the framework of the nursing process, which includes data collection, diagnosis, planning, treatment, and evaluation (American Nurses' Association, 1986).

From a systems perspective, the interaction of the nurse and the patient is ongoing throughout the nursing process. From admission through dismissal, the nurse-patient dyad forms an interpersonal system that focuses on the health goals of the patient. Information about the patient's status and needs is shared and validated, goals are set, and a plan is developed, implemented, and evaluated. The patient's nursing care requirements and the consumption of nursing resources are determined in the context of this interpersonal system operating within the constraints of the
environment. Attributes of the patient and also of the nurse influence the identification of nursing care requirements and allocation of nursing resources.

The environment, as a fixed constraint not under the control of the system (Churchman, 1979), places constraints on the care that can be provided. Society's priorities and reimbursement patterns are two environmental factors not under the control of the nurse-patient dyad or the home health agency. Within these constraints, however, patients' care requirements and consumption of nursing resources vary.

The judgement of the nurse determines admission to and continuation of home health services for the patient (Glick, 1987). Based on an assessment, the nurse identifies the nursing diagnosis, which is a pivotal factor in the care process (Peters 1988a). Knowledge and skill are needed to make nursing diagnoses. Benner (1984) describes the skill or expertise of the practicing nurse as based on both knowledge and experience. The present study includes the expert status of the nurse as an independent variable.

Patients enter home care from a variety of referral sources with differing reimbursement sources. The influence of these variables and of the nursing diagnosis on the intensity rating for the patient or nursing resource consumption is not clearly understood. Referral source, reimbursement source, and nursing diagnosis are included in this study as patient factors.
This study, then, is based in a systems framework in which the nurse-patient dyad is viewed as an interpersonal system functioning within the home health agency, which is a social system open to the environment. For the purposes of this study, nursing is defined as the process of human interactions between nurse and patient, with each perceiving the other and the situation, and mutually setting goals and agreeing on means to achieve those goals (King, 1981). The interaction takes place within the framework of the nursing process, with both nurse factors and patient factors influencing the interaction.

Statement of Problem

Nurse administrators in home health care do not have the information they need regarding home health services (Ballard & McNamara, 1983; Glick, 1987). Administrators need information on nursing care requirements and nursing resource consumption to serve as the basis for decisions on cost-effective programming and staffing (Peters, 1987). When nursing care requirements are greater, nursing resource consumption should be greater. Conversely, when nursing care requirements are less, nursing resource consumption should be less. Only one study reported in the literature has assessed the relationship between nursing care requirements and nursing resource consumption; that was the validation study for a tool used to assess nursing care requirements (Peters, 1987) and did not examine whether patient factors and nurse factors are related to nursing care.
requirements and nursing resource consumption. The present study measures resource consumption as hours of direct care delivered to the patient and includes variables specific to the patient and nurse.

The research question addressed in this study is:

What are the relationships among nursing care requirements, selected patient factors, selected nurse factors, and nursing resource consumption in home health care?

Conceptual Definitions of Terms

The terms central to this study are conceptually defined as follows:

1. Nursing. Nursing is the process of human interaction between nurse and patient, with each perceiving the other and the situation, and mutually setting goals and agreeing on means to achieve those goals (King, 1981).

2. Nursing care requirements. Nursing care requirements refer to the patient's need for care planned with a registered nurse. Those requirements vary with the nature and number of health problems present (Peters, 1987).

3. Nursing resource consumption. Nursing resource consumption is the amount of care provided to a patient by home health agency personnel, which is planned with and either implemented or supervised by a registered nurse. Such care may be provided by either the registered nurse or the home health aide.
Summary

Nursing care requirements and nursing resource consumption are essential data for programming and staffing decisions made by nurse administrators in home health care. However, it is not known how nursing needs of home health care patients relate to the amount of nursing care consumed. The research question addressed in this study is:

What are the relationships among nursing care requirements, selected patient factors, selected nurse factors, and nursing resource consumption in home health care?
CHAPTER 2 REVIEW OF THE LITERATURE

The literature is reviewed beginning with general systems theory which, along with King's model of nursing (1981), provides the conceptual framework for the present study. The literature related to the four study variables is then presented. Few studies have examined nursing resource consumption in home health care (Ballard and McNamara, 1983; Glick, 1987; Churness, Kleffel, Jacobson, & Onodera, 1986; Hardy, 1984; Pasquale, 1987), and fewer still have examined an index of nursing care requirements in regard to nursing resource consumption (Peters, 1987). Those studies are critiqued, and the new data provided by the present study are highlighted.

Systems Theory

Systems theory, which includes King's work (1981), provides the framework for this study. The home health agency is viewed as a social system open to the environment (see Figure 1) with the nurse-patient dyad forming an interpersonal subsystem. According to Churchman (1979) a system is a set of component parts which are coordinated to accomplish a set of goals. In home health, the goals include providing care to patients at home. Components of a home health agency interact with the patient to provide care at home.

Two aspects of systems, environment and resources, are important to the understanding of nursing care requirements and nursing resource consumption in home health care. A system is a
Figure 1. Home Health Agency as Social System
functioning whole which exists in an environment. Churchman (1979) described a system's environment as a fixed constraint not under the control of the system itself. Resources, on the other hand, are viewed as largely controlled by the system.

A home health agency's resources include staff, equipment, and monies. The agency administration has control over these resources through decisions regarding numbers and qualifications of staff and types of equipment available for providing care. The environment of a home health agency includes the population of the service area with its specific demographics; the local economy with specific industries and concomitant health problems; other segments of the local health care industry with various institutions and specialists; and health policy and reimbursement at the local, regional, and national levels. These environmental factors are not under the control of the agency administration, although efforts are often made to influence the environment.

Patients come from the environment and are not under the control of the agency. The agency has policies which determine whether a patient can be admitted for care but the agency accepts or refuses patients as they are for the purpose of providing care. Following care, patients return to the environment, ideally having achieved the goals set at the time of admission.

Patients, when they leave the home health agency system, may be dismissed because they are recovered or stabilized, dismissed to an institution, dismissed because of death, or dismissed for other
reasons such as having moved or refusing care. Except for the instance of death, patients may at some later time re-enter the home health agency for care as illustrated by the feedback loop at the bottom of the model.

Organization size, structure, and technology and the agency's staff are resources or agency inputs that are controlled by the agency for the purpose of providing care to patients at home. The top-level administrator, usually a nurse in home health care (O'Malley, 1986), is responsible for making decisions that maximize the agency's goal attainment. Since organizations have more than one objective, several measures of goal achievement are possible. Patient outcomes and quality assurance are among the measures of goal attainment but, since organizations must survive to provide care at all (Mackenzie, 1985; Marshon & Weslowski, 1985), resource consumption is another appropriate measure. In this study, nursing resource consumption, an important element in determining cost effectiveness, is the appropriate care indicator for the output of home health agency as a social system.

The major movement through the model is that of the patient. The patient is admitted and through interaction with the nurse is diagnosed, receives care, and is dismissed. The dynamic interaction internal to the system indicates that, in addition to the nursing care requirements, organization factors and human resource factors both influence the care provided. The influence of the nurse administrator is exerted not directly on the care, but through
decisions regarding the organization size, structure, technology, and human resources. Information about care as resource consumption is used by the nurse administrator to make strategic and operational decisions for the agency.

Systems theory stresses the dynamic nature of systems with interaction between component parts (Boulding, 1956; Churchman, 1979). A key assumption underlying the systems model presented in Figure 1 is the interaction of the nurse and the patient as the nursing care requirements are determined, the care is provided, and the patient is dismissed. For the purposes of this study, nursing is defined as the process of human interactions between nurse and patient, with each perceiving the other and the situation, and mutually setting goals and agreeing on means to achieve those goals (King, 1981).

Because nursing is an interactive process, the outcome of the interaction must be examined in light of factors related to both the patient and the nurse. In examination of the home care agency's output, measured here as nursing resource consumption, both nurse factors and patient factors must be assessed.

Nursing is a process of human interaction that occurs within a systems framework. Systems are never isolated but exist in concert with other systems (Bertalanffy, 1951; Churchman, 1979). According to King (1981), individuals can be viewed as personal systems and individuals interacting can be viewed as interpersonal systems;
societal organized boundary systems with specific characteristics can be viewed as social systems (Figure 2). Within the framework of this study, the nurse-patient interaction is seen as an interpersonal

Figure 2. A Conceptual Framework for Nursing: Dynamic Interacting Systems.

Adapted with permission from I. M. King, Toward a Theory for Nursing. New York, John Wiley & Sons, 1971, p. 20.
system which is a component of the home health agency as a social system. The effect of the components of the nurse-patient interpersonal system on the outcome or effectiveness of the home health agency is an area of study which is of value to the nurse administrator in making staffing decisions and in selecting patient service programs.

Human interactions are based on the perceptions of each of the interacting persons. These perceptions lead to judgments, actions, reactions, interaction, and transaction (King, 1981). In examining person-to-person interactions, it is important to recognize that each individual brings different knowledge, needs, goals, past experiences, and perceptions, all of which influence the interactions. King (1981) noted that a person's perceptions are related to multiple factors including past experiences, concept of self, socioeconomic groups, biological inheritance, and educational background.

When nurses purposefully interact with patients to mutually establish goals and then work to achieve and evaluate those goals, both nurse and patient affect the process. Resource consumption has been studied through examination of indicators from the patient (Ballard and McNamara, 1983; Glick, 1987; Pasquale, 1987) but not factors regarding the nurse. Because of the interactive nature of nursing, factors regarding the nurse may also be helpful in understanding the perceived levels of nursing care requirements and the nursing resource consumption since the nurse makes key decisions
in admitting, assessing, planning care with, and dismissing the patient.

Summary of Systems Framework for This Study

Nursing is an interactive process which can be viewed in the context of systems theory. The nurse and patient form an interpersonal system which interacts to provide care for the patient. This interpersonal system functions within a social system, which in this study is the home health agency.

The nurse can be viewed as an input for the home health agency system because personnel are resources under the agency's control. The patient, on the other hand, is not an input but enters the home health agency system from the environment and is thus not under the control of the agency. Throughput for the home health agency system is the process of identifying what care will be provided. The output of the system is the care itself.

The nurse administrator for the home health agency makes decisions about agency programs and resources which provide the context for the nurse-patient interaction. Accurate information about the input, throughput, and output are important to the nurse administrator.

This study examines variables within a systems framework in the home health setting. The input variable of interest is the nurse factor expertise. Throughput in this study is the identification of
nursing care requirements and is assessed using two measures: (a) patient classification and (b) patient factors that do not produce a classification. The output measure for this study is hours of direct care provided by the nurse and the home health aide.

The literature related to these variables is presented next. The input variable (the nurse factor expertise) is discussed first, followed by the system throughput measures (both classification of nursing care requirements and the patient factors). Finally, the output measure for this study (nursing resource consumption) is reviewed.

System Input: Nurse Factor Expertise

Nursing is an interactive process (King, 1981). Nurse factors as well as patient factors influence the process of providing care.

Human interactions are based on the perceptions of each of the interacting persons. These perceptions lead to judgments, actions, reactions, interaction, and transaction (King, 1981). The patient brings certain nursing care requirements to the interaction, but it is the nurse's judgement that determines whether the patient is accepted for home health services and how long home care services are continued (Glick, 1987). In other words, the level of nursing care requirement, the type of care provided, and the amount of care provided (resource consumption) are judgments of the nurse.

Skill in accurately and quickly perceiving a situation is a characteristic of the nurse who has expertise (Benner, 1984; Tanner,
1984). Expertise develops over time in the practice setting if the practitioner possesses a sufficient knowledge base to ask the right questions and look for the correct problems (Benner, 1984). Therefore, the skills of the practicing nurse are based on both knowledge and experience (Benner, 1983, 1984).

Not all nurses acquire expert status at the same level of experience. Experience refers not necessarily to length of time in a position, but to the opportunity to develop expertise when confronted with actual situations (Benner, 1984). Obtaining experience requires repeated exposures to patient situations through which expertise can evolve. Therefore time is a necessary but not sufficient aspect of acquiring expertise.

Benner's model does not support certifying nurses as novice, competent, or expert for all situations but only in familiar patient care situations. Reassignment of a nurse from critical care to hospice, for example, might mean the expert critical care nurse would, in the hospice setting, function only at a competent level. The nurse does not necessarily return to a novice level of functioning with reassignment, but does require experience to become expert in a given practice setting.

A beginning nurse does not have as extensive a knowledge base nor as much experience as the expert nurse (Tanner, 1984). The beginning nurse requires a longer time to gather and analyze patient data (Benner, 1984). The expert nurse is able to more quickly grasp
the context of a patient situation and narrow the search field (Benner, 1984).

The expert nurse can be expected to identify the nursing care requirements of a patient more quickly and accurately than a beginning nurse. No studies have been reported that assess the dimension of expertise in home health care. The impact of nurse expertise on the identification of nursing care requirements or on nursing resource consumption in home health care has not been assessed. It is not known whether there are systematic differences among nurses in home health care in regard to the amount of time committed to caring for patients or whether any such differences are related to expertise.

No tools that identify levels of nurse expertise have been reported in the literature, but several studies have focused on the expert nurse. Elster's (1987) qualitative study of clinical excellence in nursing used colleague nomination to identify nurses who demonstrate clinical excellence. Open-end interviews of the 14 professional nurses identified patient advocacy, patient-centeredness, holism and involvement, and competency as concepts related to clinical excellence. The study did not consider quantitative aspects of providing nursing care as the present study will.

Corcoran (1986) examined the initial and overall approaches to planning used by novice and expert nurses. The study identified expert nurses as nurses in leadership positions with at least 18
months of experience in the study area (hospice) who also had either published or presented on hospice nursing or who were labeled as expert by at least five hospice nurses. Novices were those nurses with less than 6 months experience. Analysis of data using the Cochran Q test revealed that experts varied their overall approaches substantially across cases, \( Q(2) = 6.5, p < 0.5 \) for experts, while most novices used opportunistic overall approaches across all cases, \( Q(2) = 3, p < .3 \). In addition, there was a trend for experts to develop better final plans than did novices. The sample size of 6 expert and 5 novice nurses is a limitation of the study. Again, quantitative aspects of providing nursing care were not considered.

A qualitative field study of factors contributing to nurses' development as expert clinical practitioners used nomination by head nurses to identify the sample of 25 expert nurses (Warmuth and Moran, 1988). Analysis of transcripts of the 25 interviews revealed that experience in patient care situations was most highly valued as contributing to development of expertise. Support from the head nurse and nurse colleagues was also viewed as important. Formal education activities were seen as important early in a career, serving more as validation and motivation later. Limitations of the study include lack of a comparison group's assessment of their career development. However, the study utilized a qualitative design and provides data as a basis for further study. No attention was given to quantitative aspects of providing care.
Summary of Nurse Factor Expertise as a System Input

Qualitative studies have described the expert nurse, but none have examined whether expertise is related to quantitative measures of nursing care such as nursing care requirements or nursing resource consumption. This study assesses whether the nurse factor expertise is related to either nursing care requirements or nursing resource consumption in home health care.

System Throughput: Identification of Nursing Care Requirements

Some method of organizing patient data is essential to understanding nursing care requirements and resource consumption. One method is classification of patients into mutually exclusive categories according to need. Another method is selection of pertinent descriptive patient factors which do not form mutually exclusive categories. Patient classification is presented first.

Patient Classification

According to Kuhn (1980), a quantitative statement of nursing needs is required to achieve economy in allocating nursing resources. But quantification of nursing needs has been difficult because a clear conceptualization of what constitutes nursing is required and agreement within the profession has not been widespread.

Conceptualization of Nursing Central to Patient Classification

Ellis (1982), in recapitulating conceptualizations of nursing, pointed out that despite Florence Nightingale’s view of nursing as
the science of health, Nightingale based her nursing school

curriculum on an analysis of the tasks nurses were performing in

hospitals at the time. Later, the conceptual focus in nursing

shifted to disease and body systems, then to the individual receiving

care, and most recently to the competing definitions of nursing

offered by the nurse theorists, including the definition by King used

in this study. Still, nurses have tended to use more concrete

definitions and have followed Nightingale’s example by using tasks

and activities to quantify nursing.

The conceptualization of nursing is a central issue in

quantification of nursing needs because, for a measurement to be

valid, it must measure the variables that conceptually fit the

purpose for which it is to be used (Haas, 1988). In other words, the

instrument must have construct validity. If nursing is

conceptualized as a process of human interaction with mutual goal

setting and agreement on means to achieve those goals, then measuring

nursing tasks and procedures is not a valid measure of nursing need

or care. In addition, basing a classification system on the limited

conceptualization of nursing as a series of tasks and procedures

fosters the argument regarding substitutability of less prepared

people such as nursing assistants to provide care by focusing on

activities rather than professional judgement and knowledge. The

tool used in this study to assess nursing care requirements reflects

the intellectual as well as task components of nursing. The measures

of resource consumption in this study also reflect the intellectual
aspects of nursing by including the care not only provided by the nurse but also the care planned by the nurse which is provided by the home health aide.

Nurses provide the preponderance of home health care (Ballard & McNamara, 1983; Pasquale, 1987), but other services are also provided to patients at home. One researcher found that 56% of the patients in a study received home health aide service (Pasquale, 1987). In the same study, fewer than 20% of the patients used physical therapy services, fewer than 15% were seen by a social worker, and only 2% were seen by a speech therapist or an occupational therapist. Home health aides do not provide nursing care, but these non-professional health workers render important service to patients by providing care planned and supervised by the registered nurse. In an examination of nursing resource consumption, it is important that the relationship of home health aide service to nursing care be specified.

It is the nurse in home health care who, in interaction with the patient, establishes patient goals and the means to achieve those goals. The means to achieve goals include both patient activities and nurse activities such as judgements, planning, teaching, procedures, and referrals. Means also include activities planned and supervised by the nurse such as home health aide care. In this regard, home health aide service can be viewed as one of the means available for achieving nursing goals.

The home health aide performs specific tasks identified by the nurse but does not substitute for the nurse in judgements regarding
patient care. The care provided by the home health aide is a resource planned and supervised by nurses, and therefore will be assessed in this study as one indicator of nursing resource consumption in home health care.

**Historical Perspective on Patient Classification**

Historically, patient classifications have been used in efforts to quantify nursing care requirements. Aydelotte (1973) described patient classification as the categorization of patients to quantify the workload created by patient care demands. Sokol (1974) defined the process of classification as ordering or arranging objects into groups or sets based on their relationships as determined by either observable or inferred properties. Giovannetti (1986) stated that patient classification is simply the process of grouping patients into mutually exclusive categories. The statement of purpose for any classification determines the criteria for the grouping. Medical diagnoses, diagnosis-related groups (DRGs), nursing diagnoses, and time-task analysis are all methods of grouping patients. Giovannetti (1986) noted, however, that patient classification in the nursing literature has referred almost exclusively to grouping of patients according to perceived requirements for nursing care for the purpose of determining nursing staff numbers and deployment. Despite this common usage, for clarity of thought and communication, she urged a clear statement of purpose for any classification procedure.
Aydelotte (1973) prepared an extensive review and critique of the literature on nurse staffing methodology. The four staffing methodologies identified were descriptive, industrial engineering, management engineering, and operations research. Aydelotte stated that while these methods drawn from engineering provide reliable data, the tasks, activities, and categories of nursing work appearing in the literature do not reflect the nature and full character of nursing practice.

During the early 1970's, Rush-Medicus conducted studies that resulted in a quality monitoring system for nursing care (Jelinek, Haussmann, Hegyvary, & Newman, 1974; Haussmann, Hegyvary, & Newman, 1976). The criteria for this quality monitoring system were developed from nursing process concepts using nurse consensus, factor analysis, and descriptive correlational studies across several departments of nursing. The patient classification in place at Rush-Presbyterian St. Luke's Hospital was adopted by Medicus to assign quality criteria measures to patients appropriately. For example, criteria used for a severely incapacitated person's quality of care were not applied to the care of a nearly recovered patient. This patient classification scheme had traditional time-task measures of nursing requirements. Since the Medicus quality monitoring system is widely used, the patient classification embedded in it is widely used. The system has been expanded to include staffing and scheduling. The protocol for calculating staff hours specified adding hours available from all staff, RN's, LPN's, and aides to
achieve total nursing hours available per patient day. The protocol for calculating work load required per patient day on a unit also achieves a total number of hours, reinforcing the implication that personnel are interchangeable regardless of educational preparation.

Patient classifications have served as guidelines for allocating nursing staff and aiding long-range projection of staffing and budget allocation (Adams & Duchene, 1985). But such application requires a two-step process: (a) classification into categories and (b) conversion of the categorical information into hours of nursing care (Giovannetti, 1986; Peters, 1987). The multiplicity of approaches to patient classification has resulted from the variety of institutions specifying both the categories and the quantification or conversion data. Such multiplicity limits the comparability of patient classification data across institutions and has resulted in a call for standardized classification procedures. The tool used in this study can be used across agencies so that the information contributed by the study can provide a beginning point for future interagency comparisons in home health agencies.

The increased emphasis on controlling costs of health care has been a major impetus for development of patient classification systems for measuring nursing intensity. Diagnosis-related groups (DRGs) have served as the basis for the prospective payment system implemented by the federal government in October of 1983 (Cromwell & Price, 1983). One of the major assumptions underlying DRGs is that nursing intensity or the amount of nursing care required does not
vary sufficiently across DRGs to include nursing intensity as a determinant (Cromwell & Price, 1988). Researchers have found, however, that nursing care requirements vary both across and within DRGs (Grohar, Myers, & McSweeney, 1986; Halloran, 1985; Reitz, 1985b; Reschak, Biordi, Holm & Santucci, 1985). If the goal of patient classification systems is to predict care requirements including nursing care requirements, and if the present basis for prospective payment is not accurately reflecting variation in nursing care requirements, then the present basis for prospective payment is not meeting the goal.

Attributes of a Patient Classification System

Important attributes of a patient classification system are the type of classification procedure, the bases for the classification, the reliability and validity of the classification procedure, and the frequency of the classification (Peters, 1987). Each of the attributes will be described and its relevance discussed.

