A QUANTIFICATION MODEL FOR HOME HEALTH CARE NURSING VISITS

by

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To Troy and Thor

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CHAPTER I

INTRODUCTION

Statement of Purpose

Because home care managers are faced with an unprecedented challenge to reduce costs while providing quality care, they need objective information with which to plan, establish standards, and monitor achievement. According to Shaffer (1985), the need for accurate documentation and baseline data, along with the need to project and forecast is essential for the survival of home health agencies. However, there is currently no technique to measure nursing productivity or the cost of nursing care more precisely than identifying the number of home visits made per day or calculating the average cost per visit. Resource utilization by specific clients or types of clients can only be identified according to the number of home visits made. Since there are no established industry-wide nursing productivity standards in home care or methodologies available which allow managers to analyze productivity and costs in enough detail to provide adequate knowledge for planning, monitoring, and implementing change, management strategies are varied and fragmented. The need for a more precise measure of home care nursing service becomes even more acute with the proposed advent of a prospective payment system for home care.

In the community, as well as in other health care settings, nursing must document and demonstrate what it does to reduce costs and enhance

quality of care. To accomplish this, a system needs to be developed that puts an accurate price on nursing's services (Shaffer, 1985; Van Slyck, 1985). This requires the creation of an objective and quantifiable data base. Community health nurses, however, have never really defined the elements of a home visit in such a way that they could be priced appropriately for various buyers (Griffith, 1987). Payment for intermittent services has traditionally been the same for each visit regardless of the services rendered, the skills utilized, or the time spent.

The real question is: how can home care nursing be quantified or measured? What are the elements of service? Past attempts at quantifying home care services have utilized either the home visit or timed tasks as the measurement unit. The first unit, the home visit, is inadequate due to its imprecision. It is well known that time and nursing skill requirements for direct and indirect client care activities differ considerably from one home visit to another (Levine, 1985). The second unit, tasks, deals with the time it takes to do specific tasks, failing to take into account either the complexity of the particular task or the service as a whole (Hegyvary, 1986). In both cases, it should be noted, the value of nursing service is measured basically in units of time.

In order to adequately quantify home care nursing service, client care activities need to be disaggregated and the components (subunits) identified. Home visits vary according to three major dimensions: (a) the types of activities or services performed, (b) the complexity or difficulty of these services, and (c) the time taken in their delivery. The purpose of this study, therefore, was to identify and quantify the components of nursing care to clients at home by developing a methodology to measure the time and complexity of client-related activities. The investigation resulted in a

unit of measurement for home care nursing activities which has potential use in the development of a pricing methodology as well as a productivity management system for home health care nursing services.

Objectives

The study was designed to:

--Propose a model for measuring home health care nursing client-related activities based on the type, time, and complexity of care provided and suitable for productivity management and pricing services.

--Identify typical visit "profiles" or configurations with weightings for each "profile."

--Identify critical indicators (predictors) of visit "profiles."

Research Questions

The following research questions were addressed:

1. What service categories can be used to group client care activities?

2. What dimension(s) best describe nursing services for productivity and pricing measurement purposes?

3. What is the strength of the relationship between home visit time and complexity of care?

4. What typical visit types or "profiles" can be identified?

5. What are the critical indicators (predictors) for:

    a. home visit "profiles"

    d. visit time

    c. visit-related activities

6. Is there a relationship between agency and/or nurse characteristics and visit characteristics?

7. Which model emerges from the data to best describe nursing services for use in productivity management and pricing?

8. How can intermittent nursing services to home-based clients be measured?

Background

The Changing Environment

Home care is a fast growing, yet complex and fragmented industry. There is a search for uniform direction at the same time that there is constant change. Numerous factors are influencing these changes including demographics, consumerism, improved technology, competition, and cost-containment strategies.

Demographics. In 1981, 11.2 percent of the United States population was over 65 years of age and spent 35 percent of the health care dollar. By 2020, this age group will comprise 17 percent of the population and spend 54 percent of all health care dollars (Tatge, 1984). The greatest increase in longevity is seen among the older members of the senior generation. While the rest of the population increased 9.1 percent in the past ten years, those over 85 increased by 56.6 percent (Halamandaris, 1985). This "graying of America" means that the health care needs of the elderly are a rapidly growing portion of the health care market. We have gone beyond the one- and two-generation family. The traditional caregivers are now either old themselves or are required to seek employment outside the home (Griff, 1984). According to the House Select Committee on Aging

(Pepper, 1985), 5.5 million elderly are going without the home care services that they need now. This number is projected to double in the next five years.

Consumerism. Demand for health care services is growing faster than absolute numbers. Informed consumers have higher expectations for retaining independent lives. There is an increasing concern about the quality of life for the aged and handicapped leading to a search for alternatives to institutionalization. The current awareness and emphasis on consumer rights has created an informed public wanting to participate in decisions regarding their health care (Young, 1980). While most Americans recognize that hospitals and nursing homes provide a valuable service, home care has a very positive image (85 percent support) among those who have any awareness and is preferred by 72 percent of the American public over nursing homes for the care of those persons who need frequent medical and housekeeping assistance (Cetron, 1985).

The market for home care services in the age group under 65 has also accelerated. It now includes more pediatric, psychiatric, ambulatory surgery, maternity and AIDS clients in addition to clients with industrial and occupational illnesses (AHPI, 1987).

Improved technology. The high-tech boom in health care has made it possible for procedures until recently requiring hospitalization to be replaced by faster, less costly and less invasive ambulatory methods. Home care now includes such high-tech services as intravenous hydration, kidney dialysis, chemotherapy, insulin therapy, antibiotic therapy, apnea monitoring, parenteral and enteral nutritional support services, and biotelemetry (Coleman & Smith, 1984). For example, organ transplant recipients are

already on home care caseloads, and respirator and oxygen dependent clients are frequently successfully cared for at home.

The Health Care Financing Administration (HCFA) projects a 30 percent annual increase in clients using home parenteral and enteral services culminating in a $1.3 billion market by 1990, and the home antibiotic market is expected to increase from $6 million in 1983 to $90 million in 1988 (Louden, 1985). Lutz (1987) estimates that revenues for home delivery drug firms will triple between 1986 and 1990 reaching annual revenues of approximately $2.8 billion.

Competition. Competition in home care is becoming more sophisticated as major corporations, hospitals, and physicians recognize the need to enlarge their service capabilities and generate new sources of revenue. In this era of health care price competition, there is increasing pressure on hospitals to hold prices down and many are diversifying into lower cost, ambulatory care operations and home care (Kuntz, 1983). Health Maintenance Organizations (HMO's) and Preferred Provider Organizations (PPO's) are also substituting hospital admissions with alternative care delivery modes including home care. Rather than contract with existing agencies for service, some of these organizations are finding it advantageous to develop their own programs (Curtiss, 1984).

In the early 1980s, HCFA removed certain limitations on the number of permissible home visits per client in order to encourage use of home care as an alternative to more expensive inpatient care (Reif, 1984). These new regulations, as well as other industry incentives have spawned an infusion of proprietary and hospital-based providers into the home care marketplace (Bonstein & Mueller, 1985). The number of Medicare certified agencies has increased to nearly 6,000, a 23 percent increase in the fifteen

months prior to January 1986. Ninety-eight percent of that increase came in the hospital-based and proprietary sectors (NAHC Report, 1/15/86).

Cost containment measures. The ripple effect of the change to a prospective hospital reimbursement system based on diagnostic-related groups (DRGs) has changed the entire health care system. The major thrust of DRGs has been to move patients out of the hospital sooner. The number of clients discharged into home care has increased by 37 percent, most of whom have more intensive medical and nursing needs (NAHC, 3/19/1986). For example, it is estimated that with home IV antibiotic therapy, AIDS clients can be treated for half the cost without being exposed to the infectious diseases present in hospitals (Lutz, 1978).

The attempt to control inpatient costs has, in fact, caused a transfer of some of these costs to home care. As a result, HCFA has changed direction and, now intent on reducing expenditures for home care as well, has taken a number of administrative initiatives such as (a) restricting admission requirements, (b) reducing allowable visits, and (c) increasing documentation requirements (NAHC, 1986; Banfield, 1987). More and more, fiscal intermediaries and insurers are determining care needs of individuals at home (Griffith, 1987). Consideration is being given to development of a prospective payment system for home care in the near future (Grimaldi, 1985; Shaffer, 1985). At the same time, managed health care plans are proliferating in an effort to further control costs, and home health agencies are needing to evaluate their ability to participate in capitated health care programs (Dombi, 1987).

Effects on Home Care Agencies

While the demand for home care services has increased dramatically, there has been a corresponding emphasis on reducing costs due to increased competition and efforts by payers such as Medicare to prevent the transfer of inpatient savings to home care expenditures. As a result, there are more home care providers competing for a dwindling amount of available Medicare business in an industry that is relatively new to competition (Wood, 1985/86; MacKenzie, 1985).

The financial impact to home care agencies includes (a) increased costs per visit, (b) inability to react to changes in a timely manner due to the lengthy retroactive denial process, (c) lowered reimbursement levels, (d) increased staff turnover with the resulting effects of reduced productivity, (e) increased costs for filing and appeal of claims, (f) larger budgets, and (g) lack of reimbursement for certain types of care (Elwell & Laff, 1987; Wood, 1985/86; Pesznecker, Horn, Werner & Kenyon, 1987).

Service effects include (a) a significant increase in the severity of illness of clinets served, (b) increased readmission rates to hospitals, (c) a wider client age span, (d) increased length of visits, (e) increased frequency of visits, (f) substantial changes in services offered such as intravenous antibiotics, chemotherapy, and total parenteral nutrition, (g) increased demand for personal care services, (h) more time and effort spent on documentation, and (i) decreased continuity of care between home care agencies and hospitals or physicians (Pesznecker et al., 1987; Seifer, 1987; Wood, 1985/86; Rozelle, 1987).

According to Reif (1984), in order to survive in such a cost-competitive environment, home care agencies need to focus on two major areas: (a) making limited revenue go further (reducing costs), and (b)

capturing more funding and more clients (increasing the volume of services). In response to changes in admission rates and higher case-mix acuity levels, home care agencies have had to improve their technology and nursing skill inventories (Coleman & Smith, 1984). In addition, they have reorganized, reduced the number of Medicare clients, increased contract personnel, expanded services, hours, and territory served, increased documentation of care, decreased social work services, added more volunteers, and attempted to decrease the number of visits made per client (Wood, 1985/86; MacKenzie, 1985; Cabin, 1987). Agencies are finding it necessary to be able to price their care more precisely in order to compete for managed care contracts (Astle & Roth, 1987).

A home care agency's survival depends on finding ways to provide quality care more economically (Harvey, 1987). Since home care is highly labor intensive with approximately 80 percent of costs being labor related, reducing labor expenses has the greatest potential for impacting total costs. Because nursing comprises the largest service component of home care, and thus the largest labor expense category, considerable attention has been given recently to increasing the number of visits made by nurses without increasing staff (Bly, 1981). In other words, improvement of nursing productivity in home care, as in other health care settings, is becoming a major strategy for reducing costs (Cabin, 1987; Harrell & Frauman, 1985).

Definitions

For purposes of this study the following definitions are used:

Activities: Categories of client care related activities, procedures and nursing processes which are grouped because of similarities in purpose and/or structure.

Client-related non-visit time: Time spent by the nurse in preparation for or follow-up of a specific home visit including documentation of the visit, coordination of care for the client as identified during the visit, and travel to and from the home.

Complexity: Degrees of difficulty and intensity of care requiring differing levels of nursing skills.

Efficiency: The relationship between time and nursing activities (quantity).

Final outputs: Changes in client health status.

Home health agency: A Medicare certified home care program, department, or organization which provides intermittent nursing services as defined by Medicare.

Home health care nursing labor productivity: The relationship between paid nursing hours and skills, and the type and amount of services performed.

Home health nurse: A registered nurse (R.N.) or licensed practical nurse (L.P.N.) employed by or contracted for by a home health agency to provide skilled intermittent nursing services to clients in their homes.

Home visit: A visit by a home health nurse to a client's home for the purpose of providing intermittent skilled nursing services.

Inputs: Total paid nursing hours and nursing skills utilized.

Intermediate outputs: Nursing activities performed.

Productivity: The relationship between the amount of acceptable output produced and the input required to achieve that output (Jelnick & Dennis, 1975).

Visit time: Actual nursing time spent in a client's home providing services.

CHAPTER II

LITERATURE REVIEW

Quantifying Nursing Services

Shaffer (1985) states that the measurement of nursing resource consumption has been approached from two directions in the past: quantitative and qualitative. The first is concerned with time and client acuity levels while the second involves nursing standards and the nursing process. With the developing emphasis on quality and productivity in health care, it is essential that these two processes become linked.

One of the first attempts to quantify the demand for nursing care in hospitals in the United States was undertaken by the National League for Nursing in the mid-1940s. A survey of 50 hospitals in New York revealed the median number of hours of bedside nursing care to be 3.4 to 3.5 hours per day (Shaffer, 1985). Generally, though, nursing has been slow to quantify service delivery and only recently, due to the impetus of a changing reimbursement system, has a sense of urgency been felt. A major deterrent to the development of measurement strategies has been the elusive definitions of the outcome of care, or the nursing "product" (Rieder & Lensing, 1987).

Measurement of nursing care has had two primary purposes. The first use was as a tool to project staffing and manage nursing productivity. More recently the increasing importance of pricing nursing care has required more refined measurement techniques (Shaffer, 1985). Hospitals

have taken the leadership in attempting to measure nursing services. However, since systems used to quantify nursing resource utilization are inextricably linked to a nurse's role in a specific setting, it is essential that each practice setting systematically define and delineate specific care activities (Verran, 1986).

In order for nursing to be measured, there needs to be some valid notion of what nursing is (Halloran, Patterson, & Kiley, 1987). While essential, describing nursing in objective, measurable terms is difficult. Opinions vary concerning the elements of nursing service.

Most nursing quantification schemes have relied on a measure of nursing effort in terms of hours of care. However, according to Joel (1983), this single dimension, time, may not be an adequate measurement of nursing resource investment. A few schemes have begun to look at the complexity of the nursing care delivered, either in addition to time or separately. Complexity refers to the degree of routineness, standardization, predictability, and required knowledge involved in delivering a nursing service or activity (Verran, 1986). According to Halloran (1983), "nursing is as much an intellectual endeavor as it is a physical one." Therefore, the best quantification schemes should place a value on the skills required in providing the service as well as time (Verran, 1986).

Some years ago Gilbreth (1960) cited three factors to consider in measuring work: (a) the units to measure; (b) the methods of measuring; and (c) the measuring devices or instruments used. The "unit" selected indicates the results desired to be achieved or eliminated. The "method" used shows the state of perfection of the theory. And the "device" shows the existing state of the practice. This paper will review two major uses of quantification schemes in nursing, productivity and pricing, focusing on

the various units of measurement, methods, and devices which have been developed in different health care settings.

Productivity Measurement

Productivity is traditionally expressed as the ratio of output to input (Edwardson, 1985; Haas, 1984; Anderson, 1985; Curtin & Zurlage, 1986; Selbst, 1985). In this economic approach, inputs include all resources utilized in the production of specific products, or outputs. Included as inputs are labor, technology, materials, management, machinery, facilities and capital. Customarily, outputs are physical units which workers make and assemble.

Productivity implies both efficiency and effectiveness. This means that productivity does not necessarily improve by simply decreasing the time utilized to accomplish an activity. It is also concerned with the quality of the product (Levine, 1985). Bly (1981) states that productivity emphasizes the importance of being aware of the needs involved in the job to be done and the best way to accomplish that job. The focus is on increasing both the effectiveness and the efficiency of personnel. Time per se does not indicate quality or effectiveness. Just as the best care is not necessarily provided by the fastest nurse, long home visits do not necessarily mean better care or outcomes. Tonges (1985) defines productivity as the relationship of resource units consumed to output units produced, assuming the product quality remains the same. In other words, productivity means increasing efficiency while maintaining effectiveness.

In a labor intensive industry such as health care, most productivity research has been restricted to labor productivity. While it is recognized that there are additional inputs required to accomplish the expected

outputs, labor resources are by far the largest and most expensive and, therefore, merit specialized attention. Productivity in this context can be defined as the relative delivery capability of a given quantity of labor of some given type and value (Fetter, Averill, Lichtenstein, & Freeman, 1984). Theoretically, productivity measures can be applied to any situation where input and output can be specified in quantitative terms (Levine, 1985). Labor inputs in nursing have generally been operationalized as total compensation for hours of practice (Haas, 1984), or total hours worked (Dennis, Dunn, & Benson, 1980; Richards, 1983; Channon, 1983; Kundel, 1985).