Classification procedures are of two types: prototype evaluation and factor evaluation (Abdellah & Levine, 1965; Alward, 1983; Giovannetti, 1978). The prototype evaluation presents characteristics of the patients typical to each category. The patient is simultaneously rated on these characteristics and assigned to the category in which his characteristics match the prototype characteristics (Giovannetti, 1978). Difficulties arise with the prototype tool when a patient has care needs that fit definitions in
different categories, and the rater must determine which category provides the best fit (Haas, 1988).

In factor evaluation, critical indicators of nursing care (nursing activities) are delineated and the patient is rated on each indicator individually. The individual indicator ratings are then combined to provide an overall rating which determines the patient’s placement into categories (Giovanetti, 1978). Even though the factor evaluation method involves a totaling of numbers, the original assignment of numbers is a subjective decision (Harris, Santoferraro, & Silva, 1985).

In this study, the patient classification was achieved using a prototype tool.

Classification can be based on disease, procedure, acuity, or some combination of these (Bermas & Van Slyck, 1984). Classification by disease categorizes patients by medical diagnosis or condition and has been found not predictive of nursing needs (Ballard & McNamara, 1983; Halloran, 1985; Nosek, 1986; Toth, 1984; Widmer, Brill, & Schlosser, 1978;). Classification by procedure uses data obtained by work measurement techniques to establish standard times for tasks (Rhys Hearn & Potts, 1978; Georgette, 1970; Kuhn, 1980). However, an adequate patient classification system must reflect the entire range of nursing care including assessment, monitoring, planning, and evaluation as well as task activities (Peters, 1987), and those other dimensions are not represented using the procedure base.

Classification by acuity incorporates the concept of "level of
wellness” as the base and can be applied to all types of care settings (Abdellah & Levine, 1965).

Reliability and validity are essential considerations if the patient classification is to be meaningful (Alward, 1983; Aydelotte, 1973; Ebener, 1985; Giovanetti, 1978). Three types of reliability must be considered: (a) stability or the consistency of measures on repeated applications, (b) homogeneity or internal consistency or the degree to which all subparts measure the same characteristic, and (c) equivalence or the extent to which instruments measure the same traits in the same subject (Ebener, 1985; Giovanetti, 1979).

Validity refers to the extent to which an instrument measures what it is designed to measure. The three primary types of validity are content validity, criterion-related validity, and construct validity (Nunnally, 1978). All are of concern in regard to patient classification systems but, along with the reliability issue, little attention has been given to these concerns in the patient classification literature.

Frequency of classification should be specified for a classification scheme (Peters, 1987). Patient classification used as a basis for staffing in an acute setting requires more frequent data gathering than classification used as a basis for budgeting. The patient intensity rating scale for community health nursing developed by Peters is used in this study. The scale can be used either one time prospectively, concurrently throughout the care process, or one
time retrospectively at dismissal. The scale, however, has been tested only in a retrospective study.

Although classification theory is important in the development and use of patient classification systems, such theory alone is not sufficient (Haas, 1988). The actual classification indicators should be based in nursing theory (Haas, 1988) and must include both qualitative and quantitative indicators (Sanford, 1987).

**Patient Classification in Home Health Care**

Patient classification systems are used widely in acute care. Complete patient classification systems are just now being developed for home health care.

Studies examining classification procedures for use in home care have had various objectives. Objectives have focused on rehabilitation potential (Daubert, 1979), classification of patient problems (Simmons, 1980), cost associated with rehabilitation potential (Harris, Santoferraro, & Silva, 1985), amount and level of care given (Churness, Kleffel, Jacobson, & Onodera, 1986) and level of care needed (Peters, 1987).

The purpose of this study was to compare care needed with care given. Only two previous studies have classified patients according to care needed (Peters, 1987) or care given (Churness, Kleffel, Jacobson & Onodera, 1986).

The factor evaluation classification used by Churness and colleagues does not attempt to assess care needed but rather to
classify patients using a measure of the amount and level of care given. The classification procedure relies on assigning weights to nurse activities during a home visit. Scores are totaled and patients assigned to Levels 1 through 5 based on total score. This patient classification focuses on nurse activities and not patient characteristics. The patient support system is not considered. The tool attempts to objectify the classification process by focusing on observable nurse activities. Even so, reliability for this classification procedure has been problematic, with only 33 percent of the instrument categories meeting the authors' targeted criterion of 65 percent agreement among raters (Churness, Kleffel, Onodera, & Jacobson, 1988).

The only tool described in the literature that attempts to use patient need as the basis for classifying home health patients is the Community Health Nursing Intensity Rating Scale (CHIRS) developed by Peters (1987). The four-point ordinal scale was formulated by expert groups of community health nurses based on 15 community health parameters inductively derived from the Omaha Classification System (OCS). The rating scale utilizes a nursing process format with the 15 parameters representing the four OCS domains: environmental, psychosocial, physiological, and health behaviors. A prototype design was necessitated by the nursing process format, which would be artificially fragmented with a factor evaluation design. The tool includes four patient profiles for each of the 15 parameters, one profile to illustrate the extent of nursing input required for
Figure 3. Community Health Intensity Rating Scale (CHIRS)
Definitions of the Four Intensity Levels

**LEVEL 1  MINOR INTENSITY**
Minimal Deficit.
Initial application of nursing process is effective in restoring
health and attaining goals.
Independent in adaptation to health status.
Patient identified at risk or predisposed for compromised health
status.
Support not required or is adequate to meet health needs.
Adequate problem solving abilities.
Accepts change and assistance as necessary.

**LEVEL 2  MODERATE INTENSITY**
Mild Deficits limited in scope.
Impairments respond promptly to noncomplex therapeutic intervention
and patient able to attain goals.
Requires periodic monitoring and reevaluation
Support required, usually available and compensates most of the time.
May require external support.
Requires some guidance with problem solving.
Motivated to accept change and assistance.

**LEVEL 3  MAJOR INTENSITY**
Significant deficits with systemic or psychosocial involvement.
Complex therapeutic interventions are employed.
Regular monitoring revision to care plan and reevaluation is needed.
Goal attainment requires a multifaceted approach and goals may need
to be modified and/or attainment may be delayed.
Support required but not consistently available or is unable to
consistently meet complex health needs.
Requires additional external support most of the time.
Requires much guidance/assistance with problem solving.
Unmotivated to change and/or resistant to assistance.

**LEVEL 4  EXTREME INTENSITY**
Severe Deficits.
Life threatening illness or totally dependent with severe deficits.
Constant observation and monitoring are required.
Continual monitoring and revision to plan care is required.
Patient not adapting to goals not attained.
Support required but not available or if available inadequate for
meeting all necessary needs.
Required ongoing external support.
Behaviors of patient or support system may negatively impact health
status.
Problem solving skills very limited or not present.
Questionable ability to learn or participate in problem solving.
Unwilling to accept change or assistance.
patient care within each level (minor, moderate, major, extreme) (Figure 3). By considering patient characteristics as well as nursing interventions, the tool reflects the intellectual aspects of nursing as well as the performance of discrete nursing tasks.

Peters found that the community health intensity rating scale identified subgroups of patients in regard to nursing requirements. The scale correlated with other measures such as number of nursing visits \( (r = .24, p < .000) \), intensity of nursing visits \( (r = .21, p < .000) \), health status scale \( (r = .38, p < .000) \), and a nursing intensity index \( (r = .20, p < .000) \).

A valid and reliable patient classification system is one way to identify nursing care requirements to predict nursing resource consumption. However, classifications such as the system developed by Peters (1987) are subjective and require diligence to maintain reliable applications of the instrument. In addition, a specific application of the instrument requires both time and judgement after care has been provided. Nevertheless, this tool meets the criteria of Haas (1988) and Sanford (1987) that indicators should be based in nursing theory and should include both qualitative and quantitative indicators. CHIRS is based in comprehensive nursing practice, has content validity, and has proven reliable. Therefore, CHIRS was used to assess nursing care requirements of home health care patients in this study.
Summary of the Literature Regarding Patient Classification in Home Health Care

Few studies have been reported that classify patients according to care needed or care given in the home health setting (Churness, Kleffel, Jacobson, & Onodera, 1986; Churness, Kleffel, Onodera, & Jacobson, 1988; Peters, 1987). Churness and colleagues are refining a factor evaluation classification based on amount and level of care given, not the care needed.

The prototype classification CHIRS developed by Peters (1987) classifies patients by level of need but has not been systematically studied beyond the validation study for the tool. This dissertation study provides new information by examining the relationship between a patient classification based on nursing care requirements and the amount of care consumed.

Non-Classificatory Patient Factors

Some authors have attempted to help the nurse and the supervisor assess the caseload and time utilization with a goal of better management (Allen, Easley, Storfjell, 1986; Brown, 1980; Kissinger, 1973). A problem common to these efforts is that in measuring the work done by nurses in home health care, consideration is not given to whether the care given was the care needed. In the study proposed here, both care needed and care given are measured.

Others have attempted to predict nursing resource consumption using patient factors but without using a classification system
(Ballard & McNamara, 1983; Glick, 1987; Hardy, 1984; Pasquale, 1987). This approach ignores a quantification of nursing care requirements and focuses on what is consumed instead of interjecting the consideration of what the patient's needs are.

That approach, however, may provide the information needed by the nurse administrator to make decisions about cost effective programming and staffing within the current health care delivery system. In addition to assessing whether nursing care requirements explain variation in nursing resource consumption, the present study sought to examine whether data that are available, patient oriented, limited in number, easily retrievable and universal (Joel, 1986) can explain variation in nursing resource consumption. Selection of patient data to serve as noncategorical patient factors indicating nursing care consumption began with a review of the literature.

Ballard and McNamara (1983) conducted a retrospective record review of 397 randomly sampled records from nine randomly selected home health agencies in one state to examine what factors best predicted the intensity of nursing service as well as total agency service required by both cardiac and cancer patients at home. A Health Status Scale (HSS) was developed that consists of 18 items focusing on problems with activities of daily living as well as nursing problems. Other factors considered in the study included patient age, sex, number of diagnoses, race, marital status, living arrangements, primary care provider, support system, payment source, discharge status, and the agency providing service. Correlation,
analysis of variance, and stepwise multiple regression were used to analyze variation in resource use. The single best predictor of nursing visits per day for both cancer and cardiac patients was the patient’s total score on the Health Status Scale \( R^2 = 0.08, F = 18.187, p < 0.001 \) for cancer patients; \( R^2 = 0.077, F = 15.187, p = 0.001 \) for cardiac patients). The study was limited by the number of medical diagnoses included (two) and by the limited definition of nursing. Variation in recording systems among the nine agencies and lack of standard definitions among agencies were major limitations of the study.

The Health Status Scale developed by Ballard and McNamara was comprised of an extensive listing of critical indicators. The study reported here used two concise measures instead of an extensive listing of indicators: (a) an index of patient need (CHIRS), and (b) a trio of patient factors as an alternate, nonclassificatory indication of need. This dissertation study included a random sample of patients not limited by medical or nursing diagnosis. The study was conducted in a single agency so that data were obtained from a single record system using standard definitions.

A pilot study by Pasquale (1987) used production function model to explore relationships among Medicare clients’ living arrangements, functional status, plan of care and consumption of home care resources. A retrospective review of clinical records was completed for 100 episodes of care for a random sample of Medicare-eligible patients in one home care agency. Using stepwise multiple
regression, Pasquale concluded that living arrangements, functional status, and plan of care significantly explained total home care resources consumed ($R^2 = 0.65, F = 11.39, p < 0.01$) but plan of care was the only variable that significantly explained nursing visits ($R^2 = 0.74, F = 288.05, p < 0.01$). Patterns of total resource consumption varied across both age and gender for this small sample, suggesting that defining home care consumers as either postacute or long-term may be an oversimplification. The study by Pasquale was limited by the small sample with restricted age (65 and over), one pay source, and largely chronic health problems. The study described in this paper was based on a larger sample which had multiple pay sources, a variety of health problems, and no restriction on age.

The patient data identified as significant indicators of resource consumption in the studies by Ballard and McNamara (1983) and Pasquale (1987) are integrated into the CHIRS tool used in this study to assess nursing care requirements. The decision was made not to reconfigure multiple data into a new index of care but to identify a limited number of data, universal and easily retrievable, that have not been assessed in regard to nursing resource consumption in home health care. The question then became, Which patient data should be included as noncategorical patient factors to indicate need? Three patient factors—referral source, initial payment source and nursing diagnosis—were selected, for reasons discussed below.
Referral Source

Patients are being dismissed from hospitals more acutely ill than ever before (Churness, Kleffel, Onodera, & Jacobson, 1988). But not all patients come to home health care from hospitals. Potential referral sources for home health care have been described as limitless (Lucas & Pancoast, 1988). Glick (1987) suggested that exploration of source of referral could enhance understanding of utilization patterns. No studies have been reported that assess source of referral for its influence on variation in nursing resource consumption in home health care. Referral source was therefore included as a nonclassifying patient factor in this study.

Initial Payment Source

Patients are able to receive care only when that care is paid for. Medicare pays for a major portion of home health care (Ballard & McNamara, 1983; Glick, 1987; Peters, 1987), and Medicare is seeking to control expenditures for all health care services including home health care (Kohler, 1988). Other sources of payment for home care include Medicaid, private insurance, private pay, and special funding through voluntary agencies. The importance of funding has been widely discussed, but no research has studied whether funding source at the initial visit helps explain variation in nursing resource consumption. Therefore, source of funding for the initial visit was selected as a patient factor for this study.
Nursing Diagnosis

Researchers have shown that nursing care time is better predicted by nursing diagnoses than by either medical condition or demographic characteristics (Halloran, 1985), and that variation in length of hospital stay is better explained by patients' nursing diagnoses than by either medical diagnosis or social position (Nosek, 1986).

Medical condition is no more effective in explaining nursing resource consumption in home health care than in acute care (Ballard & McNamara, 1983; Buck & Harris, 1987; Peters, 1987; Widmer, Brill, & Schlosser, 1978). Needs of home care patients differ greatly from those of patients who are hospitalized, and, in general, home care patients do not need medical care but require nursing care and other recuperative therapies (Buck & Harris, 1987). Nursing diagnosis has been discussed as an appropriate basis for reimbursement for home health care patients but more data and further analysis are needed (Buck & Harris, 1987; Harris, Peters, Smith, & Yuan, 1987). Therefore, nursing diagnosis was selected as a patient factor for this study.

The evolution of nursing diagnosis will be reviewed next, along with the literature that has explicitly assessed the relationship of nursing diagnosis to resource consumption measures in home health care.

Nurses have always assessed patients and used the resulting information to make judgments about the need for care. Approximately
three decades ago this process of assessment and judgement began to be called nursing diagnosis (Gordon, 1987). The development of a common language for communicating the knowledge basic to the practice of nursing has been one major contribution of the movement toward widespread use of nursing diagnoses (Gabbie, 1984; Gordon, 1987; Tanner & Hughes, 1984). In addition, nurse administrators have examined nursing diagnosis in combination with other information to help determine the number and competency of staff required to deliver care and the nursing cost component of care delivery (Gordon, 1987; Harris, Parente, Smith, & Yuan, 1988).

Evolution in the area of nursing diagnosis has been influenced by nursing's traditionally close relationship with medicine (Carnevali, 1984). That relationship slowed the evolution of diagnostic reasoning for nurses by delaying acknowledgement of its appropriate use in nursing (Carnevali, 1984). But nursing diagnosis is now widely used and is viewed as an integral part of the nursing process (Gordon, 1987; Peters, 1987).

The first national conference on nursing diagnosis was held in 1973 to identify nursing functions and establish a classification system suitable for computerization (Carpenito, 1983). Since then conferences have been held every two years to further develop and identify diagnostic terms to describe the actual and potential health problems amenable to nursing intervention (Gordon, 1987). The North American Nursing Diagnosis Association (NANDA) has both evolved from and supported the national conferences. At the most recent
conference, NANDA diagnostic categories and subcategories were discussed in multiple presentations as they relate to care in the home setting (Cole & Wallinder, 1989; Martin, 1989; Myers & Stull, 1989).

One widely used model of nursing diagnosis in home health care is the Omaha Classification System (Simmons, 1980). This patient problem classification scheme was derived inductively from the practice of community health nurses (Martin, 1982). The resulting classification scheme was field tested in four agencies and revised to the present 44 problems grouped into four domains: environmental, psychosocial, physiological, and health-related behaviors (Martin, Scheet, Crews, & Simmons, 1986). The system has been used extensively in community health nursing practice and research (Cell, Peters, Gordon, 1984; Crews, Connolly, Whitted, Bruett, & Beckwith, 1986; Helberg, 1988; Martin & Scheet, 1988; Peters, 1987; Schmele, 1986; Stein, 1982; Weidemann & North, 1987).

The Omaha Classification System (OCS) is based in practice rather than in a conceptual model. That practice base and the resulting classification are consistent with the following tenets of the 1974 ANA Standards of Community Health Practice: (a) Community health nursing is not limited to a particular age or diagnostic group, (b) it is continuing, not episodic, (c) it uses a holistic approach for health promotion, health maintenance, health education, coordination, and continuity of care, (d) it recognizes the influence of social and ecological issues, and (e) it utilizes the dynamic
forces which influence change (Peters, 1987). The OCS serves as the basis for the patient record system in the agency where this study was conducted, thus providing a strong conceptual base for the documentation system from which the study data were gathered.

Hardy (1984) developed an outcome evaluation instrument which listed a patient's nursing diagnoses in a hierarchical manner rated by acuity. Her findings indicated a trend that nursing diagnoses and acuity levels are effective in predicting resource use. Hardy's work was limited in scope, using only four nursing diagnoses with reliability and validity not determined.

The relationship of nursing diagnoses and home care resource consumption was assessed by a retrospective record review of 206 discharged patient records from one home health agency (Glick, 1987). Glick did not classify patients according to nursing care requirements but used nursing diagnoses as the independent variable. While the thrust of that study is consistent with the purpose of this dissertation study, methodological issues limit the generalizability of Glick's findings. First, the nursing diagnoses were those that evolved in practice in the test agency and not part of a taxonomy with tested reliability, resulting in a nonportable measurement system. Second, the significant diagnoses were identified by a data reduction technique that increased the likelihood of a Type I error.

Nursing diagnoses were identified that predicted variation in:

(a) the number of home visits by nurses during the first month of
service \((R^2 = 0.172)\), (b) the mean number of home visits by nurses per month over the entire duration of service \((R^2 = 0.022)\), (c) length of service \((R^2 = 0.096)\), and (d) outcome of service as measured by discharge status. The number and configuration of nursing diagnoses varied for each dependent variable, so that while nursing diagnoses were shown to predict resource consumption, explanation of variation in the different consumption measures came from different nursing diagnoses. Total time of service was not used as an indicator of resource consumption in Glick's study as it was in the study reported here.

Nursing diagnosis is widely used in home health care (Myers & Stull, 1989) and can help to explain nursing resource consumption (Glick, 1987; Harris, Peters, Smith, & Yuan, 1987). Therefore, nursing diagnosis was selected as one nonclassifying patient factor to indicate patient health problems.

**Summary of Nonclassificatory Patient Factors Included in This Study**

Studies have identified critical indicators of nursing resource consumption in home health care that do not involve classifying patients in mutually exclusive categories. Critical indicators identified as significant are included in the CHIRS used to measure nursing care requirements in this study. To assess whether nonclassificatory patient factors can explain variation in nursing resource consumption in home health care, the literature was reviewed and three factors were selected to represent patient factors that do not result in a patient classification.
Nursing diagnoses (to indicate patient health problems), payment source (to assess whether source of reimbursement indicates volume of care consumed), and referral source (to indicate whether point of referral indicates volume of care consumed) were used in this study as patient factors.

System Output: Care Measured as Resource Consumption

Resource consumption refers to the measurement of the amount of care actually provided to a patient. Nursing care resources consumed in home health care have traditionally been quantified by number of visits (Saba & Levine, 1981). With recent quantification efforts, visit intensity, length of service, or both have also been used as indicators of resource consumption along with number of visits (Glick, 1987; Harris, Peters, Smith, & Yuan, 1987). Use of visits as the measure of resource consumption does not take into account the variation in visit length. A visit may take less than 30 minutes or more than 2 hours. Total care time, rather than visits, better reflects the resources consumed in providing care. This study uses total direct care time rather than visits, visit intensity, or length of service to measure resource consumption.

Quantification coefficients, unlike method and type of classification, are agency-specific and are thought not to be generalizable to other agencies (Giovannetti, 1978). Agency resources, procedures, and policies can all affect the average care time on an agency-by-agency basis (Peters, 1987). However, Haas
(1988) proposed that nongeneralizability is a common assumption that needs to be tested. If comparable data are available across agencies, perhaps it will be found that little actual variation exists in time standards between agencies with similar characteristics. Before such a determination can be made, more data on resource consumption within single agencies is needed to determine whether patterns of relationships exist for predictors of resource consumption.

For the purposes of this study, indicators of nursing resource consumption are measured as: (a) total direct care time provided by a nurse which indicates the total amount of nurse time committed to care provided to a given patient in the home over the entire length of the patient's stay, and (b) total direct care time provided by a home health aide.

Summary

This study of nursing care requirements and nursing resource consumption is based in a systems framework in which care is the output of the system. Care is provided within a home health agency which is a social system open to the environment. The home health agency is made up of various personal and interpersonal systems and is itself a component of several larger systems, including the health care delivery system. The nurse-patient dyad, an interpersonal system, is viewed as a key component of the home health agency as a social system.
Nursing care requirements refer to the patient's needs for
nursing care, which will vary with the nature and number of health
problems present. Nursing resource consumption refers to the amount
of care actually provided, which in home health care is provided
intermittently over time. This study is concerned with the
relationship between nursing care requirements and nursing resource
consumption and ways in which selected patient factors and selected
nurse factors relate to them. A model of the hypothesized
relationships among the study variables is presented in Figure 4.

Figure 4. Model of Hypothesized Relationships Among Study Variables
Nursing care requirements are identified during the nurse-patient interaction. Consumption of nursing care occurs through the interaction of nurse and patient. Therefore, patient factors and nurse factors may be related to nursing care requirements and nursing resource consumption. Nursing diagnosis, payment source, and referral source are patient factors already collected on home health care patients which may explain variation in nursing care requirements and nursing resource consumption. Nurse expertise was assessed to examine its relationship to nursing resource consumption and to explore whether expertise along with nursing care requirements is related to assignment of nurses to patients to provide care.

This dissertation study is more comprehensive than any reported in the literature. The study is based on a definition of nursing that is broader than nursing tasks and procedure, incorporating intellectual aspects of nursing care. Both care needed and care given were measured and nurse factors as well as patient factors were considered. A valid nursing care requirements instrument was utilized in the study. Reliability data for the instrument are discussed in Chapter 3 under Instrumentation. The study provides new data regarding nursing care requirements and nursing resource consumption in home health care.

This study assessed the relationship of nursing care requirements to nursing resource consumption but also explored the relationship of nursing diagnosis, along with two other patient factors, to both nursing care requirements and nursing resource
consumption. Thus the study described here is more comprehensive than previous studies and provided important information on the relationships among nursing diagnosis, nursing care requirements, and nursing resource consumption.

The patient factors determined to be significant indicators of resource consumption in the studies by Ballard and McNamara (1983) and Pasquale (1987) are integrated into the CHIRS tool used in this study to assess nursing care requirements. The literature supports the use of nursing diagnosis as an indicator of resource consumption but no studies have examined how the three selected patient factors relate to nursing care requirements as measured by this study.

The CHIRS tool was selected to assess nursing care requirements in this study because of its comprehensive definition of nursing and its use of patient/support system as the unit of analysis. Completion of the CHIRS tool does take time, however, and if data from the record are available, patient oriented, limited in number, easily retrievable, and universal (Joel, 1986) and explain as much variation in nursing resource consumption in home health care as the CHIRS tool, then these available measures are a more economical means to predict resource consumption as presently delivered. Data already collected on home health care patients may provide important information for nurse administrators when analyzed in a new way.
CHAPTER 3 METHOD

Purpose

The purpose of this study is to explore the relationship between nursing care requirements and nursing resource consumption in home health care, and to examine the impact of selected patient factors and selected nurse factors on these variables.

Statement of Hypotheses

1. Nursing care requirements explain variation in nursing resource consumption measured as total direct care time provided by a nurse.

2. Nursing care requirements explain variation in nursing resource consumption measured as total direct care time provided by a home health aide.

3. Patient factors explain variation in nursing resource consumption measured as total direct care time provided by the nurse.

4. Patient factors explain variation in nursing resource consumption measured as total direct care time provided by the home health aide.

5. Patients of expert nurses consume the same amount of nursing resources measured as total direct care time provided by a nurse as do patients of non-expert nurses.
6. The distribution of patients across levels of nursing care requirements is the same for expert and nonexpert nurses.

7. Patient factors explain variation in the level of nursing care requirements.

Assumptions

The assumptions underlying this study include the following.

1. Although nursing care is a complex process, a patient's nursing care requirements can be identified and quantified relative to other patients' nursing care requirements using an intensity rating scale.

2. The nurses who provided care to the patients in this study accurately assessed the patients' care needs.

3. The data obtained by the nurse on each nursing visit were accurately and completely recorded in the patient records used as a basis for this study.

4. The patient assessments identified and the resulting care addressed the priority nursing needs of each patient.

These assumptions are discussed in the design and instrumentation sections.

Operational Definitions for Variables

1. Nursing care requirements were measured by the patient's score on Peters' (1987) Community Health Intensity Rating Scale (CHIRS) at the time of discharge from home health care. Peters'
prototype patient classification system uses 15 parameters derived from the Omaha Classification System and integrates the nursing process for each parameter. Each parameter can be classified as 1 (minimum nursing care requirement), 2 (moderate), 3 (major), or 4 (extreme). Classifications for the 15 parameters were added to give a total score for use in the regression analysis. An implicit integration of the ratings assigned to the 15 parameters was used to achieve the global CHIRS categorical rating of CHIRS Level 1 (minimum nursing care requirements); CHIRS Level 2 (moderate nursing care requirements); CHIRS Level 3 (major); or CHIRS Level 4 (extreme) by using Peters' definitions of the four intensity levels (Figure 6, Chapter 2). The global CHIRS categorical rating was used in the analysis of variance models and for the chi-square statistic.

2. Nursing resource consumption consisted of two measures: total direct care time provided by a nurse throughout the patient's length of stay and total direct care time provided by a home health aide. Direct care time was measured as hours of care provided to the patient in the home. Care planning, documentation, telephoning, and other indirect care activities were not included.

3. Patient factors in this study consisted of nursing diagnosis, payment source, and referral source for home health care.

   a. Nursing diagnoses were the patient problem classifications (Omaha Classification System) identified in the patient record.
b. Payment source was defined as the source of revenue for
the first nurse visit, based on seven possible options: 1) Medicare,
2) Medicaid, 3) other third party payors, 4) private/self, 5) health
maintenance organization (HMO) or preferred provider organization
(PPO), 6) agency, or 7) special funding.

c. Referral source was defined as the person or agency that
recommended the patient for home health care. Referral source was
either: 1) acute care facility, 2) patient, family, or friend, 3)
physician/clinic, 4) community agency, or 5) other.

4. The nurse factor in this study was the expertise of the
nurse case manager. Expert status was determined by being named as
an expert by three or more fellow nurses at the agency where the
study was conducted.

Design

This exploratory retrospective study of relationships between
nursing care requirements and nursing resource consumption in home
health care used: existing computerized patient service data, data
obtained from the primary nurse, and an intensity rating scale
completed using the patient's record after dismissal from home health
services. Regression analysis, t test, analysis of variance, and
chi-square were used to test the hypotheses.

Exploratory Studies

Exploratory studies have as their main objective the discovery
of relationships (Polit & Hungler, 1987). Exploratory studies seek
to determine what factors influence, affect, cause, or relate to the phenomenon of interest. The two bases which stimulate exploratory research are desire for a greater understanding of the phenomenon of interest than a descriptive study would provide and desire to estimate the feasibility and cost of undertaking a more rigorous or extensive research project on the same subject (Polit & Hungler, 1987).

This study was designed as an exploratory study because the relationship between nursing care requirements and nursing resource consumption has not been systematically examined. No previous research has compared the explanatory power of both patient classification and nonclassificatory patient indicators. No studies have assessed the relationship between selected patient factors and nursing care requirements, and none have examined the relationship of nurse expertise to nursing resource consumption. The present study will explore those relationships from a systems perspective and make recommendations for further study.

Exploratory research is an appropriate model because the variable, nursing care requirement, is not manipulable. An experimental study could assess different nursing interventions in response to nursing care requirements but could not randomly assign levels of nursing care requirements to the patients being studied. In other words, patients need the care they need. Whether the need is minimal or great, the nurse does not change the level of need but attempts to address the need.
In addition, nursing resource consumption often should not be manipulated for ethical reasons and in many cases cannot be manipulated for practical reasons. For instance, it would be unethical to withhold essential care in order to provide a control group, and it would not be practical to provide care for patients beyond the means of third party payor, the agency, and the patient.

An assumption underlying exploratory research is that one can describe useful information about the world without manipulating variables to determine impact. The implied purpose for understanding relationships among variables is to achieve prediction (Krathwohl, 1985). This study examined the relationships among the variables without manipulation.

**Retrospective Studies**

This study was designed as a retrospective study because the data to answer the research question are data that represent the patient’s status and the nursing care provided throughout the length of service by the home health agency. Such data are available only through the patient record. The use of patient records as a source of research data has both strengths and limitations (While, 1987). The patient records used in this study were the computerized patient service data and the patient chart, which were the basis for obtaining the CHIRS scores.

**Data Collection**

The CHIRS tool was applied to patient data in the record within 6 months after discharge from the home health agency by the
investigator. The referral form, the demographic sheet, the data base, the listing of nursing diagnosis, the visit record for the first two visits, and the physician's order sheet were used as data sources for this study.

Abdellah and Levine (1965) stated that use of patient records gives the researcher less control over the definition and measurement of variables. However, this study used a classification tool based on the Omaha Classification System (OCS), and the study agency used the OCS as the base for their record. Therefore, the tool and the patient record used the same terms and conceptualizations. In addition, the agency staff knew the OCS well, since it was included in their orientation and all agency records were based on it.

Use of existing computerized patient service data has the advantage of saving time in data collection (Lobiondo-Wood & Haber, 1986; McHugh, 1986) and of decreasing transcription errors. Disadvantages of using patient record data include lost or incomplete data, unknown conditions when data were collected, and data which do not clearly fit the study's conceptual framework (Treece & Treece, 1977). In this study, data were unlikely to be lost, since the data were obtained within 6 months of discharge. Even so, some records identified in the random selection process were difficult to locate for application of the CHIRS tool. Sometimes the record of the discharged patient was still at the nurse's desk for final recording from notes; sometimes the record was with clerical staff for
processing. Two records could not be found during the period of application of the CHIRS tool and so were not included in the study.

Prompt collection of data over a 6-month period meant that conditions in the agency and the general health care delivery system were known and less subject to change than over longer periods of time. No major changes were made in programming or recording protocols during the study period. Conditions in the home at the time care was provided were not known or standardized, but control of home conditions is not possible even with an experimental design.

Use of existing clinical data introduces bias that occurs when data are collected for one purpose and used for another. Data that are recorded in the record are intended to provide essential information for the provision of care and to secure reimbursement. The record therefore is not a full representation of the patient and the care received but a record of essential and priority data to secure reimbursement and provide a baseline for the next visit.

**Missing Data**

Retrospective studies based on the patient record must address the issue of missing data. Inadequate documentation is a limitation in the study of home health care (Peters, 1989). Time pressures which result in delays in the nurse recording data may mean that data obtained or interventions performed are not recalled at the time of recording. Another potential reason for inadequate documentation is that the amount of time spent on documentation seems counterproductive to the nurse where 35% of daily time is spent on
documentation, leaving 65% of time to be spent on patient care (Monica, 1988).

Data for rating the CHIRS parameters were available in the clinical records of most of the patients in this study. Thirty-one of the 257 patient records initially included in the sample had inadequate data to rate two or more parameters. When records were traced to nurses' desks shortly after dismissal, data bases were sometimes not yet completed. Incomplete documentation also occurred when a patient was seen over a short term for a very specific purpose. For example, Environmental Domain and Psychosocial Domain parameters were not addressed for a dependent patient who was visited twice a day for two days to administer insulin while his family was out of town. However, missing data on clinical records resulted in some CHIRS parameters being marked zero at the time of rating, since a judgement for rating 1-4 could not be made. The missing data therefore lowered the total CHIRS score by providing zero instead of a value from 1 to 4 to be added to that patient's score for that parameter.

Missing data also occurred because 10 of the 1,892 nursing diagnoses for the sample did not include a designation of whether the diagnosis was active, potential, or health promotion. When analyses were run using only active nursing diagnoses, these 10 diagnoses were dropped leaving 4 patients with no identified active diagnosis. Those patients therefore were not included in the analyses with
active nursing diagnoses only, and the sample size for those tests dropped to 232.

Three decisions were made regarding the missing data in this study. Two of those decisions were made at the time of rating and the third was made at the time of data analysis. The two decisions at the time of rating related to the two parameters for which there was the least data in the clinical records: (a) Reproductive Function, and (b) Individual Growth and Development. The Reproductive Function parameter considers data about menstruation, family planning, child bearing, and impediments to sexual activity. Much of this data is not of concern to a group of patients such as this sample with a median age of 72. However, some of the parameter descriptors apply at all ages so the parameter was rated zero if data were not present to make a rating from Level 1 to Level 4. When only 43 (16%) of the patients' records had data to rate the Reproductive Function parameter, this parameter was dropped from the analysis.

The other CHIRS parameter not documented extensively in the patients' records is Individual Growth and Development. This parameter is also concerned largely with earlier life cycle tasks such as cognitive, physical, and social tasks including ability to speak, read, and write. A decision was made to rate all patients Level 1 (normal timely accomplishment of milestones; may be at risk for delay) unless clinical record data specifically indicated other levels (4 patients).
The third decision regarding missing data, made at the time of data analysis, was to convert all remaining zeroes to CHIRS Level 1 rating. The rationale for this decision was based in the assumptions underlying the study, the assessment indicators for Level 1, and Peters' own previous use of this technique in handling inadequate documentation when using the CHIRS tool. The assumptions underlying the study that are pertinent to this decision are (a) that the nurses who provided care to the patients in this study accurately assessed the patients' care needs, and (b) that the assessments of the patients identified, and the resulting care addressed, the priority nursing needs of each patient. Therefore, priority nursing needs are assumed to be accurately identified and documented. Lack of data in the record therefore means there is no or only a mild problem which does not interfere with functioning, which signifies a CHIRS Level 1 rating.

One limitation of the available computerized patient service data is that resource consumption on a per patient basis is available only for the care time in the home. Care planning time, documentation, telephoning, and other indirect care activities are aggregated per staff member and not available for each patient. Since nursing in this study was defined to include judgments and goal-setting, a better measure of resource consumption would include both care provided in the home and indirect care activities for the patient including care planning, documentation, referral, telephoning, and other activities. Since indirect care time was not
available on a per patient basis, only direct care time (hours of care in the home) was used.

Confounding Variables

Confounding variables in this study included sampling from one geographic location, varying levels of family support for patients, and seasonal influence on sample selection. Each will be discussed separately.

Presence of a family member or other caregiver could influence the amount of nursing care required. While this variable was not addressed in isolation, it is one of the criteria included in the Community Health Intensity Rating Scale (CHIRS), the tool used in determining the global patient classification for nursing care requirements.

Although seasonal factors can influence types of health problems experienced by patients, the 6-month period from which the sample was randomly drawn included winter, spring, and summer months. A longer time period was not feasible due to methods of access to patient records and would have increased the likelihood of changes in third-party payor or other guidelines which could extraneously influence length of stay or amounts of service received.

Sample

The populations of interest for this study consisted of (a) discharged patients who had received nursing care at home through
the services of a home health agency, and (b) the nurses who provided care for them.

Some patients in the sample received home health aide care in addition to nursing care and some received other services such as social work or physical therapy. All patients in the study had a nurse case manager. Only hours of nursing care and hours of home health aide care were considered in the study and two subsets of the sample were addressed for some hypotheses. One subset received both nursing care and home health aide care and is so identified. The other subset received no home health aide care and is referred to as receiving nursing care only even though some of the patients may have received other services such as social work or physical therapy.

A random sample of patient records was drawn from those patients receiving at least two nursing care visits at home from a large midwestern home health agency using the Omaha Classification System as a basis for the patient record. The agency serves urban and rural areas over five counties with a total population base of 554,705 persons. The agency keeps requisite patient data in a retrievable manner; such data were not available from other agencies accessible to the researcher. The patient volume at the agency was sufficient to provide an adequate random sample.

A power analysis was completed to estimate sufficient sample size for the statistical tests involving multiple regression (Cohen, 1988). The power of a statistical test is determined in regard to the null hypothesis. The power of a statistical test is the
probability that the test will lead to the rejection of the null hypothesis and is equal to $1 - \beta$. Power is related to the alpha level, effect size, and sample size. Alpha was set at .05 for this study. Effect size is the statistical expression of the strength of the relationship between two variables or the strength of difference between two groups, with regard to the phenomenon of interest. Selection of an acceptable effect size is often a difficult decision (Cohen, 1988; Keppel, 1982).

With exploratory research, the researcher is seeking to determine whether there are relationships worthy of further study. Therefore, detecting a medium effect is acceptable. Research in the area of resource consumption in home health care has produced $R^2$ values of $0.08$ (Ballard & McNamara, 1983), $0.65$ to $0.74$ (Pasquale, 1987), and $0.02$ to $0.17$ (Glick, 1987). A medium effect size ($R^2 = 0.15$) which falls within that range was selected for this study.

Using an alpha of .05, a medium effect size ($R^2 = .15$), and a power of .80, a sample of 250 patients is needed for the largest multiple regression which includes 47 independent variables (Cohen, 1988). Therefore, the targeted sample size for this study was 250 patients. The final sample of 237 patient records was obtained in the following manner.

**Patient Record Sample**

The cooperating agency places patient data in record archives as soon after discharge as feasible. To acquire patient records for
application of the CHIRS tool prior to their being placed in archives, the records were identified in two separate samples from patients discharged in two consecutive 3-month time periods between January 1, 1989, and June 30, 1989. The intent was to select 125 patients from each of these periods.

The cooperating agency provided a listing of the 328 patients discharged between January 1, 1989, and March 31, 1989. Each discharged patient was assigned a number from one through 328. A table of random numbers was then applied to select 140 patient records. The first 125 randomly sequenced records that had a nurse case manager and at least two nursing visits were to comprise this portion of the sample. However, only 117 of the 140 records met study criteria.

Therefore, when the agency provided a listing of the 309 patients discharged between April 1, 1989, and June 30, 1989, a table of random numbers was applied to identify a list of 170 potential subjects. A total of 140 of these records met the study criteria and were included in the sample, which totaled 257.

Data were obtained from the records of these 257 discharged patients. CHIRS scores were determined and demographic and service statistics were compiled. The initial analysis of the data showed a wide range in age (< 1 year to 97 years) and a number of outliers on the residual plots for the regression analysis. The sample was therefore examined to identify any bimodal distributions or the presence of a nonhomogeneous sample.
Although the mean age of 68.8 years for the sample indicates a preponderance of older persons, the sample included 46 persons (19.4%) below age 60. These younger persons were not clustered at any particular age level. Their numbers instead tapered, creating a marked skew to the right. No changes were made in the sample based on age.

During the review of records for the application of the CHIRS scale, the investigator noted the presence of both hospice patients and bereavement patients in the home care program. These two groups were examined to see whether their resource consumption (total hours of nursing care provided) differed substantially from the mean of 11.1 hours of nursing care computed for the sample of 257 patients as a whole. The 17 hospice patients in the sample received a mean of 24 hours of nursing care and the 3 bereavement patients received a mean of 2 hours of nursing care. Due to the magnitude of these differences, these two groups, totaling 20 patients, were dropped, leaving a sample size of 237 patients which was used for the analyses.

Nurse Sample

The 29 nurses included in the study were case managers for the study subjects. The 29 nurses who completed and returned a Nurse Factors Survey comprised the nurse case manager sample. In addition to these nurses, 5 nurse case managers were not available to complete the Nurse Factors Survey. Four of those nurses had resigned from the agency and one was an administrative intake nurse. These five nurses
had cared for 22 of the sample subjects. These 22 patients were
dropped from analyses that included the expert status of the nurse
but were included in all other statistical tests.

Instrumentation & Reliability

This study used existing data on computer tape, a questionnaire
for the nurse case managers, and the CHIRS tool. Data regarding
patient factors and nursing resource consumption were transferred
from the cooperating agency’s existing computer data files to the
research data file. Some patients’ nursing diagnoses were archived
before the data was transferred to the researcher. A nurse
supervisor retrieved the nursing diagnosis codes for those patients
from the written records and the researcher entered the data into the
research file.

Nurse Factors Data

The nurse factors data for the 29 nurse case managers was
obtained through the Nurse Factors Survey (Appendix A). Personal
demographic data plus the naming of colleagues considered to be
expert were included in the survey. Each nurse case manager was
assigned a code number to be used with all data to ensure
confidentiality. The survey form was designed to increase
reliability of the data by asking for dates instead of number of
years whenever feasible (year of birth, year of graduation).

The researcher explained the study and distributed the Nurse
Factors Survey at a weekly staff meeting at the cooperating agency in
May, 1989. Participation was voluntary and all nurses returned the survey. The agency nurse supervisor distributed the self-explanatory Nurse Factors Survey to those eligible nurses who were absent from the meeting. Again all surveys were completed and returned.

The nurses had no questions about what was meant by expert. It is possible that, had they taken the survey for later completion, other nurses might have been identified as expert. None of the nurses who had recently left the agency were named as expert even though they were eligible since they had provided care during the study period. This may have been because they were not viewed as expert or because they did not come to mind for the nurses.

Nursing Diagnosis

Nursing diagnoses were obtained from automated patient records and by visual review of patient records in an agency using the Omaha Classification System (OCS) (Simmons, 1980). The OCS has been tested in four agencies located in Nebraska, Iowa, Delaware, and Texas and yielded an interrater reliability of .81 (Martin, Scheet, Crews, & Simmons, 1986). The classification scheme has been revised to the present 44 problems grouped into four domains (Appendix B). Recently an interrater reliability of .98 for the OCS was obtained on a 15% random selection of charts from a sample of 175 patient records from the four agencies cited above (N. Scheet, personal communication, October 24, 1988).
Nursing Care Requirements

Patient service records were reviewed to assess nursing care requirements using Peters' Community Health Intensity Rating Scale (CHIRS). Peters (1987) developed and tested the four-point ordinal scale by convening expert groups of community health nurses. CHIRS is based on 15 community health parameters inductively derived from the OCS (Simmons, 1980). CHIRS parameter definitions are presented in Appendix C. The rating scale utilizes a nursing process format with the 15 parameters representing the four OCS domains: environmental, psychosocial, physiological, and health behaviors. For each of the 15 parameters, the tool includes a patient profile to illustrate the extent of nursing input required for patient care within each level (minor, moderate, major, extreme). By considering patient characteristics as well as nursing interventions, the tool reflects the intellectual aspects of nursing as well as the performance of discrete nursing tasks.

Guidelines developed by Peters for use of the scale include:

1) The instrument is applied retrospectively using standard chart review at time of discharge.

2) Patient/support system is unit of analysis for environmental, psychosocial, and health behaviors domains; patient only is unit of analysis for physiological domain.

3) Decision rule for selection of a descriptor is whether it occurs "most of the time" during the course of the agency stay,
with "most of the time" defined as descriptor present during more than 50% of the total number of nursing visits to the patient.

4) Each parameter is rated at the highest level in which descriptors appear for that parameter.

5) A four-point ordinal scale is used to rate parameters, from 1 (minor nursing resources required) to 4 (extreme nursing resources required); parameter is rated zero when documentation on the chart is inadequate to rate a parameter.

6) Each of the 15 parameters must be rated prior to assigning the global community health intensity rating.

7) An implicit integration of the ratings assigned the 15 parameters is used to achieve the global community health intensity rating.