There is more confusion regarding identification of outputs for health care services because there are few objective measures of the outcome of nursing care other than the improved health of the client and nursing's role in that improvement is difficult to measure (Harrell & Frauman, 1985). Nursing outputs identified in the literature vary between client outcomes (Haas, 1984; Franz, 1984), and services or processes (Dennis et al., 1980; Franz, 1984; Anderson, 1985; Channon, 1983; Bonstein & Mueller, 1985). More simply stated, the question is whether the product of nursing care is a change in the client's health status or the specific task or procedure which is performed by the nurse. According to Curtin & Zurlage (1986), where outputs are difficult to measure, the tools of analysis often shift from measuring outputs to measuring processes. Dennis et al. (1980) concluded that the nursing process must be largely attributed to nurses and thus more free than outcomes from the influence of other health care providers.

In order to be able to measure productivity, it is essential that both inputs and outputs be quantified. Since client outcomes are often intangible

and affected by other resources, most studies have focused on measuring the time utilized to accomplish specific activities. Levine (1985) contends that in measuring nursing productivity, the output measure needs to include the intensity of care required and inputs should include the quality of care in addition to time and level of services. Corriveau and Rowney (1983) have taken a unique perspective by suggesting two levels of outputs: intermediate--nursing services, and final--health status of the client. While recognizing that the ultimate, or final, output is a change in the client's health, this study will be restricted to measuring the intermediate output, the process by which that change is attempted.

Productivity analysis in health care is a relatively underdeveloped management tool. Successful usage has made the industrial productivity model one which dominates the literature (Haas, 1984). In order to be able to evaluate and monitor productivity, it must first be measured. It is often more difficult to measure service outputs where no physical product is ultimately produced and where once the service is performed, the evidence disappears (Ruh, 1982) and the needs and nature of the client are constantly changing (Margulies & Duval, 1984). However, even though health care may be different from the production industry, many of the same principles can be used. Efficiency is not limited merely to the production of goods.

Two broad approaches have been used to measure health care productivity: the economic approach and the management science approach. The economic apprcach portrays the relationships between overall inputs and outputs over a period of time; in other words, the calculation of efficiency. For example, labor productivity for a hospital is frequently expressed as the paid hours of labor per patient day per year. Managers

are then able to monitor trends assuming that characteristics of patient days do not change appreciably over time (Edwardson, 1985).

The management science approach has been used widely in industry to seek efficient and effective methods by which to accomplish a given task or job and has received more attention in nursing studies. It is used to analyze one or more circumscribed work processes to improve the process and achieve the maximum amount of service for the resources used (Edwardson, 1985). According to Scientific Management theory (Gilbreth, 1960), management cannot be properly compared, rated, or judged without measurement. In this approach the activities that make up the work process are first described. Then the process is examined to analyze the relationship between the services delivered and the technical and human resources used to provide them.

Pricing Nursing Services

In contrast to the strong leadership taken by hospitals in the development of methodologies to measure nursing activities, home health care agencies were the first to price nursing services. In fact, nursing care has always been considered a revenue and cost center in home health agencies and, as such, has been costed out separately from other services (Shaffer, 1985). Hospitals, on the other hand, have usually lumped nursing in with room and board making it impossible to cost out services specifically (Riley & Schaefers, 1986).

Variable billing for nursing care in hospitals was introduced in the early 1970's on a limited scale (Sovie & Smith, 1986). However, with the advent of a prospective payment system by diagnostic group (DRGs) in hospitals, it has become imperative that nursing resources consumed by

patients be costed for each medical diagnosis (Ethridge, 1985). Because of this, hospitals began to look even more closely at discrete costing of nursing services and began to create separate revenue and cost centers for direct nursing care units for case-mix costing and revenue setting as well as for other fiscal management alternatives (Shaffer, 1985). As a result, inpatient facilities have moved beyond the home care industry into new arenas by looking at costs per case and costs per diagnosis or diagnostic group.

Costs for nursing care can be divided into two components: variable and fixed costs. The variable cost is based on the amount of direct services delivered while fixed costs include indirect services provided to the client by the administrative and support personnel. It is the variable costs that are addressed by case-mix classification systems (Maher & Dolan, 1982). According to Sovie and Smith (1986), charging a variable amount for nursing care according to the amount of care provided to clients is essential if nurses are committed to pricing their products.

Several studies have shown that hospitalized patients do not all receive the same amount of care; in fact, the amount, type, and intensity of care varies considerably among different patient groups (Sovie, Tarcinale, VanPutte, & Studen, 1984; Misener, Frelin, & Twist, 1987). The concept of variable charges for nursing care recognizes that patients have unique needs for nursing care that vary across inpatient lengths of stay or, for that matter, home care visits and that if charges are assessed, they should accurately reflect these nursing care services (Sovie & Smith, 1986).

According to Van Slyck (1985), the traditional cost-accounting techniques used in health care are out-dated. Averaging costs across clients who receive varying types and amounts of care fails to identify the

true costs of nursing service on a per client or per service basis. Home care agencies calculate nursing costs according to the average cost per visit (Shaffer, 1985). The variation of resource utilization within a home visit has not yet been addressed by the home care industry. It is therefore not possible to identify which type of clients consume more nursing resources, either in time or skill, beyond calculating numbers of visits.

Pricing nursing care appropriately requires that charges be based on the costs of providing that care. Without an accurate costing system, appropriate charges cannot be set (Van Slyck, 1985). The current move is to develop methodologies to price nursing care according to case-mix and tying costs to specific cost centers (Maher & Dolan, 1982). In the future, Shaffer (1985) predicts that strategic pricing will put a price tag on the standards of care necessary to yield the positive client outcomes that outcome standards define.

Unit of Measurement

In any setting, defining the "unit of measurement" is critical. If a constant value can be placed on some predescribed unit of work, nurses can begin to measure their service. The first question that needs to be asked when attempting to measure nursing is, what is nursing's basic unit of service--and thus its unit of measure or production (Porter-O'Grady, 1985; Simms, Price, & Ervin, 1985)? The industrial engineering approach establishes "manhours per unit of measure" standards (Kundel, 1985) by measuring time required for performance of a specific task or unit of work. Traditionally, the "unit of measurement" for inpatient settings has been time (Porter-O'Grady, 1985). Hospitals and nursing homes have used nursing hours or nursing full time equivalents (FTEs) per patient day (Edwardson,

1985; Reitz, 1985); for outpatient/ambulatory care settings it is office visits per day (Fetter et al., 1984; Greenlick, Hurtado, Pope, Saward, & Yoshioka, 1968); and in home care the home visit has been taken as a proxy measure for client care resource consumption (Bonstein & Mueller, 1985; HHH, 1985; Spoelstra, 1986). These measures are not, however, precise enough to provide information regarding the type and amount of care provided. They cannot sufficiently delineate the nursing demand generated per client or the supply of nursing effort assigned to answer that demand. A more clearly defined, specific unit to measure each client's consumption of nursing resources, generated by that client's requirement for nursing care, such as intensity of service, is crucial (Reitz, 1985).

More recently Patient Classification Systems (PCSs) in nursing, utilizing industrial engineering techniques, have been the basis for many health care productivity and staffing systems, usually emphasizing the time requirements for physical care tasks performed on and for the client. Thus "minutes" of care have been taken as a proxy for nursing practice. This approach, however, usually fails to take into account the difficulty or complexity of care required by a client which may or may not be directly related to time usage. Unfortunately, nursing practice is not a simple sum of discrete tasks with specific points of beginning and end (Reitz, 1985). The level of skill required by the nurse in caring for simple or complex client needs is not adequately represented by time categories alone. Rarely is a conceptual, professional view of nursing integrated into a list of timed tasks (Hegyvary, 1986).

According to Van Slyck (1985), a common measurement factor, used in departments such as laboratory and radiology, is the relative value units (RVUs) concept. RVUs are a measure of the relationship between the level

or intensity of care provided and cost, and are often used in conjunction with PCSs by calculating the number of RVUs for each patient category. Suver and Neumann (1986) advocate the usage of "physical resource units" (PRUs) to evaluate resource utilization. This requires an expert assessment of resources (such as number of nursing hours) needed to provide quality care in a given situation.

In ambulatory health care, the client visit is not a well-defined entity. Therefore studies of resource use in ambulatory care have begun to utilize other "units of measurement" such as: the episode of care (Moscovice, 1976), intensity of care with cost weights for clinical, laboratory and radiology components (Gold, 1981), case mix relationships to minutes of physician time, number of x-ray and laboratory tests, diagnoses and severity of illness (Lion & Altman, 1981), and frequency of services used (Kronenfeld, 1980).

Customarily, productivity in home care has been measured by the number of home visits made per day (Levine, 1985). As long ago as 1890, nurses were expected to conduct six nursing visits per day on foot (Wilkerson, 1980). Recent assumptions in the literature set the standard at five to six skilled nursing visits per day (Bonstein & Mueller, 1985; Oni, 1984). A survey of Michigan certified home health agencies in 1986 set the average standard at 4.89 visits per eight hour day (Spoelstra, 1986). However, neither "home visit" or "day" have had consistent definitions. Variations in time requirements by types and/or intensity of visits, other workload requirements, additional client-related activities and total nursing resources utilized per case have been generally overlooked. For instance, when Ballard and McNamara (1983) identified variables predictive of the quantity of home care services used, they operationalized resource

utilization as the number of home visits made. Levine (1985) questions, however, whether all visits made by community health nurses should be valued alike in spite of variations in case mix.

Operationalization of "day" has varied to include total paid time, total worked time, or client care related time only. A number of home care software programs are now able to calculate such average ratios as the number of home visits made per day by nurse, time per home visit, length of stay, home visits per diagnostic group, travel time and mileage per visit, and home visits per admission (Caring, 1987). Here again, however, the unit of measurement remains the home visit.

Only a few attempts have been made to identify smaller components of service for home care clients than the home visit. Corriveau and Rowney (1983) defined public health nursing services (interventions) as home visits, home health visits, office service, and direct service phone calls in addition to specific community related activities. Bly (1982) developed a productivity formula in New Jersey that separated non-visit and visit time. Time for home visits, office visits, pre and post visit time and travel constituted total home visit time. Oni (1984) developed an algebraic formula defining "visit complex" time as time spent in homes, client-related non-visit activities, non-client related non-visit activities, travel, and personal categories. Banfield (1987) in a work sampling study of nurses in one agency found a 30/70 ratio of direct to indirect care time, distributed as follows: 26 percent travel, 30 percent direct care, and 44 percent indirect care (mostly documentation).

Storfjell, Easley, and Allen (1987) divided community health nurses' workload into personal time, supportive activities, special assignments, community service, and home visit related time. Sienkiewicz (1984)

classified visits as (1) admission visits, or (2) revisits. Kingman and Hughes (1982) identified 17 direct care tasks and 17 support activities which comprised nurses' and social workers' maintenance home visits. Madera-Vanderline (1987) calculated average length of time for five visit types: admission, hospice, pediatric, IV/TPN, and other. A mathematical factor was assigned to each visit type for use in planning and productivity management.

Recently the Visiting Nurse Association of Los Angeles, Inc. took a step towards disaggregating home visits by identifying thirteen activity categories based on 85 nursing tasks: (1) bladder/catheter care, (2) bowel care, (3) colostomy care, (4) decubitus/wound care, (5) diabetic instruction, (6) feeding tube, (7) health assessment, (8) laboratory specimen, (9) oral medications and injections, (10) IV fluids and TPN, (11) mental health, (12) oxygen therapy, and (13) other (Churness et al., 1986).

The type of specificity needed to obtain adequate management information can only be accomplished by disaggregating home visit related activities into smaller units of measurement which can form the basis for a management system to answer questions such as: (a) What client-related activities are performed by a nurse? (b) Is more time spent on teaching, physical care, documentation, care coordination with other providers, or assessment? and (c) Is there a relationship between the complexity of service provided and the time utilized? Once a method is found to answer this type of question, it is possible to develop strategies to improve inefficient areas and to price care. However, as long as one home visit is considered identical to another, there is no way for a manager to accurately assess where inefficiencies are occurring or what a certain type of visit or client is costing the agency. The value of nursing care goes

beyond the time used and includes the nursing skills required. Care must be taken, however, that the system not become so complex that it becomes impractical. There needs to be a way to measure the actual units of care delivered which is simple and yet able to be individualized (Madera-Vanderline, 1987).

Method of Measurement

Engineered time standards form the basis for many work monitoring systems in industry and have been used increasingly in health care. Time studies are the most prevalent work measurement methodology. These are accomplished by one of four methods: (a) continuous observation where an observer shadows one person continuously and times his/her activities, (b) fixed observation where the observer is responsible for observing all personnel within a prescribed area, (c) individual self reporting of time, and (d) work-sampling or intermittent, instantaneous observations of activities (Abdellah & Levine, 1954). When activities can be grouped, standard times may be set for each task, the sum of which becomes the productivity standard for the group. Other work measurement methodologies include the use of historical time data to set standards and the estimation of standards by experts (Marron-Cost, 1980).

In studying the use of nursing resources, time studies have generally divided nursing time into direct and indirect client care categories (Johnson, 1984; Misener, Frelin, & Twist, 1987). Direct care time is sometimes further divided into (a) direct client contact time, and (b) other client-related time. Indirect care includes administrative time and personal time (Sovie, Tarcinale, VanPutte, & Stundan, 1985).

It must be remembered, however, that "How Long It Takes to Do Work" is not so important as "How to do it the One Best Way" (Gilbreth, 1960). Timing an activity may help to establish standards according to how fast the task is currently accomplished. New approaches to doing the work may, however, improve both the speed (efficiency) and the quality (effectiveness) of the activity.

Most health care resource utilization and pricing systems have been designed for inpatient settings and are based on some type of PCS developed by either factor (objective) or prototype (subjective) evaluation or some combination of the two (Abdellah & Levine, 1965; Gallagher, 1987). Although the designs are differentiated as either objective or subjective, both involve subjective judgments (Harris et al, 1985). Through factoring, direct client care requirements are rated and then combined in some numerical fashion to arrive at a score which corresponds to a client category or classification (Jackson & Resnick, 1982).

The primary reason for developing classification systems is to impose order on a diverse population of items. By recognizing both similarities and distinctions between items, a classification scheme groups these items and reduces a large population into smaller segments. This permits information to be generalized for explaining and predicting occurrences; however, the degree of generalization is limited to several factors: (a) variables measured by the system, (b) the setting in which the variables are measured, and (c) objects or items in the classification system (Plomann, 1985). Case mix groupings are any client aggregation created by using homogeneity on a particular variable (Schumacher, Cloapton, & Bertram, 1982). In nursing, the term "patient classification system" (PCS) means the categorization of patients according to some assessment of their nursing

care requirements over a specified period of time and the quantification of these categories as a measure of the nursing effort required (Giovannetti, 1979).

Prototype evaluation instruments are designed around broad descriptions of the typical characteristics of clients to be assigned to each category. They strive to establish several mutually exclusive and exhaustive patient classification categories graded in terms of an ordinal scale. Each category represents a client's greater or lesser requirement for nursing care. Clients are assigned that category of care which most closely matches the prototype description by comparing a given client's actual characteristics with the prototype's (Reitz, 1985).

The factor evaluation design delineates specific elements of care for which the client is rated one after the other. Combined to provide an overall rating and compared with a set of decision rules, these ratings identify the appropriate care category according to point totals (Reitz, 1985).

Hospital Systems

Classification systems in hospitals have proliferated in the past twenty years. In 1978, Giovannetti estimated that 1000 hospitals were using such systems to aid in determining the quantity of nursing personnel required to provide an acceptable standard of patient care. This number is growing daily. While many of the approaches used are similar, due to variations in case-mix, skills, and physical facilities, classification systems must be standardized for each setting (Giovannetti, 1979).

PCSs have been developed for a number of purposes such as utilization review, reimbursement, staffing, productivity, and quality

assurance (Plomann, 1985), and they may or may not be useful for purposes other than their original intent. The major types of health care classification systems include grouping clients by: (a) nursing tasks, (b) medical diagnosis, (c) nursing diagnosis, (d) intensity of care, (e) severity of illness, or (f) some combination of these.