A pilot study was conducted by Peters to evaluate and refine the rating scale "using three staff nurses from each of three agencies. A total pilot test sample of 45 patient charts resulted in an interrater reliability of 67% with 84% of all disagreements only one point apart. Raters systematically examined each prototype definition for representativeness of nursing care requirements of patients as a means of assessing content validity.

Following modifications based on the pilot study, the tool was applied to a sample of 560 charts in two home health agencies (Peters, 1987). Two nurse raters completed the tool for each chart. Interrater reliability was 77% - 86%. Content validity was established through the method of tool development which included
development by a diverse group of community nurse experts, use of the nursing process as its framework, and use of the patient/patient support system as the unit of analysis along with nursing activities.

Peters' findings indicate that the Community Health Intensity Rating Scale can be used to identify subgroups of patients in regard to nursing requirements. The scale correlated significantly with other measures such as number of nursing visits ($r = .24, p < .000$), intensity of nursing visits ($r = .21, p < .000$), health status scale ($r = .38, p < .000$), and a nursing intensity index ($r = .20, p < .000$).

**Reliability for Use of Community Health Intensity Rating Scale**

Since the tool was applied in this study to the first two visits shown on the records of discharged patients, one decision rule needed to be changed. Decision Rule 3 was changed so that a descriptor was selected if it occurred on either of the first two visits.

Training of this investigator to use the CHIRS consisted of a two-hour orientation to CHIRS provided by the author, Peters, by telephone. The investigator and the author then separately rated five records and discussed those ratings. After that discussion, the investigator and the author separately rated an additional 10 patient records and Cohen's Kappas were obtained on the CHIRS parameters plus the global rating (Table 1). The differences in the ratings were discussed and parameter indicators clarified.
Table 1. Interrater Reliability Achieved During Training and Administration of CHIRS for the CHIRS Global Rating and Each Parameter.

<table>
<thead>
<tr>
<th>Parameter*</th>
<th>Training Phase</th>
<th>First Half of Sample</th>
<th>Second Half of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># = 10</td>
<td># = 13</td>
<td># = 12</td>
</tr>
<tr>
<td>CHIRS Global Rating</td>
<td>.4915</td>
<td>.2718</td>
<td>.5000</td>
</tr>
<tr>
<td>Finances</td>
<td>.5833</td>
<td>.7400</td>
<td>1.0000</td>
</tr>
<tr>
<td>Housing: Safety/Health</td>
<td>.8333</td>
<td>1.0000</td>
<td>.8811</td>
</tr>
<tr>
<td>Community Networking</td>
<td>.0000</td>
<td>1.0000</td>
<td>.8333</td>
</tr>
<tr>
<td>Family System</td>
<td>.3750</td>
<td>.7291</td>
<td>.7600</td>
</tr>
<tr>
<td>Emotional Response</td>
<td>.3548</td>
<td>.5617</td>
<td>.7142</td>
</tr>
<tr>
<td>Individual Growth &amp; Development</td>
<td>.0000</td>
<td>.0000</td>
<td>.2500</td>
</tr>
<tr>
<td>Sensory Function</td>
<td>.1304</td>
<td>.6320</td>
<td>.4117</td>
</tr>
<tr>
<td>Respiratory/Circulatory Function</td>
<td>.7014</td>
<td>.7450</td>
<td>.8333</td>
</tr>
<tr>
<td>Neuro-Musculo-Skeletal Function</td>
<td>.6774</td>
<td>.2261</td>
<td>.5955</td>
</tr>
<tr>
<td>Digestion/Elimination</td>
<td>.6774</td>
<td>.4491</td>
<td>.5339</td>
</tr>
<tr>
<td>Structural Integrity</td>
<td>.5714</td>
<td>.6666</td>
<td>.6504</td>
</tr>
<tr>
<td>Nutrition</td>
<td>.8437</td>
<td>.5047</td>
<td>.3333</td>
</tr>
<tr>
<td>Personal Habits</td>
<td>.8387</td>
<td>.7636</td>
<td>.6603</td>
</tr>
<tr>
<td>Health Management</td>
<td>.6969</td>
<td>.3085</td>
<td>.7500</td>
</tr>
</tbody>
</table>

*Reproductive Function not included due to the amount of missing data.

Since kappa indicates the proportion of agreement between two judges’ ratings after chance agreement has been removed (Soeken & Prescott, 1986), values must be interpreted carefully. Limited variability in the ratings can depress values of kappa even if both judges agree on the ratings. For instance, if 10 subjects all receive a rating of 3 on a 4-point scale from both judges, the kappa value is zero, even though there was 100% agreement. Negative values can be obtained, which mean the judges agree less frequently than would be expected by chance.
Although there are no consensus guidelines for the interpretation of kappa, Landis and Koch (1977) suggest the following guides to assess strength of agreement between raters using Cohen's Kappa: 0.0 - 0.20 = slight agreement, 0.21 - 0.40 = fair agreement, 0.41 - 0.60 = moderate agreement, 0.61 - 0.80 = substantial agreement, and 0.81 - 1.00 = almost perfect. Using these guidelines, the training phase produced three slight agreements (community networking, sensory function, and individual growth and development), two fair agreements (family system and emotional response), and all other ratings with a moderate agreement or greater.

Following the training period, the investigator rated the first 117 records in the study sample. A random sample of 13 (11)% of those records was sent to the author, who rated the records and reported her rating to the investigator, who again computed the Cohen's Kappa coefficients (Table 1). The ratings were discussed and the investigator rerated the 117 charts on two parameters where a tool guideline had been misinterpreted.

The investigator then rated the remaining 140 records, sent a random sample of 14 (10%) of those records to the tool's author for rating, and computed the reliability based on those ratings. The Cohen's Kappa values for this reliability are reported in Table 1. The investigator judged this reliability to be acceptable. No additional rerating for interrater reliability was done.
Intrarater reliability was assessed for each half of the sample for a random selection of patient records. The Cohen's Kappa values are reported in Table 2 and were judged to be acceptable.

### Table 2. Intrarater Reliability Achieved During Administration of CHIRS for the CHIRS Global Rating and Each Parameter.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>First Half of Sample</th>
<th>Second Half of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># = 13</td>
<td># = 14</td>
</tr>
<tr>
<td>GHIRS Global Rating</td>
<td>.7234</td>
<td>.7407</td>
</tr>
<tr>
<td>Finances</td>
<td>.5937</td>
<td>.6410</td>
</tr>
<tr>
<td>Housing: Safety/Health</td>
<td>1.0000</td>
<td>.7760</td>
</tr>
<tr>
<td>Community Networking</td>
<td>1.0000</td>
<td>.8541</td>
</tr>
<tr>
<td>Family System</td>
<td>.6176</td>
<td>.7042</td>
</tr>
<tr>
<td>Emotional Response</td>
<td>.4935</td>
<td>.4696</td>
</tr>
<tr>
<td>Individual Growth &amp; Development</td>
<td>.0000</td>
<td>.6000</td>
</tr>
<tr>
<td>Sensory Function</td>
<td>.7078</td>
<td>.7021</td>
</tr>
<tr>
<td>Respiratory/Circulatory Function</td>
<td>.5894</td>
<td>.8627</td>
</tr>
<tr>
<td>Neuro-Musculo-Skeletal Function</td>
<td>.1475</td>
<td>.4615</td>
</tr>
<tr>
<td>Digestion/Elimination</td>
<td>.5593</td>
<td>.4656</td>
</tr>
<tr>
<td>Structural Integrity</td>
<td>.5398</td>
<td>.4852</td>
</tr>
<tr>
<td>Nutrition</td>
<td>.8586</td>
<td>.6612</td>
</tr>
<tr>
<td>Personal Habits</td>
<td>.7319</td>
<td>.6744</td>
</tr>
<tr>
<td>Health Management</td>
<td>.6388</td>
<td>.4262</td>
</tr>
</tbody>
</table>

*Reproductive Function not included due to amount of missing data.

**Human Subjects**

This study protected the rights of the subjects involved by maintaining the confidentiality of all patient and nurse data. No names of subjects were used; all nurse and patient data were identified using a code number. All data were stored away from the agency in a locked file. No data are traceable back to the agency.
Nurse participation was voluntary. Permission of the agency (Appendix D) and the nurses (Appendix A) and approval of the Human Subjects Committee at Case Western Reserve University were obtained.
CHAPTER 4 RESULTS

This chapter presents the results of this study. Descriptive statistics, regression, analysis of variance, t test, and chi-square were all employed. Data were analyzed using SAS. Descriptive statistics are presented first; then the data preparation and reduction are described, followed by the hypothesis tests and post hoc analyses.

Description of the Sample

Discharged Patient Data

Two hundred thirty-seven patient records were selected for the study from the 257 records reviewed using the method described in Chapter 3. The 237 discharged patients whose records made up the study sample were primarily white, female, and age 60 or older (Table 3). These patients ranged in age from less than one year to 97 years of age. The mean age of subjects was 69 years and the median age was 72. More than one-fourth of the patients were more than 80 years of age. Thirty-two percent of the subjects were married and another 42% were widowed. Thirty-six percent of the subjects lived alone.

These sample characteristics do not differ greatly from the characteristics of samples reported in other studies of home health care. In one study of home health care costs (N = 541) two-thirds of the sample were women and a majority were over 75 years of age (Harris, Peters, Smith, & Yuan, 1987). Another study of home health utilization (N = 209) described a sample that was 58% female with
Table 3. Demographic Characteristics of the Study Subjects (N = 237).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>151</td>
<td>64</td>
</tr>
<tr>
<td>Male</td>
<td>86</td>
<td>36</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>192</td>
<td>82</td>
</tr>
<tr>
<td>Black</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Missing from chart</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>76</td>
<td>33</td>
</tr>
<tr>
<td>Widowed</td>
<td>100</td>
<td>44</td>
</tr>
<tr>
<td>Divorced</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Single</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>Separated</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Missing from chart</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>Living Arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives alone</td>
<td>86</td>
<td>36</td>
</tr>
<tr>
<td>Lives with Other(s)</td>
<td>151</td>
<td>64</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean: 69 years (SD 18.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median: 72 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range: &gt;1-97 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;60 years</td>
<td>46</td>
<td>19</td>
</tr>
<tr>
<td>60-70 years</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>70-80 years</td>
<td>84</td>
<td>35</td>
</tr>
<tr>
<td>80-90 years</td>
<td>56</td>
<td>24</td>
</tr>
<tr>
<td>&gt;90 years</td>
<td>12</td>
<td>5</td>
</tr>
</tbody>
</table>

more than 75% of the subjects over age 65 and 33% living alone (Glick, 1987).

Table 4 presents the subjects' primary medical diagnoses. The most common primary medical diagnoses were diseases of the circulatory system, endocrine/metabolic diseases, diseases of the respiratory system, and neoplasms.
Table 4. Number and Percent of Primary Medical Diagnosis of Study Subjects using ICD-9 Categories in Descending Order of Frequency.

<table>
<thead>
<tr>
<th>Medical Diagnosis (ICD-9 Categories)</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
</tr>
<tr>
<td>Diseases of the Circulatory System (390-459)</td>
<td>59</td>
</tr>
<tr>
<td>Endocrine/Metabolic Diseases (240-279)</td>
<td>31</td>
</tr>
<tr>
<td>Diseases of the Respiratory System (460-519)</td>
<td>26</td>
</tr>
<tr>
<td>Neoplasms (140-239)</td>
<td>24</td>
</tr>
<tr>
<td>Diseases of the Musculoskeletal System (710-739)</td>
<td>20</td>
</tr>
<tr>
<td>Diseases of the Skin and Subcutaneous Tissues (680-709)</td>
<td>20</td>
</tr>
<tr>
<td>Injuries and Poisoning (800-999)</td>
<td>14</td>
</tr>
<tr>
<td>Diseases of the Digestive System (520-579)</td>
<td>10</td>
</tr>
<tr>
<td>Diseases of the Nervous System and Sense Organs (320-389)</td>
<td>9</td>
</tr>
<tr>
<td>Diseases of the Circulatory System (390-459)</td>
<td>59</td>
</tr>
<tr>
<td>Injuries and Poisoning (800-999)</td>
<td>14</td>
</tr>
<tr>
<td>Diseases of the Digestive System (520-579)</td>
<td>10</td>
</tr>
<tr>
<td>Anatomical Site (320-389)</td>
<td>9</td>
</tr>
<tr>
<td>Diseases of the Circulatory System (390-459)</td>
<td>59</td>
</tr>
<tr>
<td>Injuries and Poisoning (800-999)</td>
<td>14</td>
</tr>
<tr>
<td>Diseases of the Digestive System (520-579)</td>
<td>10</td>
</tr>
<tr>
<td>Anatomical Site (320-389)</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>237</td>
</tr>
</tbody>
</table>

At the time of discharge from the home health agency, 62% of the patients had recovered or stabilized, 13% had died, 11% were admitted to an institution, and the remaining 14% were discharged for other reasons such as moved or refused service.

Nurse Factors Data

The mean number of sample patients per nurse case manager in this study was 7. Four nurse case managers had only 1 patient in the sample while one nurse had 20 patients in the sample.

Age. The nurse case managers in this study ranged in age from 25 years to 63 years with a median age of 35 years and mean age of 40 years. All the nurses were female. Eight of the 29 nurses were
named as expert by three or more of their peers with 16 being the
greatest number of times any nurse was named as an expert.

**Education.** Table 5 describes the educational preparation of
the nurses in this study. Twenty-three of the nurses had at least a
baccalaureate degree in nursing and three more had earned
baccalaureate degrees in fields other than nursing. Three of the
nurses were masters prepared, two in nursing. The expert and
nonexpert nurse case managers held similar highest levels of nursing
preparation with approximately three-fourths of both groups holding a

<table>
<thead>
<tr>
<th>Educational Preparation</th>
<th>Expert (8 nurses)</th>
<th>NonExpert (21 nurses)</th>
<th>Total (29 nurses)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># (%)</td>
<td># (%)</td>
<td># (%)</td>
</tr>
<tr>
<td>Basic Nursing Preparation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocational/Practical</td>
<td>1 12.5</td>
<td>1 5</td>
<td>2 7</td>
</tr>
<tr>
<td>Diploma</td>
<td>3 37.5</td>
<td>6 28.5</td>
<td>9 31</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>-</td>
<td>8 38</td>
<td>8 27.5</td>
</tr>
<tr>
<td>Baccalaureate Degree</td>
<td>4 50</td>
<td>6 28.5</td>
<td>10 34.5</td>
</tr>
<tr>
<td>Highest Level of Nursing Preparation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>1* 12.5</td>
<td>3 14</td>
<td>4 14</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>-</td>
<td>2 10</td>
<td>2 7</td>
</tr>
<tr>
<td>Baccalaureate Degree</td>
<td>6 75</td>
<td>15 71</td>
<td>21 72</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>1 12.5</td>
<td>1 5</td>
<td>2 7</td>
</tr>
</tbody>
</table>

*Has post-diploma preparation in specialized area.

baccalaureate degree as their highest degree. Both the expert and
nonexpert groups had one nurse who was masters prepared in nursing.
Experience. The nurse case managers had a mean of 13.7 years of nursing experience with a range of 1 year to 37 years. Years of experience in home health care for the sample ranged from 1 year to 14 years, with a mean of 5.8 years experience in home health care (Table 6). Although experts and nonexperts did not differ significantly in regard to total nursing experience, the expert nurse case managers had significantly more home health care experience than those rated nonexpert ($t = -3.64$, df 23, $p = 0.0014$).

**Table 6.** Age and Experience of Nurse Case Managers by Expert Rating Reported in Years.

<table>
<thead>
<tr>
<th>Rating as Expert</th>
<th>Number</th>
<th>Mean Age</th>
<th>SD</th>
<th>Mean Years in Nursing</th>
<th>SD</th>
<th>Mean Years in Home Health Care</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert</td>
<td>8</td>
<td>40.5</td>
<td>8.7</td>
<td>16.4</td>
<td>6.2</td>
<td>9.4*</td>
<td>4.7</td>
</tr>
<tr>
<td>Non-Expert</td>
<td>21</td>
<td>39.6</td>
<td>11.5</td>
<td>12.7</td>
<td>10.1</td>
<td>4.1*</td>
<td>2.7</td>
</tr>
<tr>
<td>Total Sample</td>
<td>29</td>
<td>39.8</td>
<td>10.7</td>
<td>13.7</td>
<td>9.3</td>
<td>5.8</td>
<td>4.2</td>
</tr>
</tbody>
</table>

*t test for significant difference between these means:
$t = -3.64$, df 23, $p = 0.0014$; all other $t$ tests for this table were not significant at 0.05.

Expert status. Fifty of the 237 patient subjects (21%) had nurse case managers named as expert in this study. One hundred sixty-five patients (70%) had nurse case managers not named as expert, and the remaining 22 patients (9%) had nurse case managers not available to complete the nurse factors survey. This distribution of patients is similar to the proportion of expert/nonexpert ratings of the nurse case managers in this study (24% expert, 64% nonexpert, and 12% not available for peer rating).
In other words, 24% of the nurses (experts) were case managers for 21% of the patients, 64% of the nurses (nonexperts) cared for 70% of the patients, and the 12% of the nurses not available for rating as expert/nonexpert were case managers for 9% of the patients.

Patient Factors Data

The patient factors included in this study are nursing diagnosis, payment source, and referral source. Descriptive data will be presented for each patient factor.

Nursing diagnosis. Forty of the 44 nursing diagnoses in the Omaha Classification System (OCS) were identified for one or more patients in the study. The four diagnoses which were not identified for any patient were the four "Other" diagnoses, which occur one in each of the OCS domains (Environmental, Psychosocial, Physiological, Health Related Behavior). A complete listing of the OCS nursing diagnoses by domain is presented in Appendix B.

The 237 patients had a total of 1,892 nursing diagnoses for an average of 8 diagnoses per patient. The fewest nursing diagnoses per patient was one (11 patients) and the greatest number of nursing diagnoses per patient was 23 (2 patients).

The OCS requires the labeling of each nursing diagnosis as active, potential, or health promotion. Ten of the 1,892 diagnosis were without a designation. Of the remaining 1,882 nursing diagnoses, 1,582 were active, 287 were potential, and 13 were health promotion.
Thirty-five patients (15%) had all their nursing diagnoses from one of the OCS domains (Environmental, Psychosocial, Physiological, or Health Related Behavior). Seventy-eight patients (33%) had nursing diagnoses from two of the domains, while 80 patients (34%) had nursing diagnoses from three domains. The remaining 44 patients (18%) had nursing diagnoses from all four domains. This indicates that the nursing assessments were comprehensive since over half the patients had problems identified in three or more domains. Assessments were not, therefore, focused exclusively on the referral problem.

The nursing diagnosis cited most frequently was neuro-musculo-skeletal function (179 patients) followed by circulation (141 patients). Two nursing diagnoses, growth and development of child/adult and family planning, were identified only one time each in the sample. Table 7 presents the frequencies for all the nursing diagnoses. Table 8 presents the frequencies for the active nursing diagnoses. The sequencing of nursing diagnoses in the two tables is very similar with the top three diagnoses occurring in the same order on both lists. The top 20 diagnoses in terms of frequency are the same on the two lists, but the order varies somewhat after the first three.

Payment Source. More than two-thirds of the sample (71%) had Medicare as the payment source for their first home health care visit. Another 10% had Medicaid as the initial payment source while
Table 7. All Nursing Diagnoses (Active, Potential, and Health Promotion) in Descending Order of Occurrence in Sample (N = 237).

<table>
<thead>
<tr>
<th>Nursing Diagnosis</th>
<th># of times in sample</th>
<th>% of patients with diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuro-Musculo-Skeletal Function</td>
<td>176</td>
<td>74.3</td>
</tr>
<tr>
<td>Circulation</td>
<td>141</td>
<td>59.5</td>
</tr>
<tr>
<td>Integument</td>
<td>123</td>
<td>51.9</td>
</tr>
<tr>
<td>Respiration</td>
<td>102</td>
<td>43.0</td>
</tr>
<tr>
<td>Nutrition</td>
<td>98</td>
<td>41.4</td>
</tr>
<tr>
<td>Pain</td>
<td>94</td>
<td>39.7</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>85</td>
<td>35.9</td>
</tr>
<tr>
<td>Prescribed medication regimen</td>
<td>84</td>
<td>35.4</td>
</tr>
<tr>
<td>Bowel Function</td>
<td>82</td>
<td>34.6</td>
</tr>
<tr>
<td>Technical procedure</td>
<td>71</td>
<td>30.0</td>
</tr>
<tr>
<td>Personal hygiene</td>
<td>68</td>
<td>28.7</td>
</tr>
<tr>
<td>Genito-urinary function</td>
<td>67</td>
<td>28.3</td>
</tr>
<tr>
<td>Digestion-hydration</td>
<td>65</td>
<td>27.4</td>
</tr>
<tr>
<td>Vision</td>
<td>58</td>
<td>24.5</td>
</tr>
<tr>
<td>Income</td>
<td>52</td>
<td>21.9</td>
</tr>
<tr>
<td>Cognition</td>
<td>52</td>
<td>21.9</td>
</tr>
<tr>
<td>Hearing</td>
<td>51</td>
<td>21.5</td>
</tr>
<tr>
<td>Emotional stability</td>
<td>44</td>
<td>18.6</td>
</tr>
<tr>
<td>Role Change</td>
<td>41</td>
<td>17.3</td>
</tr>
<tr>
<td>Social Contact</td>
<td>35</td>
<td>14.8</td>
</tr>
<tr>
<td>Caretaking/parenting</td>
<td>35</td>
<td>14.8</td>
</tr>
<tr>
<td>Dentition</td>
<td>30</td>
<td>12.7</td>
</tr>
<tr>
<td>Sleep &amp; rest pattern disturbance</td>
<td>29</td>
<td>12.2</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>29</td>
<td>12.2</td>
</tr>
<tr>
<td>Speech and Language</td>
<td>25</td>
<td>10.5</td>
</tr>
<tr>
<td>Grief</td>
<td>23</td>
<td>9.7</td>
</tr>
<tr>
<td>Interpersonal relationships</td>
<td>20</td>
<td>8.4</td>
</tr>
<tr>
<td>Communication with community resources</td>
<td>19</td>
<td>8.0</td>
</tr>
<tr>
<td>Residence</td>
<td>19</td>
<td>8.0</td>
</tr>
<tr>
<td>Sanitation</td>
<td>16</td>
<td>6.8</td>
</tr>
<tr>
<td>Neighborhood/workplace safety</td>
<td>15</td>
<td>6.3</td>
</tr>
<tr>
<td>Medical/Dental supervision</td>
<td>11</td>
<td>4.6</td>
</tr>
<tr>
<td>Neglected Child/Adult</td>
<td>10</td>
<td>4.2</td>
</tr>
<tr>
<td>Consciousness</td>
<td>8</td>
<td>3.4</td>
</tr>
<tr>
<td>Spiritual Distress</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Human sexuality</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Abused Child/Adult</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Antepartum/postpartum</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Growth and Development</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Family Planning</td>
<td>1</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Table 8. Active Nursing Diagnoses in Descending Order of Occurrence in Sample (N = 232).

<table>
<thead>
<tr>
<th>Nursing Diagnosis*</th>
<th># of times in sample</th>
<th>% of patients with diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuro-Musculo-Skeletal Function</td>
<td>166</td>
<td>71.6</td>
</tr>
<tr>
<td>Circulation</td>
<td>120</td>
<td>51.7</td>
</tr>
<tr>
<td>Integument</td>
<td>98</td>
<td>42.2</td>
</tr>
<tr>
<td>Pain</td>
<td>87</td>
<td>37.5</td>
</tr>
<tr>
<td>Respiration</td>
<td>82</td>
<td>35.3</td>
</tr>
<tr>
<td>Nutrition</td>
<td>80</td>
<td>34.5</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>69</td>
<td>29.7</td>
</tr>
<tr>
<td>Technical Procedure</td>
<td>66</td>
<td>28.4</td>
</tr>
<tr>
<td>Bowel Function</td>
<td>65</td>
<td>28.0</td>
</tr>
<tr>
<td>Prescribed Medication Regimen</td>
<td>60</td>
<td>25.9</td>
</tr>
<tr>
<td>Genito-Urinary Function</td>
<td>55</td>
<td>23.7</td>
</tr>
<tr>
<td>Digestion-Hydration</td>
<td>54</td>
<td>23.3</td>
</tr>
<tr>
<td>Vision</td>
<td>54</td>
<td>23.3</td>
</tr>
<tr>
<td>Personal Hygiene</td>
<td>51</td>
<td>22.0</td>
</tr>
<tr>
<td>Cognition</td>
<td>48</td>
<td>20.7</td>
</tr>
<tr>
<td>Hearing</td>
<td>47</td>
<td>20.3</td>
</tr>
<tr>
<td>Income</td>
<td>41</td>
<td>17.7</td>
</tr>
<tr>
<td>Emotional Stability</td>
<td>38</td>
<td>16.4</td>
</tr>
<tr>
<td>Role Change</td>
<td>36</td>
<td>15.5</td>
</tr>
<tr>
<td>Social Contact</td>
<td>31</td>
<td>13.4</td>
</tr>
<tr>
<td>Sleep and Rest Patterns</td>
<td>27</td>
<td>11.6</td>
</tr>
<tr>
<td>Dentition</td>
<td>26</td>
<td>11.2</td>
</tr>
<tr>
<td>Substance Misuse</td>
<td>25</td>
<td>10.8</td>
</tr>
<tr>
<td>Caretaking/Parenting</td>
<td>24</td>
<td>10.3</td>
</tr>
<tr>
<td>Speech and Language</td>
<td>22</td>
<td>9.5</td>
</tr>
<tr>
<td>Interpersonal Relationship</td>
<td>18</td>
<td>7.8</td>
</tr>
<tr>
<td>Communication with Community Resources</td>
<td>16</td>
<td>6.9</td>
</tr>
<tr>
<td>Sanitation</td>
<td>14</td>
<td>6.0</td>
</tr>
<tr>
<td>Residence</td>
<td>13</td>
<td>5.6</td>
</tr>
<tr>
<td>Neighborhood/Workplace Safety</td>
<td>12</td>
<td>5.2</td>
</tr>
<tr>
<td>Grief</td>
<td>12</td>
<td>5.2</td>
</tr>
<tr>
<td>Medical/Dental Supervision</td>
<td>6</td>
<td>2.6</td>
</tr>
<tr>
<td>Neglected Child/Adult</td>
<td>5</td>
<td>2.2</td>
</tr>
<tr>
<td>Consciousness</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Abused Child/Adult</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Spiritual Distress</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Human Sexuality</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Antepartum/Postpartum</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Growth and Development of Child/Adult</td>
<td>1</td>
<td>0.4</td>
</tr>
</tbody>
</table>

*Family Planning did not appear as an active nursing diagnosis.
the remaining patients' first visits were paid for by other third
party payors, private/self payment, health maintenance
organizations/preferred provider organizations, or special funding
(Table 9). This distribution is not surprising given the mean age of
the sample. Medicare is commonly cited as the major payment source
for home health care (Glick, 1987; Kohler, 1988; Monica, 1988;
Peters, 1987). Many patients in this sample (42%) had multiple
payment sources, some of which may have extended the number of visits
once the initial funding source was exhausted. The mean number of
funding sources per patient in this sample was 1.5.

Table 9. Number and Percent of Patients by Payment Source for First
Home Visit.

<table>
<thead>
<tr>
<th>Payment Source</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>168</td>
<td>71</td>
</tr>
<tr>
<td>Medicaid</td>
<td>23</td>
<td>10</td>
</tr>
<tr>
<td>Other Third Party Payors</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Private/Self</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>HMO/PPO</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Agency</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Special Funding</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>237</td>
<td>101*</td>
</tr>
</tbody>
</table>

*Percent totals >100 due to rounding error.

Referral Source. Approximately two-thirds of the patients in
this study (67%) were referred for home care by an acute care
institution. Another 18% were referred by physicians' offices or
clinics. The remaining patients (15%) were referred by miscellaneous
other sources including the home health nurse. Less than 1% of the patients were referred by family, self, or friend.

Nursing Resource Consumption Data

The 237 patients in this study received 3,360 visits by a nurse with a mean total nursing care time of 10.1 hours (SD 13.1) per patient and a mean visit length of .71 hours (SD 0.34) per visit by a nurse. Home health aides provided 1,128 visits with a mean total home health aide care time of 16.24 hours (SD 21.7) per patient who received home health aide care and a mean visit length of .95 hours (SD 0.37) per patient who received home health aide care.

The standard deviation of 13.1 for the mean of 10.1 hours of nursing care per patient indicates a wide variation among the patients in regard to total hours of care consumed. The mean visit length of .71 hours (42 minutes) is close to the old standard of 45 minutes (Churness, Kleffl, Onodera, & Jacobson, 1988). Some patients received all service in one day while one patient received service over 472 days. The mean length of time on the agency caseload for this sample was 70 days (SD 88), while the median was 38 days. Substantial variation in length of stay is apparent in the standard deviation of 88.

Nursing Care Requirements

Application of the CHIRS rating scale to the clinical records of the 237 study subjects produced two expressions of nursing care
requirements. One expression is the total CHIRS score achieved by summing the individual parameter rating for each patient. The total CHIRS scores ranged from 15 to 40 with a mean score of 25.24 (SD 4.11). The median score was 25 and the modal score was 23. The total score rating was used in the regression analyses.

The second expression of nursing care requirements is the CHIRS global rating which was determined following the rating of the individual parameters. Ten patients were rated at CHIRS Level 1 (4%), 101 patients at Level 2 (43%), 115 at Level 3 (48%), and 11 at Level 4 (5%). Therefore, the greatest number of patients were rated at CHIRS Level 3 with somewhat fewer at Level 2 and relatively few at Level 1 and Level 4.

A one-way analysis of variance for the CHIRS total score among the four global CHIRS ratings was significant (Table 10). Tukey’s HSD test was used to determine the means between which there were significant differences. It was found that the mean for each global CHIRS rating level differed significantly from all other level means. Therefore these two expressions, CHIRS total score and CHIRS global rating, are consistent representations of nursing care requirements.

| Table 10. Analysis of Variance of CHIRS Total Score for the Four Global CHIRS Levels. |
| --- | --- | --- | --- |
| Source | df | SS | MS | F |
| Between | 3 | 2296.30 | 765.43 | 104.69* |
| Within | 233 | 1703.50 | 7.31 |  |
| Total | 236 | 3999.80 | |  |

R² = 0.5741
*p = 0.0001
in the study sample. CHIRS total score was used in analysis when a
continuous variable was needed and CHIRS global rating was used when
categorical data was appropriate.

The percentages of the sample rated at each CHIRS Level in this
study differ from those obtained by Peters during the validation
study for the CHIRS (N = 560). The Peters study identified a greater
proportion of Level 1 and Level 2 patients (13% and 47% respectively)
with fewer Level 3 (36%) and Level 4 (4%).

Table 11 reveals that parameters in the Environmental Domain
and Psychosocial Domain were predominantly Level 1 ratings, meaning
that there were fewer problems in these domains. There were
relatively few Level 4 parameter ratings but the majority of these
ratings occurred in the Physiological domain and the Health Behaviors
domain. This indicates that several patients had substantial
problems in physiological functioning and in managing their own
health.

Data Preparation and Reduction

Regression equations for Hypotheses 1, 2, 3, and 4 were run and
residual plots were examined. Although these examinations showed
acceptable plots around zero, 12 outliers were apparent. These
outliers were the hours of care for the 12 patients from the sample
who received the greatest number of hours of direct nursing care.

In an effort to identify any masked patterns in the data, the
regression equations were each run four times: (a) once with the
full data set, (b) once without the 12 outliers that appeared on the
Table 11. CHIRS Parameter Ratings for Sample.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
<th>Initially Unable to Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level of Intensity After Zeros Converted to Level 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Environmental Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finances</td>
<td>166</td>
<td>28</td>
</tr>
<tr>
<td>Housing Safety/Health</td>
<td>176</td>
<td>50</td>
</tr>
<tr>
<td><strong>Psychosocial Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Networking</td>
<td>189</td>
<td>38</td>
</tr>
<tr>
<td>Family System</td>
<td>111</td>
<td>77</td>
</tr>
<tr>
<td>Emotional Response</td>
<td>134</td>
<td>73</td>
</tr>
<tr>
<td>Individual Growth and Development</td>
<td>233</td>
<td>4</td>
</tr>
<tr>
<td><strong>Physiological Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensory Function</td>
<td>64</td>
<td>129</td>
</tr>
<tr>
<td>Respiratory/Circulatory Function</td>
<td>41</td>
<td>96</td>
</tr>
<tr>
<td>Neuro-Musculo Skeletal Function</td>
<td>22</td>
<td>114</td>
</tr>
<tr>
<td>Reproductive Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digestion/Elimination</td>
<td>54</td>
<td>105</td>
</tr>
<tr>
<td>Structural Integrity</td>
<td>102</td>
<td>89</td>
</tr>
<tr>
<td><strong>Health Behaviors Domain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>69</td>
<td>114</td>
</tr>
<tr>
<td>Personal Habits</td>
<td>75</td>
<td>94</td>
</tr>
<tr>
<td>Health Management</td>
<td>18</td>
<td>92</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1454</td>
<td>1103</td>
</tr>
</tbody>
</table>

residual plots, (c) once without the 31 patients with two or more missing CHIRS parameter values, and (d) once using the log 10 of the dependent variable which was total hours of care provided by the nurse (or total hours of care provided by the home health aide for Hypotheses 2 and 4). The equations that produced both the highest significant $R^2$ ($p < 0.05$), and residual plots with no evidence of heteroscedasticity were the equations using the log 10 of the
dependent variable. This can be explained by the fact that taking
the log of the hours of care pulled the outliers in toward the mean,
helping to stabilize and reduce the variance in the distribution of
the hours of care. Therefore, the tests for Hypotheses 1, 2, 3, & 4
used the log 10 of the hours of care as the dependent variable.

Hypothesis Tests

Hypothesis 1. Nursing care requirements explain variation in
nursing resource consumption measured as total direct care time
provided by a nurse.

This hypothesis is supported by the data. Regressing the log
of the total care time provided by a nurse on the CHIRS total score
for the 237 patients in the sample resulted in an adjusted $R^2$ of
0.1015, $p = 0.0001$ (Table 12). The regression equation, reported
with antilog values, for this hypothesis for the total sample of 237
patients who received nursing care is:

$$\hat{y} = 1.16 + 1.07 \text{ CHIRS Total Score}. $$

Table 12. Regression Analysis for the Log of the Sum of Direct Hours
of Nursing Care Regressed on CHIRS Total Score (Hypothesis 1).

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1</td>
<td>2.9992</td>
<td>2.9992</td>
<td>27.667*</td>
</tr>
<tr>
<td>Error</td>
<td>235</td>
<td>25.4742</td>
<td>0.1084</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>236</td>
<td>28.4734</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 0.1053$ \hspace{1cm} Adj $R^2 = 0.1015$

*p = 0.0001
Further exploration of the relationship between nursing care requirements and nursing resource consumption is undertaken in the post hoc analysis section of this chapter.

**Hypothesis 2.** Nursing care requirements explain variation in nursing resource consumption measured as total direct care time provided by a home health aide.

This hypothesis was not supported by the data. Regressing the log of the total direct care time provided by a home health aide on the CHIRS total score resulted in an $R^2$ of 0.0002, $p = 0.9008$ (Table 13). The power to detect significance for this hypothesis was .92 with the sample size of 66, a medium effect size of 0.15, and $\alpha$ set at 0.05. This is adequate power to test the hypothesis.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1</td>
<td>0.0165</td>
<td>0.0165</td>
<td>0.061</td>
<td>0.8062</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>17.3672</td>
<td>0.2713</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>17.3836</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The sample of 66 patients for this hypothesis test is biased since it represents only those patients who needed one type (intermittent) of home health aide care in addition to nursing care. Patients needing chronic long-term home health aide care are referred to another division of the home health agency and thus were not included in the sampling pool.
The design of the CHIRS tool limits its ability to discriminate quantity of care at the home health aide level. Level 1 patients by definition have their needs met largely by their personal support system and cannot have a home health aide. Level 2 patients may have a home health aide, but patients with home health aides are most likely to fall into Levels 3 and 4 by definition (Figure 3, Chapter 2).

In addition, it should be noted that CHIRS is designed to identify a patient’s global need for nursing care and not to distinguish levels of need for one aspect of that care. In other words, the tool is not reductionistic. Although home health aide care is planned by a nurse, home health aides do not do what nurses do. Home health aide care is based on the patient’s functional status and the CHIRS is a much broader representation of patient need. Identifying the patient’s nursing care requirements does not help to predict the amount of care provided by a home health aide.

Hypothesis 3. Patient factors explain variation in nursing resource consumption measured as total direct care time provided by the nurse.

This hypothesis was supported by the findings. The hypothesis was tested on the sample of 237 patients using all the nursing diagnoses (active, potential, and health promotion). The log of the total direct care time provided by the nurse was regressed on nursing diagnosis (entered as 40 dichotomous variables), referral source
(4 referral sources entered as a set of 3 indicator variables), and initial payment source (7 payment sources entered as a set of 6 indicator variables). The regression resulted in an adjusted $R^2$ of 0.2656, $p = 0.0001$ (Tables 14 & 15). Since only one patient in the

Table 14. Multiple Regression Analysis for the Log of the Sum of Direct Hours of Nursing Care Regressed on All Nursing Diagnoses, Referral Source, and Initial Payment Source (Hypothesis 3).

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>NS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>49</td>
<td>11.9032</td>
<td>0.2429</td>
<td>2.741*</td>
</tr>
<tr>
<td>Residual</td>
<td>187</td>
<td>16.5701</td>
<td>0.0886</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>236</td>
<td>28.4733</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 0.4180$ \hspace{1cm} Adj $R^2 = 0.2656$

*p = 0.0001

Table 15. Variables with Significant Beta Weights ($p < 0.10$) for the Regression of the Log of the Sum of Direct Hours of Nursing Care Regressed on All Nursing Diagnoses, Referral Source, and Initial Payment Source (Hypothesis 3).

<table>
<thead>
<tr>
<th>Variable</th>
<th># of Patients With Diagnosis</th>
<th>b</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neighborhood/Workplace Safety</td>
<td>15</td>
<td>0.2032</td>
<td>0.1137</td>
</tr>
<tr>
<td>Emotional Stability</td>
<td>45</td>
<td>0.1172</td>
<td>0.0662</td>
</tr>
<tr>
<td>Human Sexuality</td>
<td>4</td>
<td>0.3667</td>
<td>0.2050</td>
</tr>
<tr>
<td>Vision</td>
<td>58</td>
<td>0.0987</td>
<td>0.0513</td>
</tr>
<tr>
<td>Incontinence</td>
<td>126</td>
<td>0.0874</td>
<td>0.0421</td>
</tr>
<tr>
<td>Respiration</td>
<td>102</td>
<td>0.0864</td>
<td>0.0484</td>
</tr>
<tr>
<td>Sleep and Rest Pattern</td>
<td>30</td>
<td>0.2398</td>
<td>0.0663</td>
</tr>
<tr>
<td>Family Planning</td>
<td>1</td>
<td>0.6880</td>
<td>0.3266</td>
</tr>
<tr>
<td>Technical Procedure</td>
<td>71</td>
<td>0.0931</td>
<td>0.0482</td>
</tr>
<tr>
<td>Interpersonal Relationships</td>
<td>21</td>
<td>0.1659</td>
<td>0.0899</td>
</tr>
</tbody>
</table>

sample had a nursing diagnosis related to family planning, the regression was run again without that diagnosis. That regression resulted in an adjusted $R^2$ of 0.2506, $p = 0.0001$. Based on this
hypothesis test, more than one-fourth of the variance in resource consumption can be attributed to the patient factors of nursing diagnoses, referral source, and payment source.

Further exploration of this hypothesis is presented in the post hoc analysis section of this chapter.

**Hypothesis 4.** Patient factors explain variation in nursing resource consumption measured as total direct care time provided by the home health aide.

The data do not support this hypothesis. The log of the total direct care time provided by a home health aide was regressed on nursing diagnoses (entered as 35 dichotomous variables), referral source (3 referral sources entered as a set of 2 indicator variables), and payment source (4 payment sources entered as a set of 3 indicator variables). The regression was not significant (Table 16). There were fewer nursing diagnoses, referral sources, and

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>41</td>
<td>12.3301</td>
<td>0.3083</td>
<td>1.525</td>
<td>0.1333</td>
</tr>
<tr>
<td>Residual</td>
<td>24</td>
<td>5.0534</td>
<td>0.2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>17.3837</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 16. Regression Analysis for the Log of the Sum of Direct Hours of Home Health Aide Care Regressed on Nursing Diagnoses, Referral Source, and Initial Payment Source (Hypothesis 4).

payment sources in this hypothesis test than for Hypothesis 3 because the full set of variables was not represented in this smaller sample.

The power to detect significance for this hypothesis was .15 with the sample size of 66, a medium effect size of 0.15 and α set at
0.05. The model is over-parameterized and a larger sample is needed to adequately test this regression. Sample size for the study was determined by computing the number of subjects necessary to evaluate Hypothesis 3 with a power of 0.80 and an effect size of 0.15. Patient records were selected if the patient had a nurse case manager and at least two nursing visits. Specifying delivery of home health aide care as a criterion for sample selection would have biased the study sample for Hypotheses 1, 3, 5, 6, and 7 since the random sampling for this study found fewer than 30% of the subjects receiving home health care, which means that the remaining 70% would not have qualified for the study if home health aide service had been a criterion. The major emphasis of this study was nursing care requirements and nursing resource consumption and the sample selection criteria reflected that focus. Consequently, there was inadequate power to test this hypothesis with this sample.

**Hypothesis 5.** Patients of expert nurses consume the same amount of nursing resources measured as total direct care time provided by a nurse as do patients of nonexpert nurses.

This null hypothesis could not be rejected based on the data. This hypothesis was tested using the 215 patients who had nurse case managers whose expert status was known. A non-significant \( t \) value was obtained (\( t = 0.55, p = 0.6006, df 165 \) in comparing the mean of 9.46 hours (SD 7.50) of direct care time provided by the expert nurses with the mean of 10.32 hours (SD 14.87) for patients of nonexpert nurses. Additional parameters are compared for patients of
expert and nonexpert nurses in the post hoc analysis section of this chapter.

**Hypothesis 6.** The distribution of patients across levels of nursing care requirements is the same for expert and nonexpert nurses.

This null hypothesis could not be rejected based on the data. The sample size for the test was the 215 patients who had case managers whose expert status was known.

A Chi-square test of the four CHIRS levels with the expert status of the nurse case manager produced a Chi-square value of 0.156, \( p = 0.984 \). This test resulted in two of the cells having expected counts less than 5. CHIRS Levels 1 and 2 were then collapsed as were CHIRS Levels 3 and 4. A Chi-square test using a 2x2 table produced a Chi-square value of 0.96, \( p = 0.3270 \).

Therefore, patients with greater nursing care requirements in this study were just as likely to have a nonexpert nurse case manager as an expert nurse case manager and patients with lesser nursing care requirements were just as likely to have an expert as a nonexpert nurse case manager.

**Hypothesis 7.** Patient factors explain variation in a patient's level of nursing care requirements.

This hypothesis was supported by the data. The hypothesis was tested on the sample of 237 patients with all nursing diagnoses (active, potential, and health promotion). The CHIRS total score was regressed on nursing diagnosis (entered as 39 dichotomous variables).
referral source (4 referral sources entered as a set of 3 indicator variables), and initial payment source (7 payment sources entered as a set of 6 indicator variables). The regression yielded an adjusted $R^2$ of 0.3863, $p = 0.0001$ (Tables 17 & 18). Individual beta weights have no meaning for the dummy coded group variables, referral source, and initial payment source, which are therefore not reported.

Table 17. Multiple Regression Analysis for the CHIRS Total Score Regressed on All Nursing Diagnoses, Referral Source, and Initial Payment Source (Hypothesis 7).