The most typical type of hospital classification system is based on timed nursing tasks such as CASH (Georgette, 1970); Strong Memorial Hospital system (VanPutte et al., 1975); the U.S. Army and Navy Workload Management System (Vail, Morton, & Rieder, 1987), and GRASP (Zak, 1984; Meyer, 1985); which either assign patients to categories based on tasks or compute patient care times individually by patient according to a tally of timed tasks. Systems utilizing a grouping or category system (PCS) usually identify critical indicators found to correlate highly with the direct nursing care time required by each category of patients. Rather than timing individual nursing tasks, the Medicus approach to hospital nursing productivity is to group tasks into activity groups which have weights according to difficulty of care and patient self-sufficiency. Patients are then assigned to one of four categories according to their total points (Nordby, Freund, & Wagner, 1977).

A major example of a diagnostic system is DRGs, which are used in calculating prospective payments to hospitals. DRGs were developed in the early 1960s and mid-1970s at Yale-New Haven Hospital to define expected lengths of patient days for utilization review activities. The primary objective was a definition of case types, each of which could be expected to receive similar amounts of hospital services. The system relates demographic, diagnostic and therapeutic characteristics of patients to length of inpatient stay (Plomann, 1985; Jones, 1984). The patient population is

divided into 23 Major Diagnostic Categories (MDCs) which are further subdivided into 356 DRGs according to age and the presence or absence of complications (Curtin, 1983).

Medical classification systems do not, however, adequately express nursing resources consumed by patients since patients' acuity or severity of illness differs and various types and amounts of nursing care are indicated within each diagnostic group (Sovie et al, 1985; Bargagliotti & Smith, 1985; Jones, 1985; Halloran & Kiley, 1987). This is evidenced by Arndt and Skydell's (1985) study of five Massachusetts' hospitals which showed that nursing care requirements varied by (a) length of hospital stay, (b) diagnosis, surgical procedure, and DRG, (c) age, (d) diagnosis with a DRG, and (e) across hospitals.

Because of this, Susan Horn (Johns Hopkins Medical Institutions) developed a Severity of Illness (SOI) Index (a refinement of the AS-SCORE system--Plomann, 1985) which assigns hospital patients to one of four categories representing the acuteness and severity of the patient's illness based on seven characteristics: stage of principal diagnoses, complications, interacting other diseases, dependency, non-operating room life support procedures, rate of response to therapy, and residual effect of therapy (Horn, 1983). This Index, designed to be used with DRGs, claims to account for 61 percent of inpatient resource variation in comparison to the 28 percent accounted for by DRGs alone (MHC 3/15/85). Recently, because of certain criticisms, Horn (1986) has developed a second-generation system called the Computerized Severity Index which adds a sixth digit to the patient's ICD-9-CM code, rating the severity of illness on a four point scale. This revision uses only the first three of the original seven characteristics to determine the severity ranking.

Disease Staging is another way to measure the severity of specific diseases. Severity is measured in terms of risk of death or impairment. Diseases are divided into four major stages and multiple substages. Opinions are divided, however, regarding the usefulness and cost-effectiveness of the various types of SOIs (Nathanson, 1985).

Generalized patient management paths (GPMPs) are a case-mix grouping system that takes a principle diagnosis and divides it into treatment paths (Jones, 1984). GPMP was developed by Young Patterson, and Groetzinger (1985) under a HCFA grant by the Health Care Research Division of Blue Cross of Western Pennsylvania. This system includes: (a) patient management categories (PMCs) developed by a panel of physicians, (b) patient management paths--physician specified clinical management strategies for each type of patient, and (c) relative cost weights--a relative weight assigned to each PMC reflecting the cost of physician-specified services.

The Acute Physiology and Chronic Health Evaluation (APACHE) system developed at George Washington University measures therapeutic effort and resource costs in intensive care units. It combines (a) a measure of previous health status, (b) the degree of physiologic derangement, and (c) an intervention score based on 75 clinical tasks weighted from one to four based on the amount of therapeutic effort required (Jones, 1985).

According to Lucke and Lucke (1986), severity of illness and nursing intensity are two distinct classifications. Patient acuity or severity of illness cannot always be assumed to serve as proxy measures of nursing care time or nursing intensity. The medical connotation of acuity and severity refer to comorbidities, or the seriousness of the patient's illness which does not necessarily correlate with nursing workload intensity. There

are many patients who require extensive amounts of nursing care time and yet are not considered to be acutely or severely ill (Giovannetti, 1986). Work groups at Georgetown University's National Conference on Nursing Productivity (1986) agreed that intensity measures are based on a nursing model, severity of illness measures use a medical model, and PCSs are generally based on a model of patient dependency. These three concepts vary in purpose as well as content.

One attempt to quantify the type and amount of nursing care provided to patients involves developing intensity of care indexes. The Relative Intensity Measure (RIM) developed in New Jersey as a method of determining hospital nursing costs quantifies patient care by DRG and assigns relative values to determine costs. The assumption used is that the more minutes (unit of measurement) used, the greater the intensity of care (Trofino, 1985). RIMs condenses 21 MDCs into thirteen Nursing Resource Clusters (NRCs). Each NRC contains a direct and indirect care component weighted by length of stay, thereby quantifying time spent providing patient care by DRG and assigning values to the time (Reschak, Birordi, Holm, & Santucci, 1985). Considerable criticism has been raised, however, by researchers regarding the reliability of RIMs due to the associated methodology and assumptions (Prescott, 1986; Herzog, 1985; Grimaldi & Micheletti, 1983; Trofino, 1985; Reschak et al, 1985). More recently Reitz (1985) used eleven functional health parameters, both biophysical and behavioral, to rank four levels of intensity according to the nursing process. This tool was designed to be used retrospectively in all types of care settings.

An inductive approach was used to develop a diagnostic classification system for nurses which has been used as the basis for nursing management

systems as well as for planning patient care (Roy, 1975). The nursing diagnosis describes patient problems in nursing terms, rather than in medical treatment or procedural terms (Halloran & Kiley, 1984). Use of nursing diagnoses is growing rapidly, especially in development of patient care plans. Several researchers (Adams & Duchene, 1985; Donnelly, 1981; Grant, Bellinger & Sweda, 1982) have noted the potential for using nursing diagnoses with acuity levels to determine patients' nursing resource needs.

Several attempts have been made to correlate most types of hospital classification systems with DRG's, usually in order to price nursing care per DRG (Sovie, Tarcinale, VanPutte, & Stunden, 1985; Bargagliotti & Smith, 1985; McClain & Selhat, 1984; Staley & Luciano, 1984; Reschak et al., 1985). Curtin (1983) proposed the development of 23 Nursing Care Categories to correlate with the DRG system's MDCs, which are then subdivided into 356 general Nursing Care Strategies to be correlated with the 356 DRGs. These Nursing Care Strategies are basically detailed nursing care plans which include the direct and indirect patient care need and which allow for variances in the patient's severity of illness.

Long-term Care Systems

Similar developments are occurring in long-term care facilities. For example, in 1986 New York State implemented a payment system for nursing homes based on Resource Utilization Groups (RUGs) based on a case mix index defined in terms of patients' clinical characteristics and the resources they use including variations in direct and indirect nursing care (Mitty, 1987). Illinois establishes a patient-specific intensity level for each of fourteen variables or service areas, while Maryland sets reimbursement rates

according to an assessment of dependency in five activities of daily living (Joel, 1986).

Ambulatory Care Systems

Because of its similarity to home care, ambulatory care systems could be of significant interest to home care managers. Several studies have attempted to quantify ambulatory care visits. Fetter, Averill, Lichtenstein, and Freeman (1984) developed the Ambulatory Visit Group (AVG) concept by controlling factors related to the client's condition and the visit status. AVGs define types of visits that are similar with respect to time spent in face-to-face contact with a client. Each group is defined in terms of specific values for variables that are strongly related to provider time.

Several diagnosis based systems are used in ambulatory care including the International Classification of Health Problems for Primary Care (Froom, 1976) which was developed specifically for use in ambulatory care settings. Problems are classified by organ system involvement in a manner largely consistent with ICD coding conventions. Greenlick, Hurtado, Pope, Saward, and Yoshioka (1968) designed a disease classification system which expanded the 17 broad ICD classes to 33 more specific categories in order to study medical care utilization for various types of morbidity.

Hurtado and Greenlick (1971) developed the Kaiser Clinical-Behavioral Classification System for non-hospital settings, which contains ten behavioral clusters drawn from 46 clinical subgroups. These clusters were estimated to produce similar resource use for clients of similar background. The Johns Hopkins Ambulatory Care Coding Scheme (Steinwachs & Mushlin, 1978) uses a collage approach requiring a minimum data set. By integrating several other coding schemes, this system is used to identify

cases, to estimate incidence and prevalence, to determine case-mix distribution, and to analyze patterns of client care and provider practice. It is, however, limited in its ability to relate case-mix data to resource use.

Tindall, Culpepper, Henderson, Richards, Rosser, and Wiegert (1981) defined a four-digit hierarchical code which can be used to describe the procedural component of the primary care visit based on Current Procedural Terminology (CPT-4) codes and the American Society of Hospital Pharmacists' classification. Schneeweiss, Rosenblatt, Cherkin, Kirkwood, and Haart (1983) used cluster analysis as a means to compare provider, organization, and client characteristics in the ambulatory medical care sector. Ninety-two diagnosis clusters were formed from 1977 and 1978 National Ambulatory Medical Care Survey data. The Reason for Visit morbidity scheme (USPH, 1979) developed by the American Medical Records Association considers the client's motivation for seeking medical care rather than diagnosis and includes the following eight modules: symptom, disease, diagnostic screening and prevention, treatment, injuries and adverse effects, test results, administrative, and uncodable entries.

Home Health Care Systems

According to Kapke (1980), the application of classification methods is different for home care services than for hospital settings. A central difference is that, in the hospital, one nurse is providing care to a group of clients simultaneously; therefore, a system is necessary to separate out the client care hours represented in any group of clients. By contrast, home care services are provided to an individual in a specific block of time. Martin and Sheet (1985) suggest that in community health the amount of nursing resource consumption relates to a number of variables, such as:

client motivation and involvement, personality, family support, physical environment, age, and sex.

Classification systems are new to home care and have taken a variety of approaches including classifying by levels of care, client characteristics and/or problems, nursing resources required, type of service, and client outcome. Few of the existing systems have been developed for the purpose of measuring productivity or pricing care, however.

For instance, the Omaha system (Simmons, 1980; VNA of Omaha, 1986) was developed to standardize problems encountered by community health nurses. Care is documented by the number and type of client problems. The classification scheme consists of 38 problem labels with mutually exclusive signs and symptoms organized into four domains: environmental, psychosocial, physiological and health behaviors. An initial study found a significant relationship between the number of nursing problems identified for a client and the length of an episode of care (Martin & Sheet, 1985).

Hardy (1984) selected four nursing diagnoses as representative of four broad categories of home health clients: (a) Acute, non-chronic, (b) Chronic disability with potential for improvement, (c) Chronic disability with need for ongoing care, and (d) end stage disease. Trends in her study indicated that a classification system for home health clients using nursing diagnosis categories and acuity levels would be an effective means of predicting nursing resources needed.

Donna Peters (1987) of Johns Hopkins Hospital is currently testing a classification scheme conceptualized around the four nursing diagnosis domains (environmental, psychosocial, physiological, and health behaviors) which are divided into fifteen community health nursing parameters. Using

the nursing process, each parameter is ranked on a four point scale according to the level of nursing resource indicated.

Kapke (1982) used cluster analysis to develop five home care client groupings of Medicare eligible clients in one home health agency based on demographic and service characteristics: (a) functionally impaired, (b) chronic illness or surgery, (c) amputation or hemiplegia, (d) injury or eye surgery, and (e) very old or terminal.

The PCS developed by Daubert at the VNA of New Haven, Inc. (1979), is one of the few systems based on outcomes. It centers on the rehabilitation potential of clients and attempts to answer the question: "Did service make a difference in the client's health status?" Clients are classified into one of five groups (one more than Hardy's) according to the chronicity of the medical problem and outcome measures of client care needs: (a) acute, non-chronic diseases, (b) chronic disease with acute episode, (c) chronic--potential to increase level of functioning, (d) chronic--needs on-going service of maintenance at home, and (e) end stage disease. This system measures the effectiveness of services by examining the actual end result functioning level of the client and is applicable to all diagnoses and relevant to all skilled service activities necessary for achieving the expected client outcome.

Several systems classify home care clients according to levels of care required. Price (1972) established three categories of nursing care: (a) essential, (b) progressive, and (c) comprehensive, with criteria for placement and standards for service in each category. Stewart (1979) separates clients into (a) those who require professional health care services to treat specific illnesses or injuries, and (b) those primarily in need of supportive services.

Hennessey and Gorenberg (1980) classify home care services according to (a) preventive services, (b) supportive services, or (c) therapeutic services.

The Multnomah County Community Health Services Division (Portland, Oregon) developed a client classification system based on client or family problems and an acuity point rating which can be used to assess the extent of and the subsequent change in the client's problem. The system measures, by diagnosis, the amount of time spent for each visit, the frequency, and the duration of visits made for nursing services (NAHC, 1985).

Conley (1986) has attempted to combine time and acuity factors by developing a system which assigns standardized time weightings to clients according to stage of preventive care provided (primary, secondary, and tertiary). Tertiary care visits are further weighted according to a prototype acuity classification system based on: family situation, psychological condition, caretaker/therapeutic competence, physiological condition and knowledge of health conditions, health behaviors/attitudes, general hygiene, environmental milieu, and community resources. Weightings are assigned arbitrarily.

The PCS being developed by the VNA of Los Angeles (Churness et al., 1986) is an example of a task based system. Based on 85 timed tasks grouped into thirteen categories, weightings are assigned to tasks according to average time requirements. While still in the development process, the validity and reliability of this system is questionable due to the wide time ranges, lack of observer training and qualifications, and agency specificity of the system.

As a mechanism to add a severity measure to medical classifications for home care, Susan Horn has proposed an adaptation of her Severity of

Illness Index to be used with ICD-9-CM codes. The severity of illness codes, adds to the five digit ICD code a sixth digit for the highest severity during the inpatient hospital stay, and a seventh digit for admission severity. An eighth digit to code for severity at discharge is being considered (NAHC, 1/27/1986).

The Easley-Storfjell Instruments for Caseload/Workload Analysis developed in Michigan in 1978, is one of the few methodologies which provides a description of a nurse's caseload according to both time and difficulty of care factors. Clients are grouped according to nursing care needs. Each dimension (time and difficulty) is divided into four levels of intensity according to the frequency of visits and six difficulty of care variables: clinical judgment, teaching needs, physical care, psychosocial needs, multi-agency involvement, and number and severity of problems (Allen, Easley, & Storfjell, 1986). The usefulness of this system has been demonstrated by its extended use in community health agencies for nearly ten years, its flexibility and adaptability to various types of settings, its ease of implementation, and its acceptance by all levels of staff. Its major limitation for use in productivity management and cost-finding is that the home visit is considered the smallest unit of measurement.

New York State (1986) recently commissioned a study to develop a patient classification system for home care which resulted in a 27 group classification system with six hierarchy categories or Resource Utilization Groups--Home Health Care (RUG-HHCs): rehabilitation, special care, mentally/behaviorally impaired, complex management, physical impaired with skilled care needs, and impaired community living skills. A case-mix index was computed for each RUG-HHC group.

Manton and Hausner (1986) applied a multivariate grouping methodology to records from the 1982 National Long Term Care Survey linked to Medicare records on home health reimbursements. Six health and functional status dimensions were identified which, when combined with factors describing informal care resources and local market conditions, explained significant proportions of individual differences in Medicare home health reimbursements and numbers of visits. The six dimensions identified were: (a) relatively functionally intact with limited medical problems, (b) musculoskelatal problems with serious mobility limitations, (c) cancer and other acute medical problems, (d) multiple chronic health problems, (e) acute and chronic circulatory and respiratory problems, and (f) neurologically impaired with a wide range of functional problems.

Summary of measurement methods

While many of the systems in use by health care organizations today are based on PCSs, it is important to remember the limitations of such systems. Patient classification is a generic term referring to the process of grouping patients into mutually exclusive categories. The term by itself conveys very little information. It derives meaning only when it is accompanied by a statement of purpose (Giovannetti, 1986). Most of the systems described above were designed for staffing and scheduling, reimbursement (pricing nursing care), or planning patient care. There is no reason to believe that a system designed for one purpose can replace one designed for another purpose. For instance, staffing systems project potential nursing needs for some future time period; reimbursement systems establish charges.

It is also important to remember that PCSs attempt to predict utilization of nursing resources rather than measuring their use directly.