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>48</td>
<td>2044.51</td>
<td>42.59</td>
<td>4.095*</td>
</tr>
<tr>
<td>Residual</td>
<td>188</td>
<td>1955.30</td>
<td>10.40</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>236</td>
<td>3999.81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 0.5112$  Adj $R^2 = 0.3863$

*p = 0.0001

Table 18. Variables with Significant Beta Weights ($p < 0.10$) for the CHIRS Total Score Regressed on All Nursing Diagnoses, Referral Source, and Initial Payment Source (Hypothesis 7).

<table>
<thead>
<tr>
<th>Variable</th>
<th># of Patients With Diagnosis</th>
<th>b</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>54</td>
<td>1.6416</td>
<td>0.6184</td>
</tr>
<tr>
<td>Social Contact</td>
<td>36</td>
<td>2.5437</td>
<td>0.7766</td>
</tr>
<tr>
<td>Grief</td>
<td>23</td>
<td>1.5227</td>
<td>0.8725</td>
</tr>
<tr>
<td>Caretaking/Parenting</td>
<td>35</td>
<td>1.2947</td>
<td>0.7361</td>
</tr>
<tr>
<td>Speech &amp; Language</td>
<td>25</td>
<td>1.7669</td>
<td>0.9031</td>
</tr>
<tr>
<td>Personal Hygiene</td>
<td>69</td>
<td>1.5153</td>
<td>0.5691</td>
</tr>
</tbody>
</table>

Further exploration of this hypothesis is presented in the post hoc analysis section of this chapter.
Post Hoc Analysis

Hypothesis 1. Post hoc analysis for Hypothesis 1 consisted of a one-way analysis of variance using the CHIRS global rating to indicate level of nursing care requirement. This analysis was undertaken to compare the variation explained by the global CHIRS rating with the variation explained by a factor-type totaling of CHIRS parameters.

The initial test of Hypothesis 1 found that the CHIRS total score explained a significant amount of variation in the log of the hours of nursing care provided (adj. $R^2 = 0.1015$, $p = 0.0001$). The explanatory power of the alternate expression of CHIRS, the global rating, was assessed using a one-way analysis of variance. The results showed significant differences in the log of the hours of nursing care among the various CHIRS levels (Table 19). The mean log of the hours of nursing care is presented for each CHIRS global rating in Table 20. Tukey’s HSD test was used to determine the means between which there were significant differences (Table 21). The mean of the log of hours of nursing care for CHIRS Level 4 fell between the means for Levels 2 and 3. The Tukey HSD test revealed

Table 12. Analysis of Variance of the Log of Direct Hours of Nursing Care for the Four Global CHIRS Rating Levels.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3</td>
<td>3.40</td>
<td>1.13</td>
<td>10.55*</td>
</tr>
<tr>
<td>Within</td>
<td>233</td>
<td>25.07</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>236</td>
<td>28.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 0.1196$

*$p = 0.0001$
Table 20. Mean of the Log of Direct Hours of Nursing Care for the Four Global CHIRS Rating Levels.

<table>
<thead>
<tr>
<th>CHIRS Level</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>0.4446</td>
</tr>
<tr>
<td>2</td>
<td>101</td>
<td>0.7589</td>
</tr>
<tr>
<td>3</td>
<td>115</td>
<td>0.9410</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>0.8156</td>
</tr>
</tbody>
</table>

Table 21. Results of the Tukey's HSD Test for the Log of Direct Hours of Nursing Care Among the Four Global CHIRS Rating Levels (df 233).

<table>
<thead>
<tr>
<th>Comparison Between CHIRS Global Levels</th>
<th>Simultaneous Lower Confidence Limit</th>
<th>Simultaneous Upper Confidence Limit</th>
<th>Difference Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2</td>
<td>-0.595</td>
<td>-0.032</td>
<td>-0.314*</td>
</tr>
<tr>
<td>1 - 3</td>
<td>-0.776</td>
<td>-0.216</td>
<td>-0.496*</td>
</tr>
<tr>
<td>1 - 4</td>
<td>-0.741</td>
<td>-0.000</td>
<td>-0.371*</td>
</tr>
<tr>
<td>2 - 3</td>
<td>-0.297</td>
<td>-0.066</td>
<td>-0.182*</td>
</tr>
<tr>
<td>2 - 4</td>
<td>-0.326</td>
<td>0.212</td>
<td>-0.056</td>
</tr>
<tr>
<td>3 - 4</td>
<td>-0.142</td>
<td>0.393</td>
<td>0.125</td>
</tr>
</tbody>
</table>

*Comparisons significant at 0.05

that the Level 4 mean did not significantly differ from either Level 2 or Level 3. All other comparisons were significant.

In other words, the lower three global ratings all had incremental means which were significantly different from one another, while Level 4 was not incremental and did not differ significantly from either Level 2 or Level 3. The possible impact of the small number of Level 4 global ratings on this outcome is discussed in Chapter 5.

**Hypothesis 2.** Hypothesis 2 was not supported by the data. No post hoc analysis was done for Hypothesis 2.
Hypothesis 3. Post hoc analysis was undertaken to assess (a) whether using only active nursing diagnoses instead of all nursing diagnoses (active, potential, and health promotion) influenced the amount of variation explained in hours of nursing care, (b) whether using number of nursing diagnoses explained as much variation in hours of nursing care as did presence or absence of each diagnosis, and (c) which variables entered into a regression model developed using a stepwise regression procedure.

These analyses will be presented in the order listed.

1. A multiple regression was run to assess whether using only active nursing diagnoses instead of all nursing diagnoses (active, potential, and health promotion) influenced the amount of variation explained. The log of the hours of care provided by the nurse was regressed on nursing diagnoses (entered as 39 dichotomous variables), referral source (4 referral sources entered as a set of 3 indicator variables), and initial payment source (7 payment sources entered as a set of 6 indicator variables). The sample for this test was 232 patients since case managers' failure to note active, potential, or health promotion for 10 diagnoses resulted in 5 patients being dropped. The regression resulted in an adjusted $R^2$ of 0.2290, $p = 0.0001$. Therefore, using all nursing diagnoses (active, potential, and health promotion) explained about 4% more variation in hours of care provided by the nurse than did using only active nursing diagnoses.
2. In order to assess whether using number of nursing diagnoses explained as much variation in hours of nursing care as presence or absence of each diagnosis, a multiple regression was run substituting the number of nursing diagnoses for the 40 dichotomous nursing diagnoses variables. The log of the hours of care provided by the nurse was regressed on number of nursing diagnoses, referral source (4 referral sources entered as 3 indicator variables), and initial payment source (7 payment sources entered as 6 indicator variables). The regression resulted in an adjusted $R^2$ of 0.1889, $p = 0.0001$. Therefore, using number of nursing diagnoses instead of presence or absence of each nursing diagnosis in the regression equation explained 8% less variation in hours of nursing care.

A further comparison in magnitude of explanation by number of nursing diagnoses versus presence or absence of nursing diagnosis was made by running two regressions with nursing diagnosis only (without referral source and initial payment source). For one regression, the log of the hours of care provided by a nurse was regressed on number of nursing diagnoses, producing an adjusted $R^2$ of 0.1642, $p = 0.0001$. For the other regression, the log of the hours of care provided by a nurse was regressed on nursing diagnosis entered as 39 dichotomous variables. The nursing diagnoses related to family planning was not included since that diagnosis occurred only one time in the sample and that time was as a potential, not an active, diagnosis. This regression resulted in an adjusted $R^2$ of 0.2474, $p = 0.0001$. Therefore, use of the presence or absence of each nursing diagnosis
rather than number of nursing diagnoses in the regression equation resulted in 9% more variation in hours of nursing care being explained.

It should be noted that the regression with only the presence or absence of each of the 39 nursing diagnoses produced an $R^2$ of 0.2474, which is nearly identical to the regression with presence or absence of each of the 39 nursing diagnoses plus the referral source and initial payment source ($R^2 = 0.2506$). Therefore, use of referral source and initial payment source did not add substantially to the explanation of variation in hours of nursing care beyond variation explained by nursing diagnoses.

3. Three stepwise regressions were run on the nursing diagnoses (active, potential, and health promotion) to determine which nursing diagnoses would enter models of significant predictors for this sample and two subsets of the sample. The patient factors of referral source and payment source could not be included in the stepwise procedure since they were represented in the regressions as dummy coded group variables. The dependent variable was the log of the hours of care provided by the nurse.

The first forward inclusion stepwise regression analysis was conducted on the full sample ($N = 237$). The nine nursing diagnoses that entered the model are presented in Table 22.

Another forward inclusion stepwise regression analysis was conducted for the subset of the sample that received only nursing
care (N = 171). The results of this procedure are summarized in Table 23.

Table 22. Summary of Forward Inclusion Stepwise Regression for Nursing Diagnoses for Full Sample (N = 237).

<table>
<thead>
<tr>
<th>Step</th>
<th>Nursing Diagnosis</th>
<th>R²</th>
<th>R² Change</th>
<th>F*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Emotional Stability</td>
<td>0.0836</td>
<td>0.0836</td>
<td>21.4485</td>
</tr>
<tr>
<td>2</td>
<td>Sleep and Rest Pattern</td>
<td>0.0718</td>
<td>0.1554</td>
<td>19.8945</td>
</tr>
<tr>
<td>3</td>
<td>Prescribed Medical Regimen</td>
<td>0.0333</td>
<td>0.1888</td>
<td>9.5754</td>
</tr>
<tr>
<td>4</td>
<td>Integument</td>
<td>0.0290</td>
<td>0.2177</td>
<td>8.5916</td>
</tr>
<tr>
<td>5</td>
<td>Pain</td>
<td>0.0177</td>
<td>0.2354</td>
<td>5.3365</td>
</tr>
<tr>
<td>6</td>
<td>Caretaking/Parenting</td>
<td>0.0150</td>
<td>0.2504</td>
<td>4.6103</td>
</tr>
<tr>
<td>7</td>
<td>Neighborhood/Workplace Safety</td>
<td>0.0156</td>
<td>0.2660</td>
<td>4.8588</td>
</tr>
<tr>
<td>8</td>
<td>Human Sexuality</td>
<td>0.0161</td>
<td>0.2821</td>
<td>5.1094</td>
</tr>
</tbody>
</table>

*p < 0.05

Table 23. Summary of Forward Inclusion Stepwise Regression for Nursing Diagnoses for Patients Who Received Nursing Care Only (N = 171).

<table>
<thead>
<tr>
<th>Step</th>
<th>Nursing Diagnosis</th>
<th>R²</th>
<th>R² Change</th>
<th>F*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physical Activity</td>
<td>0.0676</td>
<td>0.0676</td>
<td>12.2513</td>
</tr>
<tr>
<td>2</td>
<td>Interpersonal Relationships</td>
<td>0.0574</td>
<td>0.1250</td>
<td>11.0171</td>
</tr>
<tr>
<td>3</td>
<td>Sleep and Rest Patterns</td>
<td>0.0380</td>
<td>0.1629</td>
<td>7.5727</td>
</tr>
<tr>
<td>4</td>
<td>Bowel Function</td>
<td>0.0341</td>
<td>0.1970</td>
<td>7.0474</td>
</tr>
<tr>
<td>5</td>
<td>Spiritual Distress</td>
<td>0.0320</td>
<td>0.2290</td>
<td>6.8494</td>
</tr>
<tr>
<td>6</td>
<td>Integument</td>
<td>0.0265</td>
<td>0.2555</td>
<td>5.8315</td>
</tr>
<tr>
<td>7</td>
<td>Income</td>
<td>0.0237</td>
<td>0.2792</td>
<td>5.3565</td>
</tr>
<tr>
<td>8</td>
<td>Caretaking/Parenting</td>
<td>0.0222</td>
<td>0.3014</td>
<td>5.1557</td>
</tr>
</tbody>
</table>

*p < 0.05

A final forward inclusion stepwise regression analysis was conducted for the subset of the sample that received both nursing and home health aide care (N = 66). The results of this stepwise procedure are summarized in Table 24.
Table 24. Summary of Forward Inclusion Stepwise Regression for Nursing Diagnoses for Patients Who Received Both Nursing and Home Health Aide Care (N = 66).

<table>
<thead>
<tr>
<th>Step</th>
<th>Nursing Diagnosis</th>
<th>R²</th>
<th>R² Change</th>
<th>F*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sleep and Rest Patterns</td>
<td>0.1541</td>
<td>0.1541</td>
<td>11.6619</td>
</tr>
<tr>
<td>2</td>
<td>Emotional Stability</td>
<td>0.0829</td>
<td>0.2370</td>
<td>6.8443</td>
</tr>
<tr>
<td>3</td>
<td>Respiration</td>
<td>0.0516</td>
<td>0.2886</td>
<td>4.4995</td>
</tr>
<tr>
<td>4</td>
<td>Speech and Language</td>
<td>0.0480</td>
<td>0.3367</td>
<td>4.4182</td>
</tr>
</tbody>
</table>

Sleep and rest patterns appeared in the stepwise regression for the full sample and both subsets (Table 25). Three other diagnoses occurred both in the full sample and one of the subsets (emotional stability, integument, and caretaking/parenting). Seven nursing diagnoses appeared in either the nurse only subset (physical...
activity, interpersonal relationships, bowel function, spiritual distress, and income) or the subset receiving both nursing and home health aide care (respiration and speech and language).

**Hypothesis 4.** The limited sample size provided inadequate power to test this hypothesis. No post hoc analysis was done.

**Hypothesis 5.** The test of Hypothesis 5 found that patients of expert nurses consumed the same amount of nursing resources measured as hours of nursing care time as did patients of nonexpert nurses. Post hoc analysis using additional parameters revealed that patients of expert and nonexpert nurses differed significantly in regard to length of visit, number of visits, number of nursing diagnoses, number of funding sources, and age of patient (Table 26).

**Table 26.** t Test for Differences Between Patients of Expert Nurse Case Managers and Patients of Nonexpert Nurse Case Managers.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Patients of Expert Nurse Case Managers (N = 50)</th>
<th>Patients of Nonexpert Nurse Case Managers (N = 165)</th>
<th>t(†)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours of Direct Nursing Care</td>
<td>Mean 9.46 SD 7.50</td>
<td>Mean 10.32 SD 14.87</td>
<td>0.55</td>
</tr>
<tr>
<td>Length of Visit</td>
<td>0.74 0.36</td>
<td>0.70 0.33</td>
<td>-2.26*</td>
</tr>
<tr>
<td>Numbers of Visits</td>
<td>27.46 25.57</td>
<td>51.38 54.32</td>
<td>16.01*</td>
</tr>
<tr>
<td>Length of Stay in Days</td>
<td>66.26 75.62</td>
<td>72.59 91.44</td>
<td>0.44</td>
</tr>
<tr>
<td>CHIRS Total Score</td>
<td>25.02 4.14</td>
<td>25.16 4.16</td>
<td>0.21</td>
</tr>
<tr>
<td>Number of Nursing Diagnoses</td>
<td>6.80 4.22</td>
<td>8.19 4.21</td>
<td>2.05*</td>
</tr>
<tr>
<td>Patient Age</td>
<td>62.76 22.02</td>
<td>69.93 17.28</td>
<td>2.11*</td>
</tr>
</tbody>
</table>

(†) special form of t test used when warranted due to unequal variances
*p < 0.05
The 0.04 hour (2 minutes) difference in length of visit is statistically significant but too small to be of clinical interest. Patients of expert nurse case managers did receive significantly fewer visits than patients of non-expert nurse case managers and had significantly fewer nursing diagnoses. The large standard deviations for number of visits and hours of direct nursing care indicate great variability within both groups of patients in terms of resource consumption. Means are less representative when the variability is so great, so these differences must be interpreted with caution. The mean age of patients of nonexpert nurses was 7 years greater than the mean age of patients of expert nurses. This difference may be an artifact of this sample since patients are not assigned systematically based on expertise of the nurse case manager. The greater age of patients of nonexpert nurses may help explain the larger number of visits received.

**Hypothesis 6.** The initial hypothesis test was not significant. No post hoc analysis was done for Hypothesis 6.

**Hypothesis 7.** Post hoc analysis was undertaken to determine whether using number of nursing diagnoses explained as much variation in the CHIRS total scores as did presence or absence of each diagnosis.

CHIRS total score was regressed on the dichotomous entry of the 39 nursing diagnoses resulting in an \( R^2 \) of 0.4787, \( p = 0.0001 \) (adjusted \( R^2 = 0.3755, p = 0.0001 \)). The CHIRS total score was then regressed on the number of nursing diagnoses producing an \( R^2 \) of
0.4190, p = 0.0001 (adjusted $R^2 = 0.4165$, p = 0.0001). Therefore, use of the presence or absence of each nursing diagnosis explained 6% more variation in the CHIRS total score than did the use of number of nursing diagnoses.

For comprehensiveness, a variety of models were checked changing one parameter at a time. The regression with only presence or absence of each nursing diagnosis produced an adjusted $R^2$ of 0.3755, which is nearly identical to the $R^2$ of 0.3863 obtained for the regression that included referral source and initial payment source in addition to the dichotomous entry of each nursing diagnosis. Therefore, use of only presence or absence of each nursing diagnosis explained essentially as much variation in CHIRS total score as did including referral source and initial payment source with the dichotomous entry of each diagnosis.

Test of the Whole Model. A multiple regression was run to assess whether variation in hours of nursing care was explained by considering nursing care requirements, patient factors, and nurse factors in one equation. The log of the hours of care provided by the nurse was regressed on nursing diagnoses (entered as 39 dichotomous variables), referral source (4 referral sources entered as a set of 3 indicator variables), initial payment source (7 payment sources entered as a set of 6 indicator variables), the CHIRS total score, and the expert status of the nurse (entered as a dichotomous variable). The regression resulted in an adjusted $R^2$ of 0.2630,
p = 0.0001 (Table 27). Therefore, the whole model explained slightly more variation than did the model with nursing diagnoses only.

Table 27. Regression Analysis for the Log of the Sum of Direct Hours of Nursing Care Regressed on Nursing Diagnosis, Referral Source, Payment Source, CHIRS Total Score, and Expert Status of the Nurse.

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>50</td>
<td>11.9337</td>
<td>0.2387</td>
<td>2.684*</td>
</tr>
<tr>
<td>Error</td>
<td>186</td>
<td>16.5396</td>
<td>0.0889</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>236</td>
<td>28.4733</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R² = 0.4191    Adj R² = 0.2630
*p = 0.0001

(adjusted R² = 0.2474, p = 0.0001). Four nursing diagnoses and the CHIRS total score were the variables that had beta weights significant at or below the 0.10 level (Table 28).

Table 28. Variables with Significant Beta Weights (p < 0.10) for the Regression of the Log of the Sum of Direct Hours of Nursing Care Regressed on Nursing Diagnosis, Referral Source, Payment Source, CHIRS Total Score, and Expert Status of the Nurse.

<table>
<thead>
<tr>
<th>Variable</th>
<th>#</th>
<th>b</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Sexuality</td>
<td>4</td>
<td>0.3769</td>
<td>0.2100</td>
</tr>
<tr>
<td>Integument</td>
<td>126</td>
<td>0.0718</td>
<td>0.0432</td>
</tr>
<tr>
<td>Sleep and Rest Patterns</td>
<td>30</td>
<td>0.2587</td>
<td>0.0701</td>
</tr>
<tr>
<td>Technical Procedure</td>
<td>71</td>
<td>0.0952</td>
<td>0.0497</td>
</tr>
<tr>
<td>CHIRS Total Score</td>
<td>237</td>
<td>0.0130</td>
<td>0.0067</td>
</tr>
</tbody>
</table>

Differences Between Patients Receiving Only Nursing Care and Those Receiving Nursing and Home Health Aide Care. Because some of the hypotheses examined amount of care for those who received both nursing and home health aide care, that subset of the sample was
examined for differences from the subset receiving only nursing care. The two groups of patients were found to have significantly different means for hours of nursing care, number of nursing visits, length of stay on the caseload, CHIRS total score, number of funding sources, and age (Table 29). In addition, chi-square analyses were significant for gender \( (\chi^2_{(1)} = 4.39, p = 0.036) \), whether Medicare was the initial payment source \( (\chi^2_{(1)} = 17.77, p = 0.000) \), and the reason for discharge from caseload \( (\chi^2_{(3)} = 16.30, p = 0.001) \).

Table 29. t Test for Differences Between Patients Receiving Only Nursing Care and Those Receiving Both Nursing and Home Health Aide (HHA) Care.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Nursing Only (N = 171)</th>
<th>Nursing &amp; HHA (N = 66)</th>
<th>t(†)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours of Direct Nursing Care</td>
<td>8.47 7.59</td>
<td>14.19 21.35</td>
<td>2.13*</td>
</tr>
<tr>
<td>Length of Visit</td>
<td>0.71 0.38</td>
<td>0.71 0.30</td>
<td>0.28</td>
</tr>
<tr>
<td>Number of Nursing Visits</td>
<td>21.62 21.80</td>
<td>87.49 60.23</td>
<td>38.10*</td>
</tr>
<tr>
<td>Length of Stay in Days</td>
<td>57.75 74.14</td>
<td>101.89 111.09</td>
<td>2.98*</td>
</tr>
<tr>
<td>CHIRS Total Score</td>
<td>24.91 4.15</td>
<td>26.11 3.92</td>
<td>2.01*</td>
</tr>
<tr>
<td>Number of Nursing Diagnoses</td>
<td>7.65 4.01</td>
<td>8.82 4.61</td>
<td>1.92</td>
</tr>
<tr>
<td>Number of Funding Sources</td>
<td>1.36 0.54</td>
<td>1.89 0.81</td>
<td>4.99*</td>
</tr>
<tr>
<td>Patient Age</td>
<td>66.08 20.32</td>
<td>75.76 9.88</td>
<td>4.91*</td>
</tr>
</tbody>
</table>

(†) special form of t test used when warranted due to unequal variances

*p < 0.05

Summary

The 237 discharged patients whose records made up the study sample were primarily white, female, and age 60 or older. More than one-fourth of the patients were more than 80 years of age. The
subjects had an average of 8 nursing diagnoses each. Sixty-seven percent were referred from an acute care institution. Seventy-one percent had Medicare as the payment source for their first home health care visit. The mean total nursing care time was 10.1 hours (SD 13.1) per patient while the mean total home health aide care time was 16.24 hours (SD 21.7) per patient who received home health aide care.

The mean total CHIRS score was 25.24. The greatest number of patients were rated at CHIRS global Level 3 (48%), with fewer at Level 2 (43%) and the smallest portions at Level 1 (4%) and Level 4 (5%).

There were two subsets to the sample: (a) those who received only nursing care, and (b) those who received nursing care and home health aide care. Patients in this study who received both nursing and home health aide care were as a group older and more likely to be women, to have a higher CHIRS total score, to have a greater number of funding sources, to have Medicare as a funding source for their initial visit, and to be discharged from the caseload to an institution or due to death. These patients as a group received more hours of nursing care and more nursing visits, and were on the caseload longer.

The 29 nurse case managers in this study were all female and had a mean age of 40 years. Eight of the 29 nurses were named as expert by three or more of their peers. Approximately three-fourths of both experts and nonexperts held baccalaureate degrees in nursing
as their highest degree. The expert nurses had significantly more home health care experience than the nonexperts.

Nursing care requirements explained a significant amount of variation in nursing resource consumption measured as total direct time provided by a nurse, but not when resource consumption was measured as total direct time provided by a home health aide.

Patient factors explained variation in nursing resource consumption measured as total direct care time provided by the nurse, but the number of patients receiving home health aide care was too limited to adequately assess variation in total care time provided by a home health aide. Post hoc analyses revealed that using presence or absence of all nursing diagnoses (active, potential, and health promotion) explained more variation than either active nursing diagnoses only or use of number of nursing diagnoses instead of presence or absence of each diagnosis. For comprehensiveness, a variety of models were checked by changing one parameter at a time, revealing that use of presence or absence of each nursing diagnosis was the model explaining the most variation in hours of nursing care consumed. Adding referral source and initial payment source did not explain additional variation in hours of nursing care beyond that explained by nursing diagnoses.

Eight nursing diagnoses entered a stepwise regression procedure for the sample of 237 patients. Common occurrence of a nursing diagnosis in the sample did not coincide with variation explained,
with only three of the 15 most common nursing diagnoses entering the stepwise regression.

Status of the nurse case manager as expert was not significantly related to either nursing care requirements or nursing resource consumption.

In examination of the relationship between nursing care requirements and patient factors, it was found that nursing diagnoses significantly explained variation in CHIRS total score. Inclusion of referral source and initial payment source did not add to the variation explained.

The whole model was tested in one regression with nursing care requirements, expert status of the nurse, nursing diagnoses, referral source and initial payment source entered as independent variables. Only 2% more variation in hours of nursing care consumed was explained using the whole model than was explained by use of the model with only presence/absence of each nursing diagnosis.
CHAPTER 5  SUMMARY AND CONCLUSIONS

Summary

This exploratory retrospective study addressed the research question:

What are the relationships among nursing care requirements, selected patient factors, selected nurse factors, and nursing resource consumption in home health care?

The data indicated that both nursing care requirements and patient factors in the form of nursing diagnosis explained a significant amount of variation measured as direct hours of nursing care for home health patients. The patient factors of referral source and initial payment source did not add substantially to the amount of variation in hours of nursing care that was explained by nursing diagnoses. Nor was the nurse factor expertise related to either nursing care requirements or hours of nursing care consumed. Nursing diagnosis was the patient factor that explained the greatest variation in nursing care requirements.

Nursing care requirements did not explain variation in hours of home health aide care. The test of whether patient factors explain variation in hours of home health aide care was not significant but lacked sufficient power to be an adequate test.

Nursing care requirements, nursing diagnosis, referral source, initial payment source, and expert status of the nurse as case manager were entered into a single regression equation to assess
whether entering all variables at one time influenced the amount of variation in nursing resources consumed. Two percent more variation was explained with this equation than with presence or absence of nursing diagnosis alone. Four nursing diagnoses and the CHIRS total score were the variables in the equation with beta weights significant at the 0.10 level.

Discussion

The provision of nursing care in the home health setting involves the interaction of multiple personal, interpersonal, and social systems. Figure 1 in Chapter 2 depicts the home health agency as a social system open to the environment.

This study was designed to provide new information about (a) patient need for care at the time of entry into the home health agency and how that need relates to the system output (measured as resource consumption) and (b) system input (measured as the nurse factor expertise) and how that input relates to the throughput process of assessing need as well as the output measure of resource consumption (Figure 1, page 16).

Two methods of identifying patients' nursing needs were used in this study: the Community Health Intensity Rating Scale (CHIRS), which classifies patients according to level of need, and patient factors which do not lead to a classification (nursing diagnosis, referral source, and initial payment source). Patient classification as an index of need will be discussed first followed by discussion of
the use of nonclassificatory patient factors and then the two will be compared. The nurse factor expertise as a system input will then be discussed followed by discussion of the measurement of resource consumption.

**Patient Classification**

Classifying any phenomenon according to levels of intensity requires a rather specific understanding of the phenomenon and what constitutes more or less of it. Nursing is a complex phenomenon that requires intellectual as well as physical processes. Not all nursing is visible to an observer and not all nursing care is done in the patient’s presence. The complexity of classifying nursing care requirements may be the major reason why it has only recently been undertaken. The goal of the CHIRS tool used in this study to indicate intensity of nursing need is to classify patients into mutually exclusive categories that may have quantitative coefficients attached (Peters, 1987).

The ability to classify patients according to intensity of need at the time of admission would be a very powerful tool for the home health system. Such a classification could be used internally to adjust nurses’ caseloads for equity as well as assess whether patients who need the most care are getting the most care. In addition, the classification could be a useful tool in negotiating with reimbursement sources. It is essential that patient need be considered in allocating resources to avoid a self-perpetuating cycle in which today’s patterns of care delivery become the standard for
amount of care to be reimbursed. And classifying patients relative
to one another with descriptive definitions of each level is an
easily interpretable technique.

In this study, the CHIRS total score explained about 10% of the
variation in the hours of nursing care consumed. Peters (1987) in
her validation study for the CHIRS tool found a correlation between
global CHIRS ratings and nursing visits \( (r = 0.24, p = .000) \) and
between global CHIRS ratings and intensity of nursing visits
\( (r = 0.21, p = .000) \). Squaring these correlation coefficients would
result in \( R^2 \) values of 0.0576 and 0.0441 respectively. The greater
variation explained in this study may be due to the fact that the
CHIRS tool has been refined since Peters' initial application.
Another difference is that Peters applied the tool using all visits
during the length of stay instead of the two initial visits used in
this study. Also, this analysis used a total CHIRS score obtained by
summing the parameter ratings, giving a greater range of scores than
the global CHIRS ratings of 1-4 used by Peters. In addition, this
analysis used direct hours of nursing care as the measure of resource
consumption instead of nursing visits or intensity of nursing visits
used by Peters.

The \( R^2 \) of 0.1070 between CHIRS total scores and hours of
nursing care in this study compares favorably with the relationship
Ballard and McNamara (1983) found between a patient's score on their
Health Status Scale and number of nursing visits per day \( (r = 0.3079,
p < 0.001) \).
This patient sample, although having adequate power to test the hypotheses regarding hours of nursing care consumption, provided a distribution of global CHIRS ratings with only 10 patients in Level 1 (4% of sample) and 11 patients in Level 4 (5% of sample). With such small numbers of patients at these two outer levels, one or two outlier patients could affect the mean hours of care for that level. This may well be why the CHIRS Level 4 mean for the hours of care consumed was less than for Level 3 and did not differ significantly from the means for either Level 2 or Level 3. Peters found 4% of the patients in her study were at Level 4. If 4-5% is representative of Level 4, a large sample of patients would be needed to get an adequate number of patients at Level 4 to provide a stable mean.

In summary, this study is the first to assess nursing needs of home health patients using an intensity scale outside the validation study done by Peters (1987). This study found that more than 90% of the patients were at the moderate or major levels of intensity. These two middle levels of intensity exhibited wide variation in hours of direct nursing care received at each level. In addition, the CHIRS total scores for these intensity levels overlapped although the means were incremental and significantly different. Therefore, based on the findings of this study, the only tool presently available to assess nursing intensity of home health patients, despite content validity and acceptable reliability, does not produce classifications that are significantly discrete to differentiate
among patients based on amount of direct hours of nursing care received.

The limitations of direct hours of nursing care as the measure of resource consumption are discussed in a later section.

**Patient Factors Not Leading to Classification**

The use of nonclassificatory patient factors to explain nursing resource consumption is an acceptable technique since regressions assess correlation and do not imply causation. Nurse administrators in home health care need information to help them predict the amount of care that patients are likely to receive within the present reimbursement system and other constraints. Caution must be exercised, however, so that predictors of resource consumption do not simply perpetuate the current system of care delivery without consideration of the element of need.

Rather than reconfigure data already being assessed in the CHIRS rating, three patient factors were selected. Nursing diagnosis was selected to indicate patient health problems, referral source was selected to indicate whether point of referral indicates volume of care consumed, and initial payment source was selected to assess whether source of initial reimbursement indicates volume of care consumed.

**Referral Source.** Referral source did not add significantly to the variation explained in any of the regressions. Therefore, patients from clinics, doctors' offices, and other referral sources need as much care as do patients dismissed from acute care settings.
This is important data because earlier dismissals from hospitals have been described as sending patients home "quicker and sicker." Those patients may require a different intensity of care rather than a different total amount of care.

Initial Payment Source. Initial payment source did not add significantly to the variation explained in any of the regressions. Since 71% of the patients had Medicare as their initial payment source, there may not have been enough variation to affect prediction. Number of payment sources may be a better indicator for total amount of care since patients who have private insurance or ability to pay privately may be able to extend the amount of care they receive.

Nursing Diagnosis. Nursing diagnosis is the labeling of patient problems amenable to intervention by the nurse. The labeling process does not produce mutually exclusive groupings of patients. Patients are likely to have multiple nursing diagnoses (the mean for this patient sample was 8), and the diagnoses occur in widely varying constellations. Nursing diagnoses are not all independent of one another; for example, a patient with the diagnosis of impaired dentition may well also have the nursing diagnosis of impaired medical/dental supervision.

The presence or absence of the nursing diagnoses (active, potential, and health promotion) were the data that in this study explained the greatest amount of variation in hours of nursing care consumed. This greater explanatory power may be due in part to the
fact that, although the listing of nursing diagnoses was retrieved from the patient record, the judgement on which diagnoses were present was made by the nurse who cared for the patient. The CHIRS rating, on the other hand, was made by the researcher from data provided by the nurse in the chart.

Number of nursing diagnoses was found to explain a smaller but still significant proportion of the variation in hours of nursing care consumed. Using number of nursing diagnoses gives every nursing diagnosis equal weight and does not allow for differences in patterns of diagnoses that occur together. Still it may be the easiest indicator to use at the present time. Active nursing diagnoses explained less variation than all nursing diagnoses (active, potential, and health promotion), indicating that potential and health promotion diagnoses influence intervention time.

Three forward inclusion stepwise regressions were done, one on the full sample and two on the subsets distinguished by whether or not the patient received home health aide care. The nursing diagnoses that entered into the stepwise regressions were those that added significantly to the explanation of the variation in hours of nursing care consumed. Fifteen nursing diagnoses entered into one or more of the regressions with the eight steps in the full sample regression producing the largest model. Nursing diagnoses from all four of the OCS domains (environmental, psychosocial, physiological, and health behaviors) entered into the regressions.
While the nursing diagnoses that entered the stepwise regressions were significant for this sample, care must be taken in generalizing. Glick (1987), for example, found that nursing diagnoses varied within the same sample depending on the measure of resource consumption.

Another reason to be cautious in considering nursing diagnoses identified in the stepwise regressions is that these nursing diagnoses explain variation in resource consumption and do not necessarily explain which nursing diagnoses require the most nursing care time. Neuro-musculo skeletal (NMS) function, for example, was the most frequently named nursing diagnosis in this study, being identified for 176 patients. NMS function would therefore seem to be a diagnosis that would require nursing time but it does not enter the stepwise regressions as a significant indicator of variation in nursing time provided.

The diagnoses that did enter the stepwise regressions can be understood in light of variation of time required. Emotionally unstable patients, regardless of their other nursing problems, are likely to require more care time, and emotional stability entered at the first step for both the sample as a whole and for the subset receiving both nursing and home health aide care.

Sleep and rest pattern disturbances was the only diagnosis to enter all three stepwise regressions. This diagnosis could be understood in the context of sicker patients having more problems in
resting or patients with disturbed rest patterns taking longer to care for.

The finding that nursing diagnosis using any of several measurements was the single best predictor of nursing resource consumption is consistent with Halloran's (1985) analysis of nursing workload prediction for the acute care setting. He found that nursing diagnoses explained more variation in daily nursing workload than did demographic characteristics and twice as much variation as medical condition. The finding in the present study of the importance of nursing diagnosis in understanding resource consumption also supports the need for further study of this relationship which is cited in the literature (Glick, 1987; Harris, Parente, Smith, & Yuan, 1988; Parente, 1988; Peters, 1983a).

The relationship between nursing diagnosis and nursing care requirements was assessed. Hinshaw (1989) has cited the identification of this relationship as one of the recurring issues in researching nursing care requirements. In this study the presence or absence of each nursing diagnosis explained approximately 39% of the variation in the CHIRS total score, so there is a significant relationship between nursing care requirements and nursing diagnoses. However, 61% of the variation in CHIRS total score is due to other factors. CHIRS is designed to assess (a) not the patient alone but the patient with the support system (except for physiological parameters) and (b) nursing interventions. This analysis supports
CHIRS as capturing elements of nursing care requirements in addition to nursing diagnosis.

Use of Classification Versus Nonclassificatory Factors

Although presence or absence of the various nursing diagnoses explained greater variation in nursing resource consumption than the CHIRS total score, the data on diagnoses are more difficult to use as a management tool. Constellations of nursing diagnoses vary from patient to patient, and although the model as a whole explains significant variation, it is hard to know which combinations of nursing diagnoses are related to the most care given. The stepwise regressions identified specific nursing diagnoses for further exploration but regressions stress unique variation and the nursing diagnoses are not all independent of one another. Multicollinearity among the diagnoses must be considered.

An index of nursing care requirements, on the other hand, is more easily used by management. If intensity of care requirement is specified relative to other patients, then differences in nursing care hours among patients are more easily projected for staff assignment (Adams & Duchene, 1985; Ayedelotte, 1973; Giovannetti, 1986). In addition, policy makers and reimbursement sources appreciate indexes that make complex care more interpretable (Haas, 1988). However, an intensity rating scale based on patient need has not been available in home health care (Peters, 1987).

If intensity of care need could be projected at time of admission, the nurse administrator could project the system input
staffing needs on an ongoing basis instead of depending on historical
trends. Management decisions could be made based on current
patients' needs instead of historical data. The CHIRS tool explained
a significant but limited amount of variation in nursing resource
consumption in this study. More work is needed to refine
definitions. More precision might be obtained by having the nurse
case manager apply CHIRS instead of relying on secondary
interpretation of recorded data.

System Input: Nurse Factor Expertise

This study was also designed to provide new information about
one input into the home health agency system, the expertise of the
nurse. Although the expert nurses and nonexpert nurses in this study
did not differ significantly in regard to total nursing experience,
the expert nurse case managers had significantly more home health
care experience than those rated nonexpert.

This finding is consistent with Benner's contention that
expertise is a result of opportunity in a given practice setting.
Expertise relates to a particular area of practice and is not a
generalized trait. In addition, time is a necessary but not
sufficient element in acquiring expertise (Benner, 1984).

The data from this study indicate that the total hours of
direct care provided by nurses in home health care does not differ
significantly according to expertise of the nurse. Occasionally a
nurse other than the nurse case manager provided care for some
patients but expert status of the nurse was identified on a per patient, not per visit, basis. Therefore, the measure of care may not be exact in terms of whether provided by an expert or nonexpert nurse.

It may be that differences in the care provided by experts in home health care relate more to qualitative measures than to quantitative measures. The differences might also be more apparent in indirect care time (planning, charting, coordinating) than in direct hours of nursing care.

The nurse-patient interaction described by King (1981) as the base for nursing care underlies the models which explain greatest variation in resource consumption in this study of home health care. Although expert status of the nurse neither explained variation in care consumed nor related to level of nursing care requirements of patients in the study, the judgement of the nurse proved to be integral in explaining variation in resource consumption. It is the nurse's judgement that determines which nursing diagnoses are present. It is the nurse who assesses and documents the patient's status, which in turn serves as a basis for determining level of nursing care requirement. Nursing diagnosis and nursing care requirements were the two variables that contributed explanation of variation in resource consumption in the various models.

Measurement of Resource Consumption

The output measure selected for this study was nursing resource consumption because of the importance of such data to the decision
making that contributes to agency survival. The literature reports studies that use number of visits, visit intensity, or length of service as measures of resource consumption (Ballard & McNamara, 1983; Glick, 1987; Harris, Peters, Smith & Yuan, 1987; Pasquale, 1987; Peters, 1987) but direct hours of nursing care in the home had not been assessed. The value of direct hours of care as a measure of resource consumption is that it is readily available for most care provided in the home and reflects the amount of direct interaction with the patient and/or family. Its limitations include the fact that nursing is a complex phenomenon that is not all completed in the presence of the patient. Planning, referral, coordination, and some aspects of evaluation are often done away from the patient. Variation in the amount of these indirect care activities is not reflected in the total number of direct hours of care.

It may be that levels of nursing care requirements relate more to variation in the complexity of care required than to the volume of direct hours of care consumed. The assumption that the most time-consuming care is the most complex has been challenged (Haas, 1988) if level of nursing care requirements relates more to complexity than to direct hours of care, then it would be important to measure the indirect time a nurse case manager spends planning and following up on care provided for each patient. Indirect time would include synthesis and judgments as well as documentation of care. Such a measure was beyond the scope of this study.
It must also be noted that factors besides nursing care requirements may affect the amount of time spent in a patient’s home. For instance, the nurse’s interest in a given type of patient problem, visitors in the home, number of visits to be made in the day, and the amenities involved in entering and exiting a patient’s home can all influence the number of direct hours of care provided.

Therefore the measure of direct hours of care time has limitations and other indicators of resource consumption may more accurately indicate the complexity of nursing care provided to home health care patients.

Implications for Future Research

Nursing Care Requirements

Further research is needed to refine and clarify measures of nursing care requirements. CHIRS is a helpful framework and it would be useful to determine whether its application by nurse case managers would explain greater variation in resource consumption than its application by a nurse not involved in the patient’s care. It would also be useful to assess whether CHIRS is more explanatory of variation in other outcome measures such as quality of care or patient satisfaction.

The CHIRS tool should be applied to a sample that has a larger number of Level 1 and Level 4 patients. This might be done by applying the tool to a larger sample from an agency such as the one
in which this study was conducted, or perhaps by obtaining a sample from an agency that does more high tech care.

Further assessment is needed regarding the amount of indirect time (planning, coordinating, documenting) required by patients with different levels of nursing care requirements. Perhaps the greater nursing care requirements of the CHIRS Level 4 patient are reflected more in planning and coordinating time than in time spent in the patient’s home.

Since the CHIRS tool explained only 10% of the variation in hours of direct nursing care, it would be useful to study whether greater variation is explained if hours of indirect nursing care time are included, or if the CHIRS is applied at the conclusion of service rather than at the beginning as in this study.

It might also be helpful to examine what criteria are involved in the nurse case manager’s decision to dismiss a patient. Does the nurse believe at dismissal that goals have been met? What are the goals at the beginning of care? Do the nurse’s perceptions and the patient’s perceptions of goals and dismissal coincide? How do they relate to the CHIRS rating and the amount of care consumed? These questions are framed recognizing that the decision to dismiss is subject to substantial environmental and agency constraints.

CHIRS could be studied as a case management tool to see whether application of the tool at time of admission increases variation in total hours of nursing care among patients at differing levels of nursing need on the nurse’s caseload.
The CHIRS tool itself might be studied to determine how the various parameters relate to both total score and global rating. A factor analysis could provide insights into a potential weighting scheme that might help decrease overlap of CHIRS total scores among the various global ratings.

The prediction of variation in hours of home health aide care requires a larger sample to test the explanatory power of the presence or absence of nursing diagnoses. Since intensity of nursing care need does not significantly explain hours of home health aide care, a different tool that examines this specific aspect of care may be needed. Such a tool might be more functionally focused with a heavy emphasis on physiological parameters.

**Patient Factors**

Further examination of the relationship between nursing diagnosis and nursing resource consumption is also needed. Nursing diagnosis, which is readily available patient data, explained a significant amount of variation in hours of direct nursing time. Some means is needed to identify constellations of nursing diagnoses that relate to volume of resource consumption. Those nursing diagnoses that contribute unique variation may not be the basic reason the patient needs a nurse.

**Nurse Factors**

Nurse expertise determined by peer nomination did not relate to either nursing care requirements or nursing resource consumption.
Further examination of expertise in home health care could focus on whether expertise is related to other outcome measures such as quality of care or patient satisfaction. The nurse case managers' views of the value of expertise might provide an important starting point.

Limitations

This study is limited by selection of the sample from one agency. Agency-specific or regional differences in health care delivery patterns may limit the generalizability of the data. However, demographic characteristics of the sample are similar to characteristics reported in other studies of home health care.

The use of secondary data is a limitation in that the records used as a data source were prepared to document care given with an eye to ensuring reimbursement. Missing data required decisions regarding coding of parameters for the CHIRS rating. In addition, nursing care requirements were based on data about the patient rather than on interaction directly with the patient. CHIRS ratings by the nurse case manager might have varied from the ratings obtained by the investigator using secondary data.

Expert status was assigned based on peer nomination, a technique used in other studies of expertise. A specific definition of expert was not provided by the investigator and conceptualizations of expert status may have varied greatly among the nurse subjects.
Conclusion

This retrospective exploratory study revealed that the only tool presently available to classify patients according to nursing care requirements in home health care explained 10% of the variation in the number of direct hours of nursing care. Efforts must continue to develop a patient classification system for home health care that reflects Haas' (1988) concerns for construct validity and a base in nursing theory, and which reflects care time needed by the patient, not just care time provided.