According to Edwardson (1985), their use for productivity assessment may not be completely satisfactory since the goal of patient classification methods is to identify a limited number of easily measured critical indicators that are statistically powerful predictors of how much (quantity) nursing care will be required. These indicators usually fail, however, to identify the relative skill of the needed nursing care. They also fail to describe the process of care in sufficient detail to permit assessment of work flow, work design, and effectiveness of effort.

PCSs are usually oriented to time. While time is a basic dimension to the study of productivity and cost, time alone can not account for areas such as the skill needed to perform the care, the intensity of care needed, or the complexity of the tasks. According to Shaffer (1986), in the future these systems will need to be oriented to standards of care as well.

Although nursing activities must be disaggregated in order to be quantified, nursing is more than a summation of a series of timed tasks (Hegyvary, 1986). This is where the Scientific Management theory espoused by Gilbreth (1960) falls short. According to Drucker (1954), since we must analyze work into its simplest constituent motions, Scientific Management theory assumes that we must also organize it as a series of individual motions, each, if possible, carried out by an individual worker. To take apart and to put together are two different things: one uses a principle of analysis, the other a principle of action. Especially in the service industry, activities are often integrated when performed. The work sampling and time studies commonly used in developing patient classification systems are particularly insensitive to the non-repetitive and intellectual problem-solving activities required to give highly integrated and closely sequenced care (Edwardson, 1985).

Classification levels reflect care as it was provided when the levels were established. Changes in financing policies are likely to produce substantive changes in client care that may not be reflected in a patient classification system. For instance, of the few studies done attempting to identify predictors of the amount of home care used by clients, a primary critical indicator of duration and intensity of care tends to be the payer and agency (Day, 1984; Ballard & McNamara, 1983), demonstrating the strong influence the source of payment exerts on the amount and type of care provided to clients. Therefore, classification systems based on care being provided under one type of payment system could be obsolete when the criteria for payment change.

Measurement Devices

The majority of systems designed for pricing and/or productivity management purposes are based on the two approaches previously described (prototype and factor evaluation) or some combination of the two. The difference between the two types relates to the actual design of the classification instrument. The first generally describes the characteristics of clients typical to each category. The average amount of direct nursing care time provided within each care category has been determined from observational studies. The number of clients in each care category multiplied by the corresponding average care time provides an estimate of the total average direct care time required. This figure, coupled with an estimate of the total average indirect care time, gives the total average nursing care time required for a specified group of clients (Giovannetti, 1979). The limitation with this approach is one of precision, requiring careful monitoring of "within category" distributions (Gallagher, 1987).

In the second (and more common) type, a number of critical indicators or descriptors of direct care requirements are separately rated and then combined to designate a client's category. Typically, an exhaustive list of tasks or client characteristics is presented. Points are then assigned to these items according to their relative complexity as measured by time needed to complete the given task (Reitz, 1985). According to Gallagher (1987), this approach can minimize subjectivity. It may, however, fail to recognize time variabilities for activities occurring at different times and/or locations, and may also become cumbersome by including too many care indicators.

The number and scope of critical indicators used for classification systems has been debated considerably primarily because they often seem to lack comprehensiveness and have given limited attention to the psychosocial and teaching components of nursing care. Giovannetti (1979), however, points out that assessment for classification does not constitute the comprehensive assessment required for client care planning. She feels that since clients' psychological, social, and teaching requirements are larely met by nurses while providing physical or technical care, inclusion of critical indicators specific to emotional support and teaching may be redundant. The number of critical indicators need not restrict the possibilities for categorization.

In hospitals, patients may be classified by level of care categories every eight or twenty-four hours. In home care, the time per visit and/or visits per day statistics are generally calculated from daily activity reports completed by the nurse.

Effective nursing management cannot take place without uniform comprehensive terminology. According to Halloran and Kiley (1984), terms

describing nursing care should reflect the complexity of care, the judgment required of the nurse, and nurse competence. In addition, uniformity in data collection and expression is essential to accumulation and comparability.

An instrument developed to provide information for home care management systems must be easy to use in a distributed environment (away from the office and computer), simple in form, require minimal time, and be able to be integrated with other required documentation (Van Slyck, 1985; Bennett, 1983; Kay & Utenner, 1985; Marron-Cost, 1980).

CHAPTER III

METHODOLOGY

Design

This exploratory investigation used a field approach in which an observer (the researcher) recorded time for specific nursing activities during a series of home visits in order to analyze the content of a nursing visit. Client, nurse and agency demographic data were collected by use of interview schedules and questionnaires.

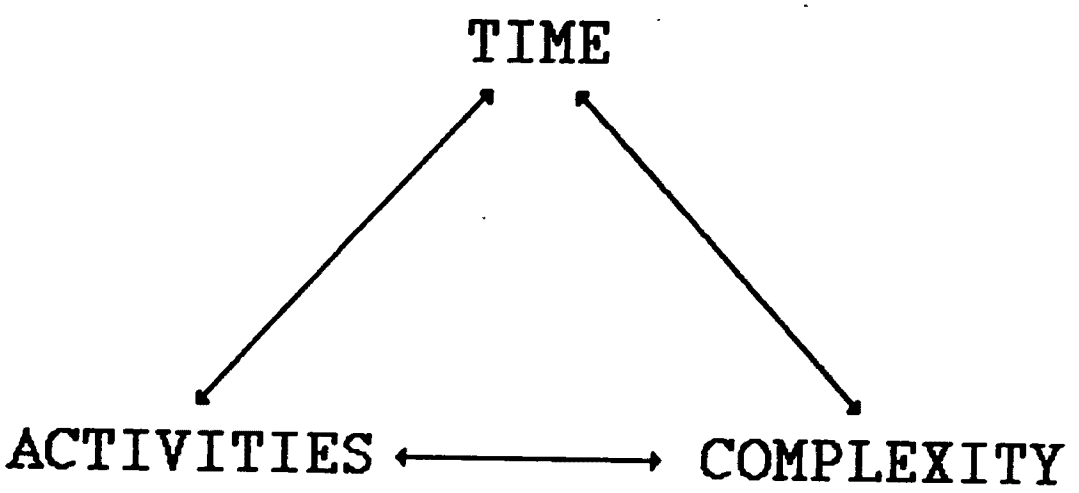
Conceptual Framework

As has been shown from the preceding literature review, most work measurement strategies involve time and activity--how long it takes to do a specific task. Recently concern has been expressed that the complexity of care delivered is also an important aspect of nursing services and should be considered in its measurement. While it is important to identify more precisely the time and activities that constitute home care nursing, care must also be taken not to overlook the interaction of these activities and the professional judgments involved. The ability to do more than one activity at the same time (e.g. assess and treat), as well as the varying degrees of complexity of the same task/service provided to clients in different circumstances, require that the complexity of care and skills be taken into account as well. Therefore, three dimensions were used as dependent variables to analyze the content of a home nursing visit: (a) the

type of activity performed, (b) time, and (c) the complexity or intensity of the service provided (See figure 1). This schema provided a conceptual framework for the study.

Figure 1

Dimensions of a home nursing visit



Time was conceptualized as minutes used in providing client-related services. Operationalization of activity types and complexity was done by adapting the classification scheme used in the Easley-Storfjell Instruments for Caseload/Workload Analysis (E-S) (Storfjell, 1987). The continuous use of the E-S classification system for nearly ten years in community health agencies throughout the United States and Canada has given it a measure of content validity. E-S classifies home care clients according to four levels of difficulty (complexity) based on six variables: (a) clinical judgment (assessment), (b) teaching (education), (c) physical care, (d)

psycho-social support, (e) multi-agency involvement (care coordination), and (f) number and severity of problems (See Appendix A). Five of the factors can be adapted to provide a framework for grouping client care activities. The sixth, number and severity of problems, is actually a potential indicator of care complexity and was assessed during the collection of client demographic data as a possible critical indicator. Analysis of services performed by grouping activities into these five major categories makes it possible to still identify specific tasks and associated times while at the same time allowing for the interaction of services and judgments involved. Complexity can also be integrated into the categories.

Client-related activities occuring prior to and following a visit were categorized as: (a) travel, (b) documentation, and (c) non-visit care management or coordination. Care management activities include such things as preparing for the visit, arranging for services, and communicating with other care providers such as physicians, therapists, and aides.

Sample

Home visits were made between February and July, 1987, to a convenience sample of eight geographically dispersed Medicare certified home health agencies stratified according to type: freestanding (non-profit and proprietary), and hospital-based. Agencies were selected based on their willingness to participate in the study, accessability, and their scope of services. An attempt was made to ensure that home visits were made to clients in each of the following programs: high tech, terminal care, medical/surgical, and rehabilitation. In order to obtain as "routine" a sample of home visits as possible, the researcher requested to accompany

nurses on home visits that were normally scheduled for the day. Nurses and visits were selected by the agency.

Subjects

Observed home visits (n=75) were made to 74 clients. One client was visited twice. Twenty-six nurses (25 R.N.s and 1 LPN) were observed making home visits. Visits per nurse ranged from one to five with 74 visits observed with R.N.s and one visit observed with an L.P.N. Eight agencies participated in the study. They were distributed geographically in five different HCFA regions and in five states: California, Minnesota, Michigan, Maryland, and Massachusetts. Half of the agencies (n=4) were freestanding agencies and half (n=4) were hospital based. Of the four freestanding agencies, one was a voluntary agency, one was a governmental agency, and two were proprietary agencies. Observed home visits were distributed among agencies as follows: Forty percent hospital-based (n=30) and sixty percent freestanding (n=45). A breakdown of the visits made to freestanding agencies includes: 12 percent to health departments (n=9), 20 percent to visiting nurse associations (n=15), and 28 percent to proprietary agencies (n=21).

Table 1

Observed visits according to type of agency

	Freestanding Agencies			Hospital based	
	Official/ Voluntary	Proprietary	Total Freestanding	Agencies	Total
N	24	21	45	30	75
%	32%	28%	60%	40%	100%

Human Subjects Review

Prior to beginning this study, approval was obtained from The University of Michigan School of Nursing Human Subjects Review Committee with regard to the protection of human subjects. Agencies, and nurses participating in the content analysis (observed home visit) portion of the study signed statements regarding their willingness to participate. Clients were informed regarding the purpose of the observer during the home visit and verbal consent to participate in the study was obtained. A written statement explaining the study and identification of the researcher was offered to the clients (See Appendix B).

Instruments

Five instruments were developed for data collection purposes: (a) home visit content recording form, (b) client data form, (c) agency questionnaire, (d) RN questionnaire, and (e) home visit content analysis form (See Appendix C).

The home visit content form was constructed to allow the observer to list time used for activities according to the five E-S categories. Accordingly, it was designed with six columns (one each for assessment, education, physical care, psycho-social, care coordination, and other) and thirty numbered rows to be used each minute. The observer used the form by recording specific activities performed each minute in one of the five categories in each row (one row used for each minute). Minutes utilized in each category are totaled at the bottom of the form. Additional forms were used as required by the length of the visit.

The client data form was developed using information readily available to the observer, either by observation during the visit, or in the medical record on HCFA Form 485, the plan of treatment, and problem lists. Information was collected on areas which either (a) had been shown through a survey of the literature or other studies to have a potential relationship to the type, length, and/or complexity of home visit activities, and/or (b) were, in the experience of the researcher, variables which might explain variations in visit activities.

The following types of information were collected on all clients: demographic (birth date, race, sex, marital status, socioeconomic status, languages spoken), payment source, referral source, admission and service history (admission status, number of previous nursing visits made, number of nursing visits planned, frequency of nursing visits), environmental situation (quality and type of housing, pets), support systems (living arrangements; availability, willingness and capability of caregivers), and physical care information (primary and secondary diagnoses, surgery, functional limitations, activities permitted, number of orders for treatment, number of medications, safety measures, mental status, diet, medical equipment and supplies ordered, prognosis, and number of nursing problems).

The agency questionnaire was designed to collect information about agencies participating in this study which might differentiate them from other agencies and which may have a relationship to types of services provided. Data collected on this form included: geographic (HCFA region, urban/suburban/rural), longevity (years in operation), type of agency (community--voluntary, private-non profit, for profit; hospital based), organizational structure (freestanding, sub-unit, subdivision, other), types of

services provided, size (number of clients, visits, admissions), reimbursement (number of visits by payer), and clients' age.

The RN questionnaire provided information regarding nurses participating in the study including: age, sex, basic nursing education, highest educational degree, years of experience, special training, employment status, and payment mechanism.

Information obtained during the home visit (content analysis) was transferred and tallied on the "Home Visit Content Analysis Summary" form. An area was available for the observer to indicate whether, in her opinion, the time usage by the staff nursing during the home visit was appropriate, low, or high. In addition, both complexity ratings were recorded on this form and comments concerning the reasons for the various ratings. Finally, non-visit client related time was recorded on the form and total time (visit and non-visit) was calculated.

The data collection instruments were pre-tested during three home nursing visits. Following these initial observed home visits, the data collection instruments were revised slightly to improve ease of use. Two additional variables, frequency of nursing visits and history of surgery, were added to the client data form and two variables, employment status and payment mechanism, were added to the RN questionnaire. The suitability of the five E-S activity categories was evaluated during this trial phase and it was noted that all activities fit easily into one of the five E-S categories.

Data Collection Procedure

A type of content analysis, inter-action analysis, was used to analyze the activities occurring during the course of a home visit. A work sampling approach was utilized in order to obtain actual, objective

information regarding the content of visits made by home care nurses, rather than using the less reliable methods such as self reports.

Inter-action analysis is a type of time-motion study in which the observer logs activities at specified time increments, in this case every 60 seconds. Accordingly, during a series of home visits, an observer recorded time used for specific nursing activities performed in each of the five E-S categories. As a check on the representiveness of the five activity categories, any activity observed which did not clearly fall into one of the five categories, was to be listed in a column marked "other."

Using the five categories described above, the same observer timed the nursing activities of 75 home visits in a group of Medicare certified home health agencies, recording specific activities each 60 seconds. Client-related visit time was divided into actual visit time (using the five E-S activity groups) and non-visit time. Non-visit time included travel, documentation and care coordination. The non-visit client-related activities are more difficult to document by an observer. Therefore, nurses were requested to record and report to the researcher time spent related to a specific visit for documentation of the visit and care coordination. The observer recorded travel time to and from the home visit.

Use of an observer, in contrast to self-administered studies, of necessity limited the number of home visits that could be included in the study. However, the degree of specificity and accuracy was increased considerably. In addition to noting and timing the type of activity performed, it was possible to observe any integration and/or overlap of activities.

Following the visit, the observer ranked each activity category and the composite visit according to their E-S level of complexity (difficulty).

As a measure of reliability, a second indicator of complexity was recorded. The staff nurse was asked to independently rank each of the five activity categories and the home visit as a whole on a four point scale, with one being the least complex and four being the most complex, in comparison to all other home visits made by her/him. Reasons for the assigned rankings were recorded by the observer. The observer also collected the demographic data for each client, nurse, and agency.

Data Analysis Procedures

Data were analyzed on Midas (Michigan Interactive Data Analysis System) operated under the Michigan Terminal System (MTS) at The University of Michigan, and on Systat microcomputer software. Initially, the time and complexity variables, as well as the demographic data collected on clients, nurses and agencies were analyzed using descriptive statistics. This included the individual tasks which comprised the activity groups. Correlations were done on grouped time and complexity variables in order to identify any significant relationships. Pearson product moment correlation was used for interval data and Spearman's rho was used for ordinal data.

Several approaches to developing a model useful in measuring nursing services to clients in their homes were evaluated including a timed task approach, grouping visits according to combinations of time and complexity, and the development of time weighted taxonomy based on activity categories and service complexity. A taxonomy, according to Roy (1975), is a set of classifications which are ordered and arranged on the basis of a single principle or of a consistent set of principles.

In order to evaluate a timed task approach, tasks were identified for each of the 5 activity groups. Central tendencies and variance were calculated for each of the tasks. A taxonomy of the five activity groups and the four levels of complexity for each group was developed with central tendency and variability measures computed for each activity/complexity diad. Identification of visit types based on various combinations of activities, time, and complexity was accomplished by using cluster analysis and multivariate regression techniques.

Cluster analysis is a multivariate procedure for detecting natural groupings in data. It is used to separate objects into mutually exclusive constituent groups. According to Bijnen (1973), cluster analysis attempts to construct groups of variables in such a way that the clustered variables have "great" similarity between each other but show "little" similarity with variables outside that cluster. The hierarchical method using standardized scores and Euclidian distance was used. The hierarchical method partitions a set of variables into a group of nested sets and displays the linkage of variables as the joining of branches of a tree (Wilkinson, 1984). Cluster analysis was used to identify groups (clusters) of visits based on different combinations of time, activity, and complexity variables.

Multivariate techniques deal with problems that involve describing the relationship between two or more variables (Kleinbaum & Kupper, 1978). Regression analysis allows the researcher to identify what independent or predictor variables are related to the criterion variable and to predict values on the criterion variable when given values on the independent or predictor variables (Edens, 1987).

One-way analysis of variance was utilized to identify significant relationships between total visit time and various continuous variables

related to visit, client, nurse, and agency in each of the visit categories. Two-way analysis of variance measures were used to identify relationships between total visit time and categorical variables.

Relationships between client, nurse, agency and visit data were studied to identify possible predictors of total visit time as well as to identify predictors of each visit profile. This was done by using multiple regression techniques at the .1 inclusion level. Coefficients are expressed in units of the dependent variable. A glossery of statistical symbols is shown in Appendix D.

Reliability and Validity

By using the same observer for all home visits, inter-rater variances were controlled. Content validity was established by using the five mutually exclusive service categories and recording all activities performed during the course of the home visit into one of these five categories. Use of the "other" activity category was not required as the nursing activities easily fit into the five E-S categories, further demonstrating the validity of that system of activity classification.

Reliability of the complexity ratings was established by using a second rating measure, ranking by staff nurse, and comparing that to the E-S ratings.

Since application of the resulting instruments of this study will involve establishing agency specific time weights, it was not necessary to evaluate the validity or reliability of the weights themselves. Of more significance was the validity of the specific visit profiles identified and their critical indicators. The validity and reliability of the proposed models and visit profiles should be the focus of later studies.

CHAPTER IV

RESULTS

Description of Subjects

Client Characteristics

The seventy-four clients participating in the study ranged in age from five years to 92 years with an average age of 68. Twenty-six percent were males (n=19) and 74 percent (n=55) were females. Ninety percent (n=67) of the clients were white, seven percent (n=5) were Black, and three percent (n=2) were Hispanic. Table 2 shows the distribution of clients according to race and sex. Slightly over half (53%, n=39) were married, while 13 percent (n=10) were single, 30 percent (n=22) were widowed, and

Table 2

Relationship between client sex and race

	White	Black	Other	Total
Male				
N	17	0	2	19
Row%	89%		11%	100%
Female				
N	50	5	0	55
Row%	91%	9%		100%
Total				
N	67	5	2	74
%	90%	7%	3%	100%

four percent (n=3) were separated or divorced (see Table 3 for tabulation of marital status by sex). All but one client spoke English. Socioeconomic status was categorized as: low, 39 percent (n=29); middle, 58 percent (n=43); and high, three percent (n=2). Thirty-nine percent (n=29) of clients had pets in their homes.

Table 3

Relationship between client sex and marital status

	Single	Married	Widowed	Separated/ Divorced	Total
Male					
N	3	12	2	2	19
Row%	15%	63%	11%	11%	100%
Female					
N	7	27	20	1	55
Row%	13%	49%	36%	2%	100%
Total					
N	10	39	22	3	74
%	13%	53%	30%	4%	100%

Home health service profiles showed considerable variation. The number of previous home visits made to clients (n=73) ranged from none to 259 with a mean of 14 and a standard deviation of 33.68. Total visits planned to clients (n=56) ranged from one to 120 with a mean of 15 and standard deviation of 19.72. Visit frequency varied from twice daily to every thirty days with an average interval of 6.31 days between visits (sd=7.81). The current episode of care was the first admission to the agency for 65 percent of the clients (n=48). Twenty percent (n=15) of the clients were being admitted to service during the observed visit. The number of home health disciplines serving each client ranged from one

(nursing) to five with a mean of 1.74 and a standard deviation of 0.86. In addition to nursing services 16 percent (n=12) of the clients received physical therapy services, four percent (n=3) received occupational therapy, three percent (n=2) received speech pathology, five percent (n=4) were visited by a medical social worker, and 45 percent (n=33) received the services of a home health aide. Number of orders for care ranged between one and ten with an average of 4.26 orders per client and a standard deviation of 2.56.

Reimbursement sources for clients included: Medicare, 64 percent (n=47); Medicaid, 16 percent (n=12); Blue Cross, one percent (n=1); other private insurance, 14 percent (n=10); self pay, four percent (n=3); and free care, one percent (n=1). Referral sources included: client/family, three percent (n=2); physician, four percent (n=3); hospital, 82 percent (n=51); and other sources, 11 percent (n=8).

There was also considerable variation in clients' living conditions. Seventy-three percent (n=54) of the clients lived in detached houses, seven percent (n=5) in town or row houses, and 20 percent (n=15) lived in apartments. The majority of houses visited were considered clean (62%, n=46), while 28 percent (n=21) were classified as cluttered and ten percent (n=7) were classified as dirty. Fourteen percent (n=10) were considered unsafe. Thirty-one percent (n=23) of clients lived alone, 42 percent (n=31) lived with their spouse, 11 percent (n=8) lived with families (including spouse), and the remainder (16%, n=12) lived with other individuals or groups. Half of the clients (50%, n=37) had a caregiver available full time, 28 percent (n=21) had a part time caregiver, and 22 percent of clients (n=16) had no caregiver available. Male clients had a significantly (X^2=6.04, p=.049, Ø=.284) higher availability of caregivers than did female

clients (See table 4). Willingness of the available caregivers was judged to be high in 69 percent (n=40) of the cases where caregivers were available, moderate in 17 percent (n=10), and low in 14 percent (n=8). Caregivers were judged capable of providing the following levels of care: heavy (34%, n=20), moderate (41%, n=24), and light (33%, n=14).

Table 4

Caregiver availability by client sex

	Full time	Part time	Unavailable	Total
Male				
N	14	3	2	19
Row %	74%	16%	10%	100%
Female				
N	23	18	14	55
Row %	42%	33%	25%	100%

X^2=6.04 p=.049 Ø=.284

Data on several indicators of health condition or status were collected. Twenty-four percent (n=18) of clients had had surgery prior to their home health admission. Circulatory problems, including C.V.A. (n=4), accounted for 22 percent (n=16) of all primary diagnoses; 18 percent (n=13) having skin and subcutaneous diagnoses; and eight percent (n=6) of clients with a primary diagnosis of cancer. The remainder of clients (52%, n=39) were distributed among ten other diagnostic categories (see Table 5). The number of medications prescribed for each client varied from none to 20 with a mean of 6.38 and a standard deviation of 3.92. The number of nursing problems identified per client ranged from 1 to 16 with a per client average of 3.26 and a standard deviation of 1.96. Prognosis of clients was

listed as follows: poor, 12 percent (n=9); guarded, 30 percent (n=22); fair, 23 percent (n=17); good, 31 percent (n=23); and excellent, 4 percent (n=3).

Table 5

Number of clients by primary diagnosis

	Number	Percent
Circulatory system	12	16%
--C.V.A.	4	5%
Skin & subcutaneous tissue	13	18%
Endocrine, nutritional, metabolic, & immune disorders	4	5%
--Diabetes	4	5%
Neoplasms	6	8%
Respiratory system	4	5%
--C.O.P.D.	2	3%
Musculoskelatal system & connective tissue	4	5%
--Arthritis	2	3%
Nervous system & sense organs	4	5%
Digestive system	4	5%
Genitourinary system	4	5%
Injuries, fractures	3	4%
Pregnancy	2	3%
Blood & blood forming organs	1	1%
Mental disorders	1	1%
Totals	74	100%

Client's functional limitations included: amputation, five percent (n=4); incontinence of bladder and/or bowel, 24 percent (n=18); contractures, 12 percent (n=9); impaired hearing, 18 percent (n=13); paralysis, 20 percent (n=15); limited endurance, 91 percent (n=67); difficulty with ambulation, 86 percent (n=64); mental impairment, 16 percent (n=12); speech impairment, 16 percent (n=12); vision impairment, 18 percent (n=13); respiratory impairment, 31 percent (n=23); and eight percent (n=6) had other functional limitations. Twenty percent of clients (n=11) were confined to bed or had bathroom privileges only. Sixty-two percent of clients (n=46) required some mechanical assistance with walking, distributed as follows: crutches, one percent (n=1); cane, seven percent (n=5); walker, 27 percent (n=20); and wheelchair, 27 percent (n=20). All clients had some type of safety measures taken including, among other things, oxygen safety, 8 percent (n=6); I.V. precautions, one percent (n=1); and catheter safety, nine percent (n=7). Eighty-four percent of clients had durable medical equipment or medical supplies ordered ranging from one to 14 articles with an average of 2.3 (sd=2.5).

In seventy-two percent (n=53) of clients, mental status was considered normal. Impairments in mental status were found in the remaining 28 percent as follows: seven percent (n=5) were forgetful, five percent (n=4) were depressed, seven percent (n=5) were disoriented, four percent (n=3) were lethargic, four percent (n=3) were agitated, and one percent (n=1) had another mental condition.

Forty-one percent (n=31) of clients were on regular diets. Primary dietary restrictions for the remaining (59%, n=43) clients was distributed as follows: diabetic (20%, n=15), low salt (18%, n=13), low calorie (4%, n=3),

low fat (1%, n=1), soft (1%, n=1), and other diets (7%, n=5). Table 6 lists some of the major client characteristics.

Table 6

Client characteristics

	Mean	S.D.	Range
Age	68.00	6.22	5-92
# Physician orders	4.26	2.56	1-10
# Nursing problems	3.26	1.96	1-16
# Medications prescribed	6.38	3.92	0-20
# Previous home visits	14.00	33.68	0-259
Frequency of visits (days)	6.31	7.81	.5-30
# Home health disciplines	1.74	0.86	1-5

	N	%		N	%
Sex:			Functional limits:		
Male	19	26%	Endurance	67	91%
Female	55	74%	Ambulation	64	86%
			Respiratory	23	31%
First admission	48	65%	Incontinence	18	24%
Initial visit	15	20%	Mech. assistance required for ambulation	46	62%
Reimbursement:					
Medicare	47	64%			
Medicaid	12	16%	Mental status		
Other	15	20%	normal	53	72%
Referral Source:			Regular diet	31	41%
Hospital	51	82%			
Physician	3	4%	Prognosis:		
Other	10	14%	Poor/guarded	31	42%
			Fair	17	23%
Prior Surgery	18	24%	Good/excellent	26	35%

Nurse Characteristics

Ninety-six percent (n=25) of the twenty-six nurses participating in the study were female and four percent (n=1) were male. Basic nursing education was varied: four percent LPN (n=1), 27 percent A.D. (n=7), 27 percent diploma (n=7), and 42 percent B.S. (n=11). The highest educational degree achieved was as follows: four percent LPN (n=1), 15 percent diploma (n=4), 19 percent A.D. (n=5), 42 percent B.S. (n=11), eight percent M.S. (n=2), and 12 percent M.P.H. (n=3).

Ages of nurses ranged from 27 to 47 years with an average age of 34 years. Experience as a nurse varied from one to 28 years, averaging 10 years with an average of four of those years in home care and over three years in the current agency. Fifty percent of the staff nurses (n=13) had received specialized training in addition to their regular academic degrees. Sixty-nine percent (n=18) of the nurses were employed full time and thirty-one percent (n=8) were employed part time. Eighty-five percent (n=22) were paid on a salary or hourly basis as regular agency employees, eleven percent (n=3) were paid on a fee-for-service basis, and four percent (n=1) worked under a subcontract to the agency. Educational background and nurse payment mechanism are shown in Table 7 according to employing agency.

Agency characteristics

The eight agencies participating in the study had been in operation between three and 76 years with a mean of 22. They were equally divided among freestanding (n=4) and hospital-based (n=4) agencies and located in five different HCFA regions. Of the freestanding agencies (n=4) 25 percent

Table 7

Nurse characteristics according to agency type

	Health Dept.	Voluntary	Proprietary	Hospital based	Totals
N	6(23%)	5(19%)	6(23%)	9(35%)	26
Education:					
LPN	--	--	1(17%)	--	1
AD	--	3(60%)	--	2(22%)	5
Diploma	--	1(20%)	1(17%)	--	2
BS	4(66%)	1(20%)	1(17%)	5(56%)	11
MS	1(17%)	--	--	1(11%)	2
MPH	1(17%)	--	1(17%)	1(11%)	3
Totals	6(100%)	5(100%)	6(100%)	9(100%)	26
Payment mechanism:					
Salary/hourly	6(100%)	5(100%)	2(33%)	9(100%)	22
Fee-for-service	--	--	3(50%)	--	3
Subcontract	--	--	1(17%)	--	1

(n=1) were health departments, 25 percent (n=1) were visiting nurse associations, and 50 percent (n=2) were proprietary agencies. The eight agencies ranged in size from 1708 visits per year to 54,941 visits per year with a mean of 18,599 visits. Number of clients served in the past year varied between a low of 138 to a high of 7167 with an average of 1463 clients. Sixty-three percent (n=5) of the agencies offered services other than Medicare reimbursed types of services.

Visit Analysis

Visit related time

Seventy-five observed home nursing visits were made to seventy-four clients with activities recorded every minute according to the five E-S

activity categories. Assessment activities generally took longer time ($\bar{X}$=13.88) than other visit activity groups. There was considerable variability in all of the time categories as evidenced by standard deviations ranging from 5.61 (care coordination) to 17.33 (documentation). The average in-home time per visit was 41 minutes with a standard deviation of 21.81. When this is combined with non-visit time (documentation, $\bar{X}$=19, sd=17.33; care coordination, $\bar{X}$=13, sd=13.41; and travel, $\bar{X}$=19, sd=12.71), the average total time per visit was found to be 92 minutes. Median times, however, were considerably shorter for most categories with the median for visit time being 37 minutes and for total time being 76 minutes.

Visit Activities. Significant ($p<.05$, df=73) relationships were found between several activity/time categories. For example, there is a weak positive relationship between assessment time and time used for education (r=.3), physical care (r=.24), psychosocial support (r=.26), and care coordination (r=.24); and a strong positive relationship between assessment and documentation time (r=.6), actual visit time (r=.59) and total visit-related time excluding travel (r=.66). In addition, moderately strong positive relationships were found between education time and time for documentation (r=.37), visit time (r=.49), and total time (r=.5). Physical care time, in addition to admission time, was found to have positive relationships with home visit time (r=.41), and total time (r=.23). Psycho-social support time was also found to have similar positive relationships: visit time (r=.48), and total time (r=.35). Care coordination time during the visit was found to have additional positive relationships with visit time (r=.48), and total time (r=.35). When both in-home and non-visit care coordination time were grouped together, it was found to have positive

relationships with home visit time (r=.31), and total time (r=.52) (see Table 8).

Table 8

Visit-related time—correlation matrix

N=75	Assessment Time	Education Time	Physical Care Time	Psycho-social Time
Assessment time	1.000			
Education time	0.298*	1.000		
Physical care time	-0.241*	-0.078	1.000	
Psychosocial time	0.262*	-0.070	-0.080	1.000
Care Coord. time	0.236*	0.215	0.022	0.111
Documentation time	0.600*	0.371*	-0.074	0.115
Non-visit coordination	0.066	0.104	0.071	0.022
Travel	-0.029	-0.076	0.022	0.093
Visit Time	0.590*	0.486*	0.408*	0.477*
Total visit-related time	0.659*	0.503*	0.234*	0.347*
	Care Coord Time	Document Time	NV Coord. Time	Travel Time
Care Coord. time	1.000			
Documentation time	0.007	1.000		
Non-visit coordination	0.076	-0.015	1.000	
Travel	0.147	-0.212	-0.015	1.000
Visit Time	0.502*	0.413*	0.138	0.047
Total visit-related time	0.446*	0.713*	0.441*	-0.078
	Visit Time	Total Time		
Visit Time	1.000			
Total visit-related time	0.521*	1.000		

*p<.001

In order to predict the amount of time used in each of the five different activity categories, multiple regressions were run for several client, agency, and nurse variables on each of the timed activity groups. A significant (F=15.462, df=6, p=.000) relationship (r_2=.577, SE=6.68) was found between assessment time (b_o=11.947, p=.000) and initial visits (b=17.162,

p=.000), a fair prognosis (b=4.837, p=.014), daily visits (b=-4.768, p=.05), agency type (b=-1.176, p=.104), sex (b=2.782, p=.003), and history of surgery prior to admission (b=1.751, p=.058). The predictive ability of these six variables was confirmed by a forward stepwise regression at the .1 inclusion level. Initial visits accounted for 41 percent of the variance of assessment time, with the other six variables (hospital-based agencies, sex (male), fair prognosis, daily visits, and surgery prior to admission) increasing predictive ability to 58 percent. In other words, assessment time was longer if the visit was an initial visit, if it was made by a hospital-based agency, if the client was male, if the client had a fair prognosis, if the interval between visits was more than one day, and if the client had had surgery prior to admission.