The model that explained the greatest amount of variation in nursing resource consumption was the presence or absence of each nursing diagnosis. This model involved dichotomous entry for the nursing diagnoses as independent variables. Referral source and initial payment source did not add to the amount of variation explained.

Nursing care requirements did not explain variation in hours of home health aide care. The test of whether patient factors explain variation in hours of home health aide care was not significant but lacked sufficient power to be an adequate test.

The dichotomous entry of nursing diagnoses explains a significant amount of variation in the CHIRS total score. Nursing diagnoses do not explain all the variation in the CHIRS total score, however, indicating that CHIRS captures additional elements of nursing care requirements.
Finally, the study found that the nurse factor expertise did not relate significantly to either nursing care requirements or nursing resource consumption in home health care.

The findings support the importance of the nurse-patient interaction in home health care but indicate that further study is needed to refine measures of nursing care requirements and determine what role these requirements have in the provision and termination of nursing care at home. Additional work is needed in defining measures of resource consumption both for use in agency management and for reimbursement. The use of nursing diagnosis holds promise as a means for predicting nursing resource consumption with further work needed in developing techniques for grouping and weighting the various diagnoses. Further work is also needed to understand what nurse factors influence the nurse-patient interaction in regard to nursing care requirements and nursing resource consumption.
REFERENCES


APPENDIX A

NURSE FACTORS SURVEY
NURSE FACTORS SURVEY

As a doctoral student in nursing at Case Western Reserve University, I am conducting a study of nursing care requirements and nursing resource consumption by home health care patients. I hope to learn how nursing care requirements and nursing resource consumption are related, and whether selected patient factors or nurse factors are related to either nursing care requirements or nursing resource consumption.

Because you are one of the case managers for patients receiving home health care through your agency during 1989, you are being asked to participate. The information you provide may help home health agencies do a better job of offering programs of care that meet patient needs.

You will be asked to provide information about your educational preparation and experience in nursing as well as limited demographic information. The information from this study will be reported as group data only. The agency will never be identified by name in any report. No one will be identified by name in this study and no information about any one individual in this study will be identifiable.

Participation is voluntary. Participation in this study will not affect your job status in any way. This study has been reviewed by the agency administration and been approved. However, no individual data will be shared with agency administrators. Only aggregate data will be reported.

Completion of the survey is your consent to participate. If you have any questions, please call me at 559-6412 during the day or 323-9579 in the evening.
NURSE FACTORS SURVEY

Because you are a nurse who provides home care for the patients in this study, I would like to ask you a few questions about your educational preparation and your experience in nursing. I will also ask you to identify the expert nurses you work with.

Nurse Code

1. What year did you graduate from your basic nursing program? (please specify year)
   19

2. What was your basic nursing preparation? (circle number)
   1 VOCATIONAL/PRACTICAL NURSING
   2 DIPLOMA IN NURSING
   3 ASSOCIATE DEGREE IN NURSING
   4 BACCALAUREATE DEGREE IN NURSING
   5 DOCTOR OF NURSING (ND)
   6 MASTERS DEGREE IN NURSING

3. What other academic degrees have you earned? (circle numbers of those that apply)
   In Nursing:
   1 DIPLOMA IN NURSING
   2 ASSOCIATE DEGREE IN NURSING
   3 BACCALAUREATE DEGREE IN NURSING
   4 MASTERS DEGREE IN NURSING
   5 DOCTORAL DEGREE IN NURSING
   6 OTHER (please specify) ________________
   7 NONE

   Other than nursing:
   1 ASSOCIATE DEGREE
   2 BACCALAUREATE DEGREE
   3 MASTERS DEGREE
   4 DOCTORAL DEGREE
   5 OTHER (please specify) ________________
   6 NONE

4. How many years have you worked as a nurse? (please specify years)
   ________________YEARS
5. How many years have you worked in home health care? (please specify years)

__________________ YEARS

6. Some nurses in every practice setting are viewed as expert nurses by their peers. They are consulted by colleagues when difficult patient situations arise. Please list the names of the expert nurses who have provided home health care here at the agency since January 1, 1989.

Finally, here are some demographic questions.

7. What year were you born? (please indicate year)

__________________ YEARS

8. What is your sex? (circle number)

   1   FEMALE
   2   MALE

9. What is your marital status? (circle number)

   1   NEVER MARRIED
   2   MARRIED
   3   DIVORCED
   4   SEPARATED
   5   WIDOWED

Your contribution to this effort is greatly appreciated. Thank you for taking time to participate.
APPENDIX B

OMAHA CLASSIFICATION SCHEME
OMAHA CLASSIFICATION SYSTEM

CLASSIFICATION OF CLIENT PROBLEMS
ADDRESSED BY COMMUNITY HEALTH NURSES

DOMAIN I. ENVIRONMENTAL

Refers to the material resources and physical surroundings of the home, neighborhood, and broader community.

01. Income:
   Health Promotion
   Potential Deficit
   Deficit
   01. low/no income
   02. uninsured medical expenses
   03. inadequate money management
   04. able to buy only necessities
   05. difficulty buying necessities
   06. other

02. Sanitation:
   Health Promotion
   Potential Deficit
   Deficit
   01. soiled living area
   02. inadequate food storage/disposal
   03. insects/rodents
   04. foul odor
   05. inadequate water supply
   06. inadequate sewage disposal
   07. inadequate laundry facilities
   08. allergens
   09. infectious/contaminating agents
   10. other

03. Residence:
   Health Promotion
   Potential Deficit
   Deficit
   01. structurally unsound
   02. inadequate heating/cooling
   03. steep stairs
   04. inadequate/obstructed exits/entries
   05. cluttered living space
   06. unsafe storage of dangerous objects/substances
   07. unsafe mats/throw rugs
   08. inadequate safety devices
   09. presence of lead based paint
   10. unsafe gas/electrical appliances
11. inadequate/crowded living space
12. other

04. Neighborhood/workplace safety:
   Health Promotion
   Potential Deficit
   Deficit
   01. high crime rate
   02. high pollution level
   03. uncontrolled animals
   04. physical hazards
   05. unsafe play area
   06. other

05. Other:
   01. other

DOMAIN II. PSYCHOSOCIAL

Refers to patterns of behavior, communications, relationships, and development.

06. Communication with community resources:
   Health Promotion
   Potential Impairment
   Impairment
   01. unfamiliar with options/procedures for obtaining services
   02. difficulty understanding roles/regulations of service providers
   03. unable to communicate concerns to service provider
   04. dissatisfaction with services
   05. language barrier
   06. inadequate/unavailable resources
   07. other

07. Social contact:
   Health Promotion
   Potential Impairment
   Impairment
   01. limited social contact
   02. uses health care provider for social contact
   03. minimal outside stimulation/leisure time activities
   04. other
08. Role change:
Health Promotion
Potential Impairment
Impairment
  01. involuntary reversal of traditional male/female roles
  02. involuntary reversal of dependent/independent roles
  03. assumes new role
  04. loses previous role
  05. other

09. Interpersonal relationship:
Health Promotion
Potential Impairment
Impairment
  01. difficulty establishing/maintaining relationships
  02. minimal shared activities
  03. incongruent values/goals
  04. inadequate interpersonal communication skills
  05. prolonged, unrelied tension
  06. inappropriate suspicion/manipulation/compulsion/aggression
  07. other

10. Spiritual distress:
Health Promotion
Potential
Actual
  01. expresses spiritual concerns
  02. disrupted spiritual rituals
  03. disrupted spiritual trust
  04. conflicting spiritual beliefs and medical regimen
  05. other

11. Grief:
Health Promotion
Potential Impairment
Impairment
  01. fails to recognize normal grief responses
  02. difficulty coping with grief responses
  03. difficulty expressing grief responses
  04. conflicting stages of grief process among family/individual
  05. other

12. Emotional stability:
Health Promotion
Potential Impairment
Impairment
  01. sadness/hopelessness/worthlessness
  02. apprehension/undefined fear
03. loss of interest/involvement in activities/self-care
04. narrowed perceptual focus
05. scattering of attention
06. flat affect
07. irritable/agitated
08. purposeless activity
09. difficulty managing stress
10. somatic complaints/chronic fatigue
11. expresses wish to die/attempt suicide
12. other

13. **Human sexuality:**
    Health Promotion
    Potential Impairment
    Impairment
    01. difficulty recognizing consequences of sexual behavior
    02. difficulty expressing intimacy
    03. sexual identity confusion
    04. sexual value confusion
    05. dissatisfied with sexual relationships
    06. other

14. **Caretaking/parenting:**
    Health Promotion
    Potential Impairment
    Impairment
    01. difficulty providing physical care/safety
    02. difficulty providing emotional nurturance
    03. difficulty providing cognitive learning experiences and activities
    04. difficulty providing preventive and therapeutic health care
    05. expectations incongruent with stage of growth and development
    06. dissatisfaction/difficulty with responsibilities
    07. neglectful
    08. abusive
    09. other

15. **Neglected child/adult:**
    Health Promotion
    Potential
    Actual
    01. lacks adequate physical care
    02. lacks emotional nurturance/support
    03. lacks appropriate stimulation/cognitive experiences
    04. inappropriately left alone
    05. lacks necessary supervision
    06. inadequate/delayed medical care
    07. other
16. **Abused child/adult:**
   Health Promotion
   Potential
   Actual
   01. harsh/excessive discipline
   02. welts/bruises/burns
   03. questionable explanation of injury
   04. attacked verbally
   05. fearful/hypervigilant behavior
   06. violent environment
   07. consistent negative messages
   08. assaulted sexually
   09. other

17. **Growth and development of child/adult:**
   Health Promotion
   Potential Impairment
   Impairment
   01. abnormal results of development screening tests
   02. abnormal weight/height/head circumference in relation to growth curve/age
   03. age inappropriate behavior
   04. inadequate achievement/maintenance of developmental tasks
   05. other

18. **Other:**
   01. other

**DOMAIN III. PHYSIOLOGICAL**

Refers to the functional status of processes that maintain life.

19. **Hearing:**
   Health Promotion
   Potential Impairment
   Impairment
   01. difficulty hearing normal speech tones
   02. absent/abnormal responses to sound
   03. abnormal results of hearing screening test
   04. other
20. **Vision:**
   Health Promotion
   Potential Impairment
   Impairment
   01. difficulty seeing small print/calibrations
   02. difficulty seeing distant objects
   03. difficulty seeing close objects
   04. absent/abnormal response to visual stimuli
   05. abnormal results of vision screening test
   06. squinting/blinkings/tearing/blurring
   07. difficulty differentiating colors
   08. other

21. **Speech and language:**
   Health Promotion
   Potential Impairment
   Impairment
   01. absent/abnormal ability to speak
   02. absent/abnormal ability to understand
   03. lacks alternative communication skills
   04. inappropriate sentence structure
   05. limited enunciation/clarity
   06. inappropriate word usage
   07. other

22. **Dentition:**
   Health Promotion
   Potential Impairment
   Impairment
   01. abnormalities of teeth
   02. sore/swollen/bleeding gums
   03. ill-fitting dentures
   04. malocclusion
   05. other

23. **Cognition:**
   Health Promotion
   Potential Impairment
   Impairment
   01. diminished judgement
   02. disoriented to time/place/person
   03. limited recall of recent events
   04. limited recall of long past events
   05. minimal calculating/sequencing skills
   06. limited concentration
   07. minimal reasoning/abstract thinking ability
   08. impulsivity
   09. repetitious language/behavior
   10. other
24. **Pain:**
   Health Promotion
   Potential
   Actual
   01. expresses discomfort/pain
   02. elevated pulse/respirations/blood pressure
   03. compensated movement/guarding
   04. restless behavior
   05. facial grimaces
   06. pallor/perspiration
   07. other

25. **Consciousness:**
   Health Promotion
   Potential Impairment
   Impairment
   01. lethargic
   02. stuporous
   03. unresponsive
   04. comatose
   05. other

26. **Integument:**
    Health Promotion
    Potential Impairment
    Impairment
    01. lesion
    02. rash
    03. excessively dry
    04. excessively oily
    05. inflammation
    06. pruritus
    07. drainage
    08. ecchymosis
    09. hypertrophy of nails
    10. OTHER

27. **Neuro-musculo-skeletal function:**
    Health Promotion
    Potential Impairment
    Impairment
    01. limited range of motion
    02. decreased muscle strength
    03. decreased coordination/balance
    04. decreased muscle tone
    05. increased muscle tone
    06. decreased sensation
    07. increased sensation
    08. gait/ambulation disturbance
09. difficulty managing activities of daily living
10. tremors/seizures
11. other

28. **Respiration:**
Health Promotion
Potential Impairment
Impairment
01. abnormal breath patterns
02. unable to breathe independently
03. cough
04. unable to cough/expectorate independently
05. cyanosis
06. abnormal sputum
07. noisy respirations
08. rhinorrhea
09. abnormal breath sounds
10. other

29. **Circulation:**
Health Promotion
Potential Impairment
Impairment
01. edema
02. cramping/pain of extremities
03. decreased pulses
04. discoloration of skin/cyanosis
05. temperature change in affected area
06. varicosities
07. syncopal episodes
08. abnormal blood pressure reading
09. pulse deficit
10. irregular heart rate
11. excessively rapid heart rate
12. excessively slow heart rate
13. anginal pain
14. abnormal heart sounds/murmurs
15. other

30. **Digestion-hydration:**
Health Promotion
Potential Impairment
Impairment
01. nausea/vomiting
02. difficulty/ inability to chew/swallow/digest
03. indigestion
04. reflux
05. anorexia
06. anemia
07. ascites
08. jaundice/liver enlargement
09. decreased skin turgor
10. cracked lips/dry mouth
11. electrolyte imbalance
12. other

31. **Bowel function:**
   Health Promotion
   Potential Impairment
   Impairment
   01. abnormal frequency/consistency of stool
   02. painful defecation
   03. decreased bowel sounds
   04. blood in stools
   05. abnormal color
   06. cramping/abdominal discomfort
   07. incontinent of stool
   08. other

32. **Genito-urinary function:**
   Health Promotion
   Potential Impairment
   Impairment
   01. incontinent of urine
   02. urgency/frequency
   03. burning/painful urination
   04. difficulty emptying bladder
   05. abnormal urinary frequency/amount
   06. hematuria
   07. abnormal discharge
   08. abnormal menstrual pattern
   09. abnormal lumps/swelling/tenderness of male/female reproductive organs
   10. dyspareunia
   11. other

33. **Antepartum/postpartum:**
   Health Promotion
   Potential Impairment
   Impairment
   01. difficulty coping with body changes
   02. inappropriate exercise/rest/diet/habits
   03. discomforts
   04. complications
   05. fears delivery procedure
   06. difficulty breast-feeding
   07. other
34. Other
   01. other

DOMAIN IV. HEALTH RELATED BEHAVIORS

Refers to activities which maintain or promote wellness; promote recovery; or maximize rehabilitation.

35. Nutrition:
    Health Promotion
    Potential Impairment
    Impairment
      01. weighs 10 percent more than average
      02. weighs 10 percent less than average
      03. lacks established standards for daily caloric/fluid intake
      04. exceeds established standards for daily caloric/fluid intake
      05. unbalanced diet
      06. improper feeding schedule for age
      07. nonadherence to prescribed diet
      08. other

36. Sleep and rest patterns:
    Health Promotion
    Potential Impairment
    Impairment
      01. sleep/rest pattern disrupts family
      02. frequently wakes during night
      03. somnambulism
      04. insomnia
      05. nightmares
      06. insufficient sleep/rest for age/physical condition
      07. other

37. Physical activity:
    Health Promotion
    Potential Impairment
    Impairment
      01. sedentary life style
      02. inadequate/inconsistent exercise routine
      03. inappropriate type/amount of exercise for age/physical condition
      04. other
38. **Personal hygiene:**
   Health Promotion
   Potential Impairment
   Impairment
   01. inadequate laundering of clothing
   02. inadequate bathing
   03. body odor
   04. inadequate shampooing/combing of hair
   05. inadequate brushing/flossing/mouth care
   06. other

39. **Substance misuse:**
   Health Promotion
   Potential
   Actual
   01. abuses over-the-counter/street drugs
   02. abuses alcohol
   03. smokes
   04. difficulty performing normal routines
   05. reflex disturbances
   06. behavior change
   07. other

40. **Family planning:**
   Health Promotion
   Potential Impairment
   Impairment
   01. inappropriate/insufficient knowledge of family planning methods
   02. inaccurate/inconsistent use of family planning methods
   03. dissatisfied with present family planning method
   04. other

41. **Medical/dental supervision:**
   Health Promotion
   Potential Impairment
   Impairment
   01. fails to obtain routine medical/dental evaluation
   02. fails to seek care for symptoms requiring medical/dental evaluation
   03. fails to return as requested to physician/dentist
   04. inability to coordinate multiple appointments/regimens
   05. inconsistent source of medical/dental care
   06. inadequate prescribed medical/dental regimen
   07. other
42. **Prescribed medication regimen:**
Health Promotion
Potential Impairment
Impairment
  01. deviates from prescribed dosage
  02. demonstrates side-effects
  03. inadequate system for taking medication
  04. improper storage of medication
  05. fails to obtain refills appropriately
  06. fails to obtain immunizations
  07. other

43. **Technical procedure:**
Health Promotion
Potential Impairment
Impairment
  01. unable to demonstrate/relate procedure accurately
  02. does not follow/demonstrate principles of safe/aseptic techniques
  03. procedure requires nursing skill
  04. unable/unwilling to perform procedure without assistance
  05. unable/unwilling to operate special equipment
  06. other person(s) unable/unavailable to assist
  07. other

44. **Other**

  01. other
APPENDIX C

PARAMETER DEFINITIONS FOR

COMMUNITY HEALTH INTENSITY RATING SCALE (CHIRS)
### Community Health Intensity Rating Scale (CHIRS)

#### PARAMETER DEFINITIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finances</strong></td>
<td>Available financial resource, including employment status, of an individual/family reflecting the adequacy/availability of income related to financial obligations.</td>
</tr>
<tr>
<td><strong>Housing:</strong></td>
<td>Condition of patient's home/neighborhood including availability of necessary facilities and transportation to those facilities.</td>
</tr>
<tr>
<td><strong>Safety, Health</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Community Networking</strong></td>
<td>Individual's/family's knowledge and use of community resources/services.</td>
</tr>
<tr>
<td><strong>Family System</strong></td>
<td>Interpersonal relationships within the household (primary unit) and/or with relatives, friends, and significant others outside the household such as church members, social group members and fellow employees. This parameter does not reflect the family's ability to render physical care unless that ability is marred due to interpersonal problems.</td>
</tr>
<tr>
<td><strong>Emotional Response</strong></td>
<td>Expression of feelings including sexual concerns, grief, confusion, depression, anxiety, and behavioral outcomes which arise from an individual's/family's perception of self as it relates to a change in health status.</td>
</tr>
<tr>
<td><strong>Individual Growth and Development</strong></td>
<td>Early life development of cognitive, physical, and social tasks including ability speak, read and write.</td>
</tr>
<tr>
<td><strong>Sensory Function</strong></td>
<td>The body function concerned with the use of senses to include vision, hearing, taste, touch, smell, proprioception, and an individual's perception of pain.</td>
</tr>
<tr>
<td><strong>Respiratory/Circulatory Function</strong></td>
<td>The body functions concerned with (1) the transfer of gases to meet ventilatory needs, and (2) the supply of blood to body tissues via the cardiovascular system.</td>
</tr>
</tbody>
</table>
Neuromuscular-skeletal Function
- The body functions concerned with integration and direction of body regulatory processes related to gross and fine motor movements including level of consciousness, speech patterns, muscle strength, coordination, skeletal integrity, and degree of physical independence/mobility.

Reproductive Function
- The body function concerned with menstruation, family planning, fertility, pregnancy, and impediments of sexual activity.

Digestion/Elimination
- The ability to ingest food and fluids, utilize nutrients and excrete waste products from the body.

Structural Integrity
- The character and intactness of the body's protective mechanisms including skin and/or the immunological system.

Nutrition
- An individual's/family's preparation and consumption of nutrients including significant cultural and health factors.

Personal Habits
- An individual's/family's management of personal health related activities. It includes sleep activity patterns, personal hygiene, and avoidance of harmful materials. It addresses patient/family habits not ability to ADLs.

Health Management
- An individual's/family's management of their own health status including their perception of health and their motivation to strive for an optimal level of wellness as demonstrated by 1) regular participation in recommended health screenings/examinations appropriate for age and physical condition, 2) participation in technical procedures, and 3) adherence to prescribed therapeutic plans.

The Community Health Intensity Rating Scale is copyrighted by the author:

Donna Ambler Peters
26 Jacob Court
West Trenton, NJ 08628
APPENDIX D

AGENCY CONSENT FORM
AGENCY CONSENT FORM

Director of Nursing
(Name of Agency)

Dear __________________:

This letter is to confirm plans for participation of your agency in the nursing study entitled "The Relationship Among Patient Factors, Nurse Factors, Nursing Care Requirements, and Nursing Resource Consumption in Home Health Care". The purpose of the study is to examine nursing care requirements and nursing resource consumption for patients receiving home health care, with particular emphasis on the relationship of these two variables to each other and to patient factors and nurse factors.

Information will be obtained from computerized patient data, a review of patient records, and from nurses employed by your agency whose completion of a survey will indicate their consent to participate. Two hundred fifty (250) patient records will be required for the sample. Data from patient records will be gathered by the investigator only. Forty (40) records for interrater reliability will have all names and addresses removed, will be sent by certified mail only, and will be reviewed by a nurse who agrees in writing to maintain their confidentiality.

The patient and nurse data will be for the use of this investigator only and will not be added to any existing data files. Confidentiality of the data will be maintained by using identifying numbers to represent both patients and nurses. Computer files containing the data will be available only to the investigator and will be safeguarded by use of a password known only the investigator.

The name of your agency will remain anonymous in the report of the study. Neither patients nor nurses will be identified by name in the report. When data from this study have been compiled, I will be glad to share a summary of the findings with you and your staff.

If you agree to participate in this study, please sign on the lines provided. Please return the signed letter to me. A copy is included for your files. Thank you for your assistance.

Sincerely,

________________________________________
Agency

________________________________________
Director

________________________________________
Date

Bevely J. Hays, MS, RN
Doctoral Student
Case Western Reserve University