Visit time spent in education (b_o=4.491, p=.004) was found to have a significant (F=4.439; df=4, p=.003) relationship (r_2=.202, SE=7.365) with initial visits (b=4.827, p=.029), Medicare visits (b=4.664, p=.011), a fair prognosis (b=4.357, p=.357), and one other non-agency health care provider (b=-3.405, p=.086). A stepwise forward regression (p<.1) confirmed the total predictive ability of these four variables at 20 percent with Medicare visits accounting for seven percent of the variance and a fair prognosis, initial visits, and one other health care provider (the physician) accounting for the remaining 13 percent of education time variance. This indicates that time utilized for education was longer if (a) the visit was reimbursed by Medicare, (b) the client had a fair prognosis, (c) it was an initial visit, (d) and (e) there was more than one other health care provider involved.

Only the number of medications a client was taking, between four and seven, was found to be significantly (F=5.117, df=1, B=6.436, p=.027)

related (r_2=.066, SE=12.132) to time spent providing physical care (b_o=4.5, p=.016), explaining only six percent of the variance.

Significant (F=5.514, df=3, p=.002) relationships (r_2=.189, SE=8.056) were found between visit time spent providing psychosocial support (b_o=6.644, p=.000) and a poor prognosis (b=4.286, p=.028), number of home health disciplines serving the client (b=-2.117, p=.029), and sex (b=2.743, p=.013). A stepwise forward regression (p<.1) showed the predictive power of these three variables to be: poor prognosis, seven percent; number of home health disciplines, an additional six percent; and sex (male), an additional five percent. Longer time was, therefore, spent on psychosocial support for clients with a poor prognosis, males, and those clients receiving two or more additional home health services.

Finally, the last of the five activity categories, in-home care coordination time (b_o=3.111, p=.015) was found to have a significant (F=8.025, df=7, p=.000) relationship (r_2=.456, SE=4.372) with seven variables: initial visit (b=4.177, p=.003), admission status (b=2.581, p=.029), one to two physician orders (b=-4.628, p=.002), four to seven medications (b=2.291, p=.032), a fair prognosis (b=3.442, p=.01), voluntary or health department agency (b=3.046, p=.000), and staff nurse's education (b=-3.34, p=.004). A stepwise forward regression (p<.1) confirmed the predictive ability of these seven variables as: voluntary agencies or health departments, 10 percent; baccalaureate or masters prepared nurses, an additional 11 percent; four to seven prescribed medications, an additional six percent; initial visits, an additional five percent; one or two physician orders, an additional six percent; a fair prognosis, an additional four percent; and repeat admissions, a final four percent; for a cumulative total predictive ability of 46 percent. Therefore, more time was spent on care coordination during the visit by

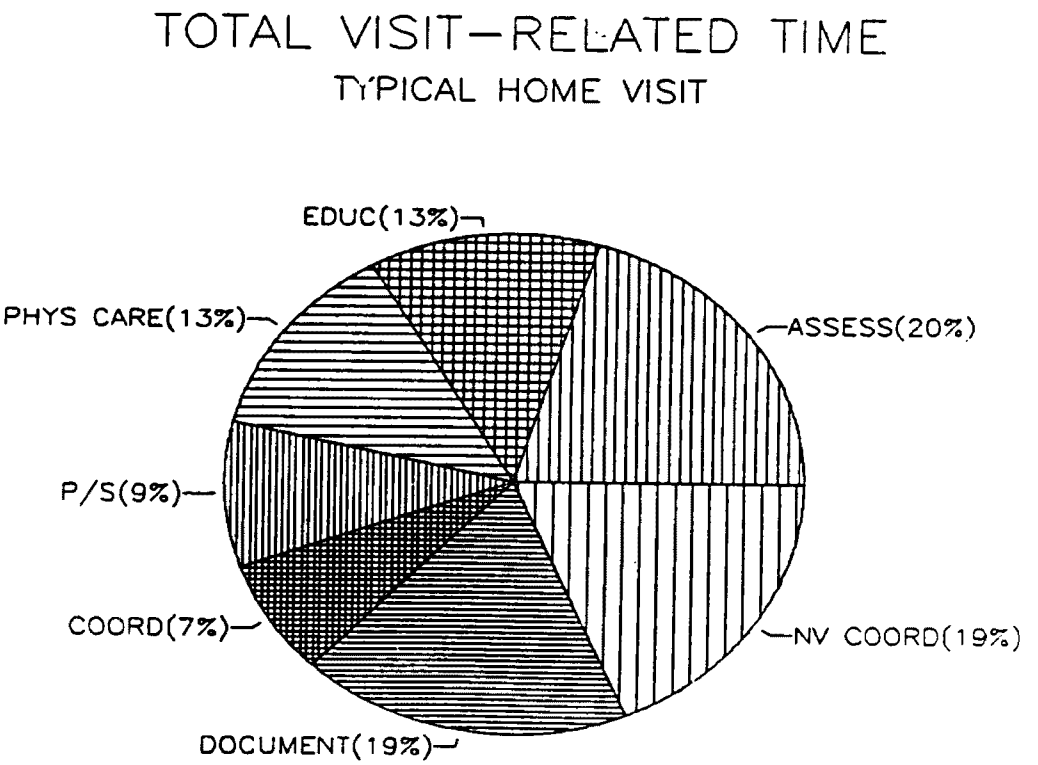
voluntary and health department agencies, by bachelor's and master's prepared nurses, if the client had four to seven prescribed medications, if it was an initial visit, if the client had three or more physician orders, if the client's prognosis was fair, and if this was the client's first admission to the agency.

In addition to identifying critical indicators of the five activity categories, regressions were done on the actual number of tasks performed during the home visit. There was a significant ($F=7.045$, $df=5$, $p=.000$) relationship ($r_2=.338$, $SE=2.652$) between the number of tasks ($b_0=11.074$, $p=.000$) and initial visits ($b=1.542$, $p=.06$), one or two physician orders ($b=-2.215$, $p=.018$), daily visits ($b=-1.766$, $p=.07$), number of home health disciplines involved ($b=-1.073$, $p=.002$), and sex ($b=.715$, $p=.048$). A stepwise forward regression ($p<.1$) showed the total predictive ability of these variables to be 34 percent with more than one home health discipline involved with the client accounting for 18 percent of the total variance. The remaining 16 percent of variance was accounted for by one or two orders, initial visits, male clients, and daily visits. This indicates that more tasks were done by the nurse during the visit if the client had three or more physician orders, a visit interval of more than one day, two or more additional home health services involved, and if the client was male.

Non-visit time. Time for non-visit activities directly related to specific visits was collected for travel, documentation, and care coordination. Documentation time was found to have a strong significant ($p<.5$, $df=73$) relationship with assessment time ($r=.6$), education time ($r=.37$), visit time ($r=.41$), and total visit-related time ($r=.71$). Non-visit care coordination time was positively related to total visit-related time ($r=.44$). No relationships were found between travel time and any other time

grouping. Figure 2 depicts the distribution of time for a typical home visit (using median times).

Figure 2



Multiple regressions were run in order to identify predictors of time for the non-visit activities. Documentation time was found to have a significant (F=11.215, df=5, p=.000) relationship (r_2=.448, SE=13.331) with five variables: initial visits (b=20.652, p=.000), Medicare visits (b=7.747, p=021), three to five physician orders (b=-14.918, p=.001), one or two physician orders (b=-13.82, p=.011), and clients with one other health care provider (b=-8.416). The stepwise forward regression (p<.1) confirmed the predictive ability of these variables with the initial visit accounting for 26 percent of the total variance in documentation time. Three to five physician orders, Medicare visits, and no health care providers other than the home care agency and physician accounted for an additional 19 percent of the variance. This indicates that significantly more time was spent on documentation for initial visits, Medicare visits, for visits to clients with six or more physician orders, and for clients with two or more other health care providers.

Time utilized for coordination of care outside of home visit time had a significant (F=7.366, df=4, p=.000) relationship (r_2=.296, SE=11.569) with a poor prognosis (b=5.022, p=.074), available caregivers in the home (b=5.326, p=.080), education of the staff nurse (b=-11.171, p=.000), number of home health disciplines providing care to the client (b=-3.251, p=.020), a poor prognosis (b=5.022, p=.074), and an available caregiver (b=5.33, p=.08). The predictive ability of these variables, as shown by the stepwise forward regression (p<.1), was 30 percent with the nurse's education at the baccalaureate or masters level explaining 17 percent of the variance. An additional 13 percent of variance was accounted for the number of home health disciplines involved, a poor prognosis, and the availability of a caregiver on either a full time or part time basis. Therefore, more time

was spent coordinating care either prior to or following the home visit by nurses with Bachelor's and Master's degrees, for clients receiving two or more other home health services, for clients with a poor prognosis, and for clients with caregivers available part time.

Only visit frequency, every two to three days, was found to have a significant ($F=4.739$, $df=1$, $p=.033$) relationship ($b_0=22.382$, $p=.000$) with travel time ($r_2=.06$, $SE=12.4$), explaining only 6 percent of the variance. Since travel time was not shown to have a strong relationship with other variables, it was not included in total visit-related time in subsequent analyses. Table 9 lists characteristics of visit activity categories.

Total visit-related time. Significant ($p<.1$) relationships were found between visit and total time (excluding travel) and several independent variables. In addition to the relationships noted above with visit activity time, actual visit time was significantly related to assessment complexity ($r_s=.312$), education complexity ($r_s=.404$), payer source ($r_s=.461$), number of previous home visits made ($r_s=-.532$), number of home health services involved ($r_s=.429$), number of medications prescribed ($r_s=.339$), and the number of nursing problems identified ($r_s=.287$). Total visit-related time was significantly ($p<.05$) related to education complexity ($r_s=.303$), psychosocial support complexity ($r_s=.35$), care coordination complexity ($r_s=.317$), payer type ($r_s=.286$), number of home health services ($r_s=.583$), and the number of client medications ($r_s=.294$).

Multiple regressions run on various client, agency, and nurse variables showed significant ($F=8.616$, $df=5$, $p=.000$) relationships ($r_2=.384$, $SE=17.718$) between visit time ($b_0=38.059$, $p=.000$) and five variables: initial visit ($b=.349$, $p=.000$), Medicare visits, ($b=14.398$, $p=.002$), one or two physician orders ($b=-14.108$, $p=.022$), clients with one other health care provider (the

Table 9 Characteristics of visit-related time

N=75	Mean (median)	Range	S.D.	r_2	Predictors (.1 inclusion)	b
Visit Time:						
Assessment	14	1-50	9.85	.414	Initial visits	17.2
	(11)			.458	Agency type (hosp)	-1.8
				.501	Sex (male)	2.8
				.533	Fair prognosis	4.8
				.554	Daily visits	-4.8
				.577	Prior surgery	1.8
Education	8	0-52	8.02	.070	Medicare	4.7
	(7)			.127	Fair prognosis	4.4
				.169	Initial visit	4.8
				.202	1 provider (MD)	-3.4
Physical Care	7	0-8	12.47	.066	4-7 medications	6.4
	(1)					
Psychosocial	7	0-65	8.76	.071	Poor prognosis	4.3
	(5)			.132	Sex (male)	2.7
				.189	# H.H. services	-2.1
Coordination	5	0-3	5.64	.095	Health dept/VNA	3.1
	(4)			.204	nurse ed (BS/MS)	-3.3
				.260	4-7 medications	2.3
				.313	Initial visits	4.2
				.376	1-2 orders	-4.6
				.415	Fair prognosis	3.4
				.456	Admission status	2.6
Total Visit:	41	15-99	21.81			
	(37)					
Client-related non-visit time:						
Documentation	19	0-90	17.33	.257	Initial visit	20.7
	(10)			.310	3-5 orders	-14.9
				.371	1-2 orders	-13.8
				.404	Medicare	7.8
				.448	2+ providers	-8.4
Coordination	13	0-59	13.41	.168	Nurse ed (BS/MS)	-11.2
	(10)			.229	# HH services	-3.3
				.265	Poor prognosis	5.0
				.296	Avail. caregiver	5.3
Total time	73	22-184	36.63			
	(61)					
Travel time	19	5-65	12.71	.061	Visit freq. 2-3	-6.3
	(15)					

physician) (b=-15.516, p=.009), and clients with two additional health care providers (b=-9.39, p=.07).

The predictive ability of these five variables was confirmed by a forward stepwise regression at the .1 inclusion level and accounted for 38 percent of the variance in the length of a home visit. Initial visits accounted for 16 percent of the variance in visit time, with Medicare visits accounting for an additional 10 percent, one to two physician orders an additional five percent, one other health care provider (the physician) four percent more, and two other providers accounting for three more percent of the variance.

Multiple linear regressions using total visit-related time (excluding travel) as the dependent variable indicated significant relationships (r_2=.414, SE=29.042) between total time (b_o=65.452) and initial visits (b=32.83, p=.000), number of home health services involved (b=-8.76, p=.021), visit complexity of one or two (b=-16.89, p=.023), one other health care provider (the physician) (b=-17.36, p=.029), and Medicare reimbursement (b=15.17, p=.05) predicting 41 percent of the total time variance.

This indicates that visit time is longer for initial visits than repeat visits, Medicare visits are longer than non-Medicare, clients with three or more physician orders have longer visits than those with one or two orders for care, and clients with three or more other health care providers have longer visits than those with two or fewer.

Additionally, the regression analysis shows that for the visits included in the study, total visit-related time (excluding travel) is longer for initial visits than for repeat visits, clients with two or more other home health services have longer visits than those with one or fewer, levels three and four complexity visits are longer than those with complexity levels of one

two, clients with only one other health care provider (the physician) have longer visits than those with two or more providers, and Medicare visits are longer than non-Medicare visits. Table 10 lists characteristics and predictors of visit and total visit-related time.

Table 10

Characteristics of visit and visit-related time

	Visit time	Total time (excluding travel)
Time:		
Mean	41	73
Median	37	61
S.D.	21.81	36.63

Significant Descriptors ($p<.05$):

Total time*	Visit time*
Assessment time*	Assessment time*
Education time*	Education time*
Psychosocial time*	Psychosocial time*
Coordination time*	Documentation time*
Documentation time	Non-visit coordination time*
Assessment complexity	Education complexity
Education complexity*	Psychosocial complexity
# Previous visits*	Coordination complexity
Payer*	Payer
# Home Health services*	# Home Health services*
# Medications	# Medications
# nursing problems	

Predictors (.1 inclusion level):

Step	Predictor	r_2	b	p	Predictor	r_2	b	p
1	Initial	.16	26.3	.000	Initial visit	.19	42.8	.000
2	Medicare	.26	14.4	.002	# HH services	.31	-8.8	.001
3	1-2 orders	.32	-14.1	.020	Complexity 1-2	.35	-16.9	.046
4	1 provider	.35	-15.5	.050	1 provider (MD)	.38	7.8	.071
5	2 providers	.38	-9.4	.070	Medicare	.41	15.2	.050

*$p<.01$

Complexity

Complexity ratings assigned to visits by the observer according to the E-S classification scheme were compared with ratings assigned by staff nurses. The staff nurse was instructed to rank activities and total visit complexity by comparing this visit with all his/her other visits. Both classifications were done on a four point scale with a rating of one being the least difficult and a rating of four being the most difficult. Staff nurses tended to rate complexity slightly lower than the E-S scale. A significant ($p<.001$, $df=73$) strong positive relationship was found between the rating mechanisms, both for each of the five activity categories (assessment, $r_s=.65$; education, $r_s=.62$; physical care, $r_s=.77$; psychosocial support, $r_s=.68$; and care coordination $r_s=.72$) and for the visit as a whole ($r_s=.62$) (See Table 11). Therefore, the E-S complexity rating done by the observer was used in subsequent analyses.

Table 11

Comparison of complexity ratings (means)

	Observer	Staff Nurse	Spearman rho
Assessment	2.89	2.21	0.654*
Education	2.43	2.07	0.622*
Physical Care	1.83	1.64	0.765*
Psychosocial support	2.31	2.23	0.680*
Care Coordination	2.49	2.32	0.716*
Total visit	2.81	2.25	0.621*

*p<.001

In an attempt to obtain a more accurate picture of visit complexity, a time-weighted complexity score was developed for each visit by multiplying the E-S complexity scores by the time (minutes) for each of the activity categories and dividing the result by the total home visit time (minutes). This new variable, time-weighted complexity, was used in subsequent analyses as well as the observer E-S complexity rating. As would be expected, there was a strong positive relationship between E-S visit complexity and time-weighted complexity (r_s=.824, p<.01).

Predictors of complexity were also identified. The dependent variable, time-weighted complexity, was found to have a significant (F=6.639, df=9, p=.000) relationship (r_2=.479, SE=.413) with nine variables on multiple regression. Nearly 50 percent of the variance of complexity (b_o=2.94, p=.000) can be explained by: a poor prognosis (b=.336, p=.003), clients 75 years of age or over (b=-.198, p=.058), one to two physician orders (b=-.389, p=.007), voluntary agencies or health departments (b=.208, p=.001), no caregiver available (b=-.391), education of the staff nurse (BS/MS) (b=-.361, p=.001), prior surgery (b=.124, p=.04), daily visits (b=.386, p=.022), and visit frequency every two to three days (b=.194, p=.085) explaining 48 percent of the variance.

Using E-S complexity scores as the dependent variable, significant (F=7.279, df=10, p=.000) relationships (r_2=.532, SE=.523) were found with ten variables (see Table 12), explaining over 50 percent of the variance (b_o=3.333, p=.000): one to two physician orders (b=-.81, p=.002), age over 75 (b=-.448, p=.01), agency type (VNA/health department) (b=.335, p=.033), daily visits (b=.44, p=.019), nurses' education (BS/MS) (b=-.417, p=.025), lack of an available caregiver (b=-.525, p=.019), available caregiver (b=-.349, p=.013), admission status (b=.189, p=.06), four to seven medications

prescribed (b=.25, p=.093), and prior surgery (b=.133, p=.08). This indicates that visits were more complex for clients with three or more physician orders, those under 75 years of age, those seen by voluntary and health department agencies, those requiring daily visits, those seen by nurses with Bachelor's or Master's degrees, those clients with available caregivers full time, clients seen during their first agency admission, those with four to seven medications, and those clients who had surgery prior to admission.

Table 12

Predictors of home visit complexity (Easley-Storfjell scale)

Predictors (.1 inclusion)	Step	r_2	Coefficient	Significance
1-2 physician orders	1	.121	-.810	.002
Age over 75 years	2	.199	-.448	.009
Voluntary/health dept agency	3	.629	.334	.033
Visit frequency--daily	4	.306	.440	.019
Nurse education (BS/MS)	5	.355	-.417	.025
No caregiver available	6	.406	-.525	.018
Available caregiver	7	.459	-.349	.013
Admission status	8	.487	.189	.060
4-7 Medications	9	.509	.251	.093
Prior surgery	10	.532	.133	.080

Model Formation

Several approaches to the development of a quantification model were explored including timed tasks, an activity/complexity taxonomy, and grouping visits by type.

Timed tasks

Individual tasks within each of the five activity categories were identified with some difficulty and ranges, means, and standard deviations calculated (see Table 13). Considerable variability in length of tasks was

Table 13: Timed nursing tasks (minutes)

Tasks	N	Range	Mean	S.D.
Assessment:				
History-general	11	5-29	13.7	8.844
Medications	45	1-22	3.7	4.045
Condition	43	1-12	3.2	2.177
History-illness	53	1-9	3.1	2.175
Physical assessment	58	1-8	3.1	1.881
Functional limitations	9	2-6	2.7	1.323
Preparation time	4	1-5	2.3	1.893
TPR-BP	68	1-5	2.2	1.087
Diet	23	1-7	2.0	1.414
Care provision	3	1-3	1.7	1.155
Education:				
Medications	36	1-52	6.2	8.736
Specific treatment	27	1-12	4.0	3.240
Diet	24	1-13	3.3	3.651
Illness/condition	30	1-7	2.6	1.633
Health care services	20	1-6	2.2	1.473
Bowel training	6	1-3	2.0	0.894
Care provision	13	1-8	1.9	1.706
Safety	15	1-3	1.7	0.799
Activity	8	1-2	1.1	0.354
Physical care:				
Tracheotomy care	1	25	25.0	
Catheter care	4	11-39	19.3	13.226
Wound/skin care	16	1-86	15.6	19.983
Enema/impaction	2	4-25	14.5	14.849
Hickman catheter	1	13	13.0	
Blood draw	5	3-14	8.6	5.030
Ostomy care	1	6	6.0	
Personal care	13	1-17	5.3	5.170
Wrap/support	2	1-9	5.0	5.657
Give medications	2	3-4	3.5	0.707
Psychosocial support:				
Provide support	19	1-55	7.6	12.199
Facilitate expressions	28	1-20	4.8	4.632
Listening	35	1-10	3.8	2.809
Counsel	14	1-5	2.2	1.369
Establish rapport	43	1-7	2.0	1.511
Care Coordination				
Home Health Aide	44	1-30	3.8	4.788
Provide information	14	1-9	3.7	2.523
Arrange services	27	1-13	3.1	2.792
Durable Medical Equip.	17	1-7	2.6	1.698
Reimbursement	4	1-3	2.0	0.817

noted with nine different task areas having standard deviations over five and seven tasks had standard deviations greater than the mean. Difficulty in assigning times to each task occurred because of the frequent overlap of activities.

Activity/complexity taxonomy

A taxonomy was developed for the five activity groupings and the four E-S levels of complexity (see Table 14). With the exception of the

Table 14

Activity/Complexity Taxonomy (Median minutes/standard deviations)

Activity **p<.001 *p<.1	Complexity			
	1	2	3	4
Assessment X^2=2.99		9(8.2)	12(10.9)	12(7.9)
Education X^2=28.28**	1(1.5)	5(4.6)	8(9.2)	21(5.3)
Physical Care X^2=130.43**	0(2.0)	6(33.1)	14(13.8)	20(10.6)
Psychosocial Support X^2=45.8**	4(3.9)	4(4.6)	5(6.9)	11(19.1)
Care Coordination X^2=6.27*	0(1.1)	3(3.4)	5(7.)	9(6.)
Total Visit Time: 37 Complexity: 3	55	51	65	74

assessment category, there was a significant (df=3. p<.1) increase in the median time for each type of activity as the complexity of the activity increased. This positive relationship between visit time and complexity is further confirmed by the significant (p<.05, df=73) corrlations of the grouped activity time and complexity variables (see Table 15). No visits were categorized with assessment activities at complexity level one and minimal variation was noted in median times for the remaining three assessment/complexity cells. There was, however, considerable variability within the cells as evidenced by large standard deviations.

Table 15

Activity time/complexity correlations

Activity	Spearman rho
Assessment	.133
Education	.575*
Psychosocial support	.389*
Care Coordination	.596*
Total visit related time	.385*

*p<.001

Types of visits

Cluster analyses were performed using various combinations of the dependent variables, activities, time, and complexity, in an attempt to identify significant groupings of visits. However, clustering of activity categories, either by time alone or including complexity levels, did not develop distinct visit groups.

Visit content clusters. Clustering of activity groups by the percent of time spent in each activity category during the visit resulted in six distinct visit clusters or groupings: (a) assessment/education visits, (b) physical care visits, (c) physical care/education visits, (d) assessment/ psychosocial support visits, (e) psychosocial support/education visits, and (f) assessment/care coordination visits (see Figure 3). The percent of time spent in each activity area for each of the five visit content clusters is outlined in Table 16. Since the purpose of this particular analysis was to focus on visit content, the length of the visit was not considered. Predictors of the percent of time utilized in each of the five activity areas are listed in Table 17.

Table 16

Visit Content Clusters--allocation of time by category

	Assess/ Education Visits	Physical Care Visits	Physical care/ education Visits	Psycho-social Assess Visits	Psycho-social/ education Visits	Care Coord/ Assess Visits
N	37	3	14	12	5	3
Percent of time:						
Assessment	39	8	17	60	21	32
Education	27	0	17	8	22	6
Physical Care	7	89	43	1	2	3
Psycho-social	14	3	12	22	47	19
Care coord-ination	13	0	11	9	8	40
Totals	100%	100%	100%	100%	100%	100%

Figure 3

Visit content clusters

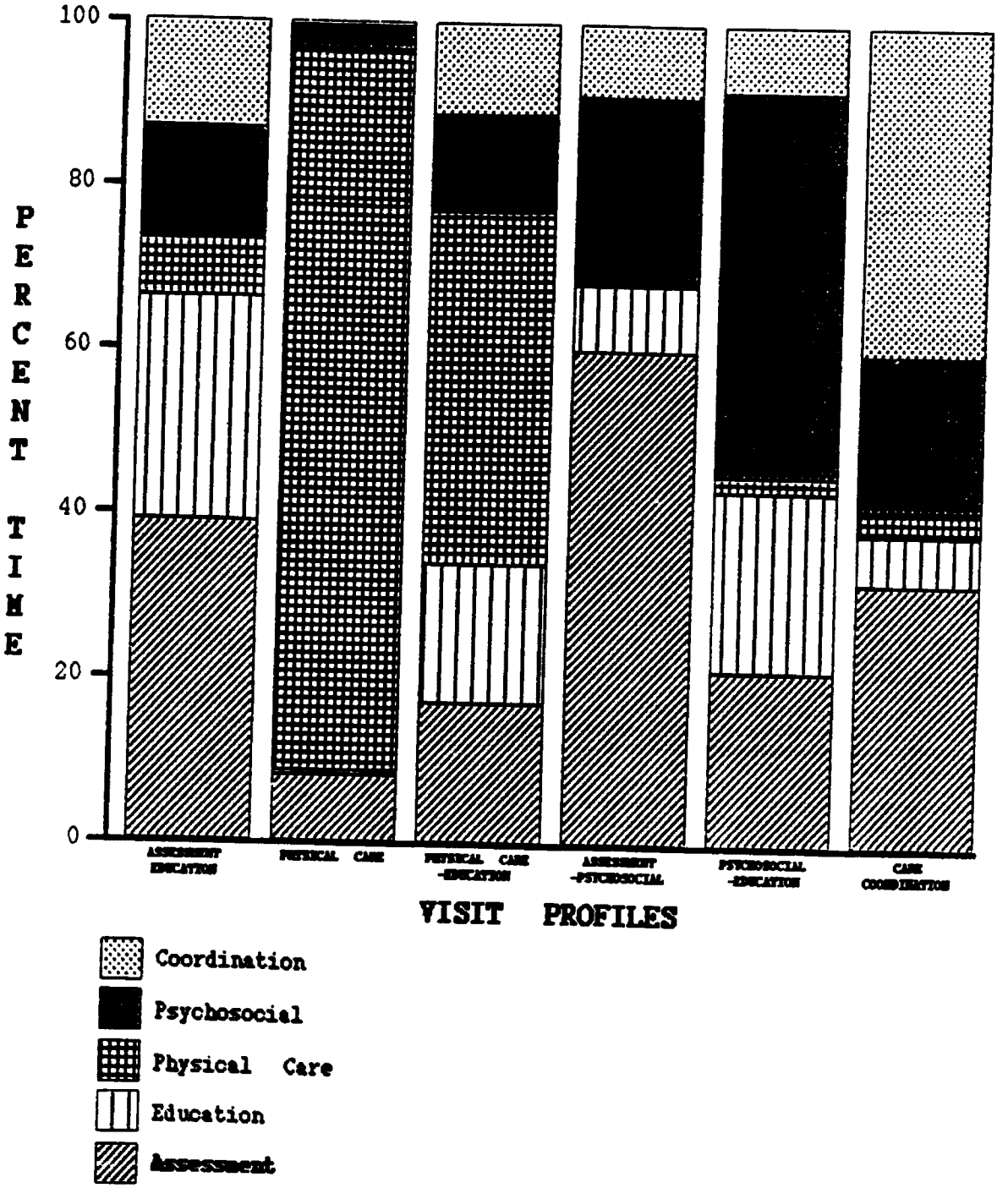


Table 17

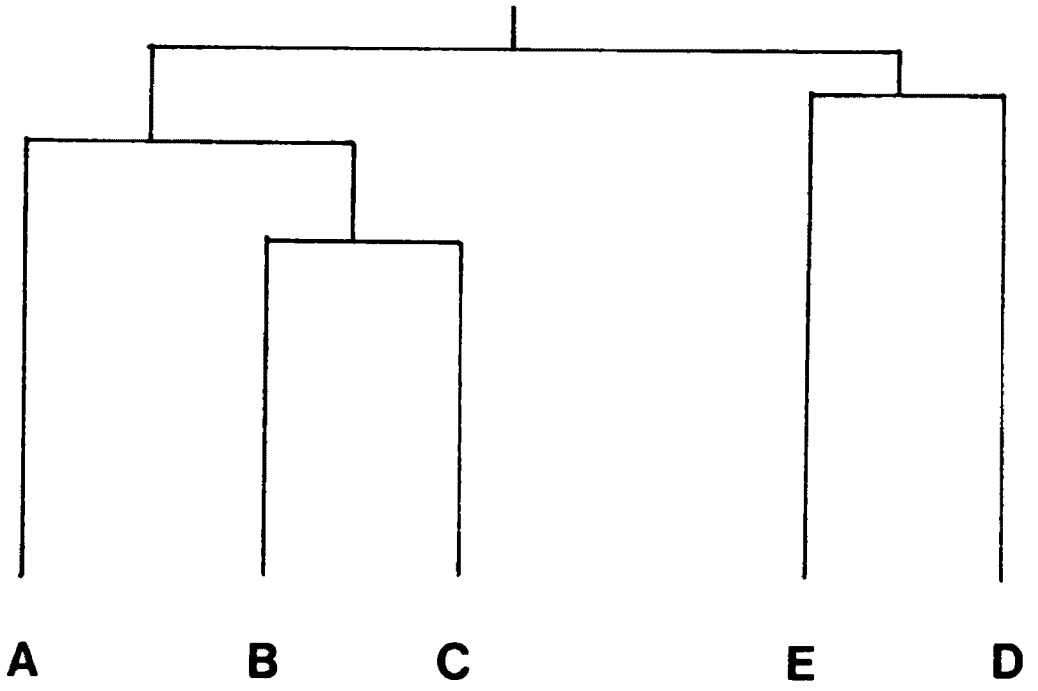
Predictors of percent of time spent in activity categories

Category	Step	Predictor (.1 inclusion)	r_2	B	p
Assessment	1	Initial visit	.113	8.7	.003
	2	Agency type (hospital)	.193	-10.4	.010
	3	4-7 medications	.305	-10.4	.033
	4	0-3 medications	.370	-17.5	.010
	5	1-2 physician orders	.431	14.9	.009
	6	Proprietary agency	.448	4.7	.098
Education	1	1 other provider (MD)	.058	-7.9	.037
	2	Nurse education (AD/dip)	.105	8.8	.058
	3	Fair prognosis	.166	8.6	.026
	4	Age 65 to 75	.205	6.4	.067
Physical care	1	Daily visits	.135	31.5	.001
	2	Agency type (hospital)	.191	-12.5	.029
	3	0-3 medications	.228	26.5	.070
	4	4-7 medications	.271	15.7	.043
	5	1-2 physician orders	.314	-13.4	.042
	6	Voluntary or health dept. agency	.344	7.8	.081
	7	Restricted to bedrest	.376	6.3	.069
	8	Visit frequency 2-3 days	.403	8.9	.087
Psychosocial Support	1	Fair prognosis	.082	-8.5	.013
	2	Daily visits	.160	-18.1	.012
	3	Visit frequency 2-3 days	.226	-11.2	.016
	4	Admission status	.264	-7.8	.060
	5	Sex (male)	.305	3.4	.047
Coordination	1	Nurse education (BS/MS)	.114	-7.9	.003
	2	Voluntary or health dept. agency	.232	4.7	.001
	3	4-7 medications	.272	4.5	.050

Visit time/complexity clusters. Analysis of the actual visit time and the total visit E-S complexity scores did result in five distinct groupings of visits (See A through E in Figure 4). This analysis resulted in five clusters of visits, divided into three complexity levels (low, moderate, high) according to three time categories (short, average, long). There were no

Figure 4

Hierarchical cluster—visit time/complexity



groupings of lengthy, low complexity visits or short, moderate and high complexity visits. While five distinct visit profiles were developed, several of the visit groupings contained too few visits to be considered valid. The clusters identified included: (A) low time, low complexity (n=22); (B) average time, moderate complexity (n=36); (C) average time, high complexity (n=9); (D) high time, moderate complexity (n=5); and (E) high time, high complexity (n=3). Figures 5 and 6 depict the time and complexity relationships of these five visit clusters.

Figure 5

Time/complexity visit model (according to complexity and time)

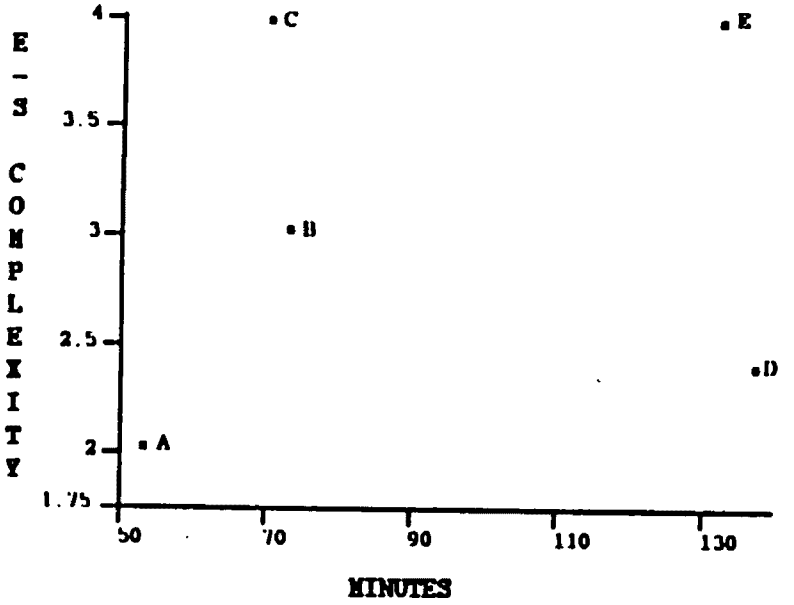
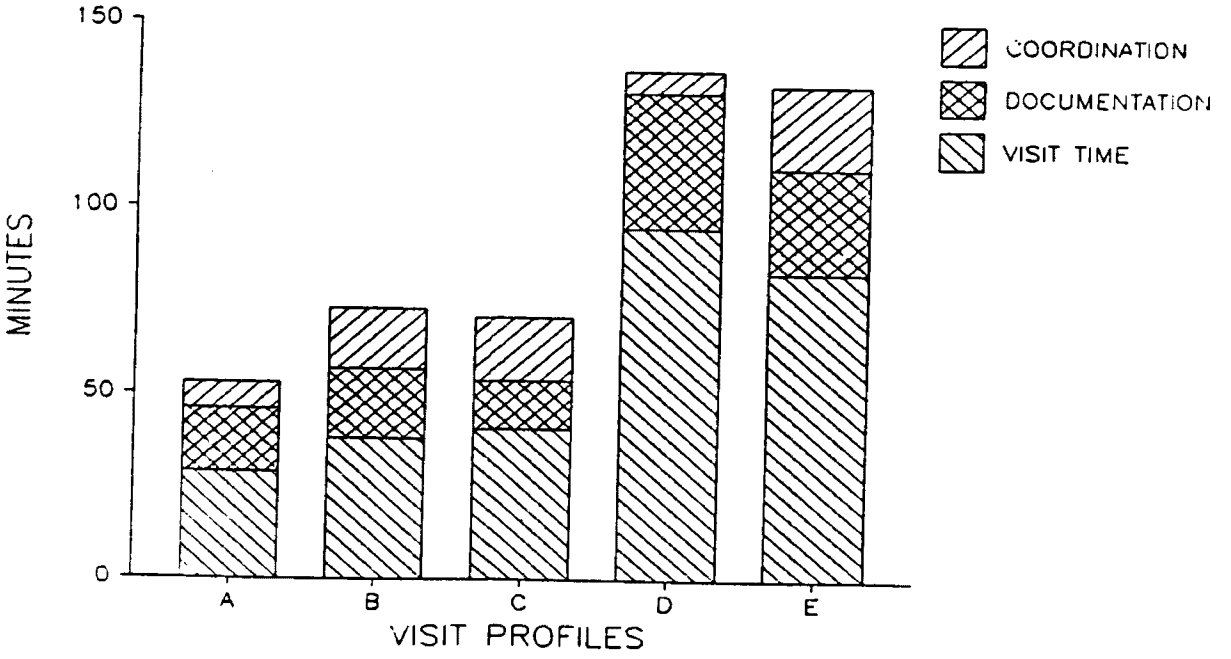


Figure 6

Time/complexity visit clusters (according to time)



Generally, the five visit clusters can be identified as follows: Group A (n=22) consists of short (visit time=29 minutes, total time=53 minutes), non-complex (E-S=2, time weighted=2.2) visits which are spent mostly in assessment, education, and psychosocial support activities. Very few, if any, physical care tasks are performed during these visits with physical care time averaging only one minute ($F=3.645$, $p=.009$). The majority (70%) are repeat ($X^2=7.4$, $p=.015$), Medicare (60%) visits to clients age 75 or over (60%). Housing conditions are generally good (73%). Length of stay (or episode of care) for clients receiving this type of visit is short as indicated by an average of eight visits planned per client. Sixty-eight percent of Group A visits were made by nurses with less than baccalaureate education.

Group B visits (n=36) can be considered average in both time (visit=38 minutes, total=73 minutes) and complexity (E-S=3, time weighted=2.8). Visit activities are spread over all the five activity groups with a slightly lower average percent of time (14%) spent on psychosocial support. Non-visit care coordination accounted for more time than usual (16%). These are also mostly repeat (86%), Medicare (70%) visits. Housing conditions are generally good (58%). Physical care activities include catheter changes, enemas, and drawing blood. Seventy-two percent of Type B visits were made by baccalaureate or master's prepared nurses.

Group C visits (n=9) can be categorized as average in time (visit=41 minutes, total=71 minutes) but complex (E-S=4; time-weighted=3.6). While time may be spent in all activity categorized, slightly less than average time is utilized for education (14%) and documentation (13 minutes). Non-visit care coordination consumed more than average (17%) time. Significantly ($p<.1$) more nursing problems (5.1) are found during these visits, clients have more than one other health care provider, an average of

44 visits are planned, and 65 percent of clients are under 65. Physical care activities in this category include caring for Hickman catheters, tracheotomies, and drawing blood. Housing conditions are generally good (78%).

Group D visits (n=5) are long (visit=95 minutes, total=137 minutes) and of average complexity (E-S=2.4, time weighted=2.7). A significantly ($p<.1$) smaller percent of time is spent on education (14%) and more time than usual is spent on documentation (36 minutes). Eighty percent of visits are reimbursed by Medicare, 60 percent are initial visits. Care coordination is considered complex (E-S=3.3). Clients in this category have more than two other health care providers and 80 percent have home health aides.

The final category of visits, Group E (n=3), is best described as long (visit=83 minutes, total=133 minutes) and complex (E-S=4, time weighted=3.6). Significantly ($p<.1$) more time is spent in all visit and non-visit activities with the exception of psychosocial support. The average frequency of visits for clients receiving Group E visits is every 2 days. Group E clients have significantly ($p<.1$) more nursing problems (X=5.3) than Group A, B, and D clients; they have fewer than two other health care providers; they have the services of home health aides (100%); they have caregivers with low capability (67%); their primary diagnosis involves the circulatory system (67%); and a majority are incontinent (67%). All clients in this category lived in poor housing conditions and were Medicare recipients. Table 18 describes the characteristics of these visit groups.

While the results of this cluster analysis were interesting, the fact that two of the visit clusters contained few visits (n=3 and 5) and few objective measures were developed which could be used to easily distinguish one visit type (profile) from another raise concerns regarding validity and

Table 18 Visit profile characteristics for a Time/Complexity Model

PARAMETER	A	B	C	D	E
N	22	36	9	5	3
Time:					
Visit**	29 min	38 min	41 min	95 min	83 min
Doc	17 min	19 min	13 min	36 min	28 min
Total**	53 min	73 min	71 min	137 min	133 min
Activity**	phys.care (low) coord. (low)	non-visit coord	non-visit coord	assess phys.care psych. coord.	assess educ. phys.care coord. nv coord.
Visit Type**	77% Repeat	86% Repeat	100% Repeat	67% Initial	60% Initial
Complexity:					
Visit**	2	3	4	2.4	4
High**			assess phys. care	coord.	assess educ. phys. care coord.
% Time:					
Assess**	44%	32%	30%	29%	26%
Educ.	23%	21%	14%	14%	26%
Phy.Care	03%	20%	22%	22%	20%
Psych.	20%	14%	18%	23%	13%
Coord.	09%	13%	16%	13%	14%
Payer	60% MC	70% MC	all	100% MC	80% MC
HH Services			SP*	HH Aide* PT	HH Aide* PT
Clients	over 75** planned visits =8**		2+ provid* planned visits =44** under 65**	1 provide	2+ provid* pet in home incontinent*
Diagnosis	Circulatory	Skin			Digestive
Housing*	good 78%	good 58%	good 78%	good 60%	poor 100%
Tasks (Time)		catheter** enema blood draw	Hickman trach. blood draw	wound** support** express* HHA coord**	catheter** ed care** coord*
RN ed**	AD / dipl.	BS / MS	BS / MS	AD / dipl.	BS / MS

**p=<.05
*p=<.1

usefulness. Therefore, an alternative approach was tried. It was decided to use the major predictors of visit related time (excluding travel) and assess their suitability for use in categorizing visits.

Initial/repeat visits by payer. Since the initial visit and reimbursement source accounted for 26 percent of variance in visit time, an analysis of variance was done on these variables. Twenty percent (n=15) of the 75 home visits included in the study were initial (admission) visits. These admission visits took an average of 59 minutes, while repeat visits averaged 37 minutes in length (T=3.759, p=.000). Documentation time was also significantly (T=5.02, p=.000) related to initial versus repeat visits with documentation of initial visits averaging 37 minutes compared with 15 minutes for repeat visits. Statistically significant differences (df=73) were also found between initial and repeat visits according to the average time spent in assessment activities (T=7.179, p=.000), percent of visit time spent doing assessment activities (T=3.056, p=.003), and the average time spent in education activities (T=1.974, p=.052).

In addition, significant relationships were found between initial/repeat visits and number of physician orders (X^2=7.943, df=2, p=.0188, Ø=.325), type of agency (X^2=14.189, df=2, p=.001, Ø=.435), and the education of the nurse (X^2=.048, df=1, p=.048, Ø=.228). Nearly half (48%) of the visits made by the proprietary agencies were initial visits in contrast to 13 percent of visits made by voluntary agencies/health departments, and seven percent of hospital-based agency visits. Twice as many initial visits (n=10) were made by AD or diploma prepared nurses compared with those made by baccalaureate or master's prepared nurses, while nearly 62 percent (n=37) of all repeat visits were made by nurses with the higher education. Table 19

lists the characteristics of initial and repeat visits and Figure 7 depicts these two types of visits according to time allocation.

Table 19

Initial and repeat visit characteristics

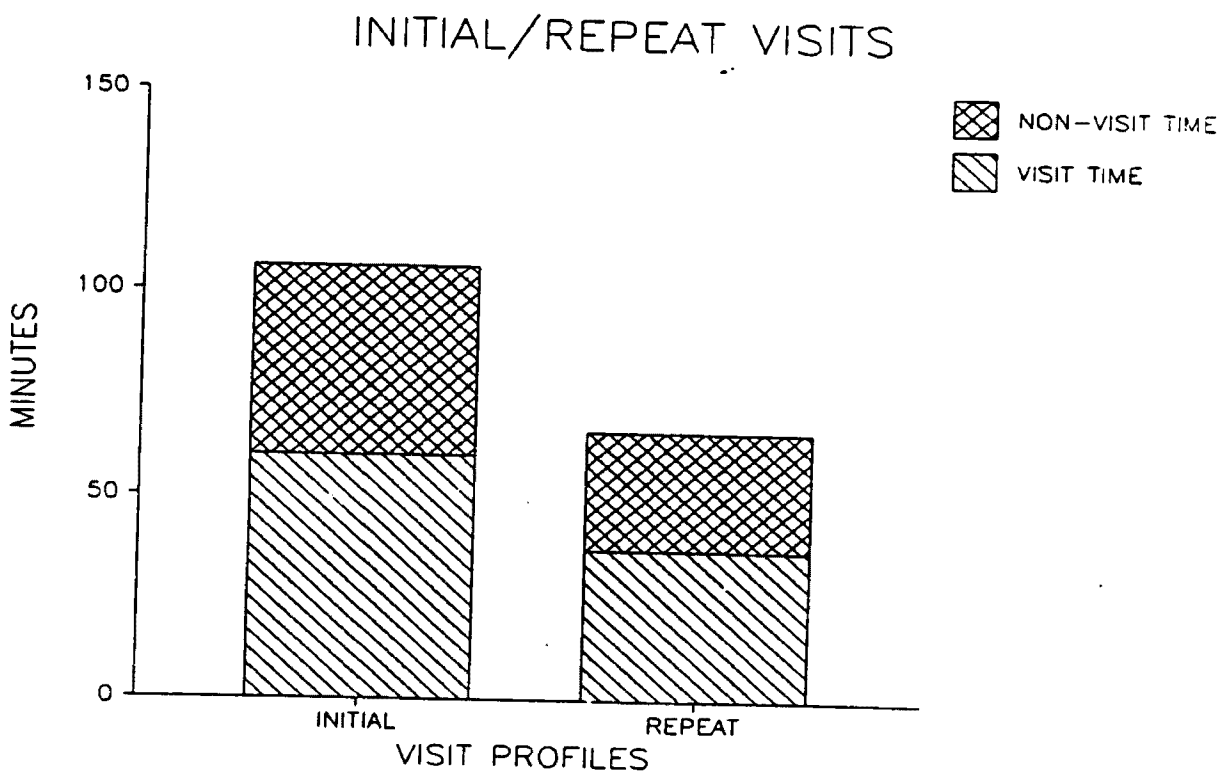
Parameter	Initial visits	Repeat visits
N	15	60
Time (average minutes):		
Assessment**	26	11
Education*	12	8
Physical care	5	8
Psychosocial	9	8
Care coord (visit)	7	7
Total visit**	60	37
Documentation**	36	15
Coord (non-visit)	10	14
Total visit-related**	105(106)	65(57)
Significant descriptors:		
Physician orders*	3-5 (73%)	
Agency type**	Proprietary (67%)	
Nurse education*	AD/diploma (67%)	BS/MS (62%)

**p<.001
*p<.05

Multiple regression identified several predictors of the total time variance of initial and repeat visits. Total visit-related time (excluding travel) of initial visits (b_o=76.867, df=7, F=82.11) was found to have significant (p=.000, r_2=.988,, SE=7.178) relationships with Medicare, Medicaid, 3-5 physician orders, number of health care providers, client sex (male), hospital-based agencies, and prior surgery predicting 99 percent of the total time variance of initial visits. Medicare visits alone accounted for 39 percent of the variance.

Figure 7

Initial/repeat visits



Three variables were found to be significantly (p=.001, r_2=.267, SE=25.623) related to total time for repeat visits (b_o=73.618, df=3, F=6.798): E-S complexity levels one and two, number of home health services, and hospital-based agencies accounting for 27 percent of the variance of total time for repeat visits. Results of regressions are shown on Table 20.

In other words, total visit-related time for initial visits was longer for Medicare visits, Medicaid visits, clients with two or more other health care providers, clients less than three or more than five physician orders, hospital-based agencies, clients having had surgery prior to admission, and males. Total visit-related time for repeat visits was longer for clients with two or more home health disciplines involved, visit complexity of three to four, and for hospital-based agencies.

Table 20

Initial/repeat visit time critical indicators

Predictors*	Step	r_2	Coefficient	Significance
Initial Visits:				
Medicare	1	.391	128.74	.013
Medicaid	2	.558	85.55	.055
1 other provider (MD)	3	.738	-67.87	.019
3-5 physician orders	4	.835	-42.80	.035
Agency type (hosp)	5	.944	-21.10	.002
Prior surgery	6	.968	13.13	.042
Sex (male)	7	.988	7.92	.011
Repeat Visits:				
# Home Health Services	1	.161	-10.4	.002
Visit complexity 1-2	2	.224	-15.1	.035
Agency type (hosp)	3	.267	-14.3	.076

*.1 inclusion level

Reimbursement source was the second predictor of visit time, adding 10 percent to the predictability of the variance. Several variables were

also found to be significantly related to payer type (or reimbursement source). Three categories of payers were identified, Medicare (n=47, 63%), Medicaid (n=12, 16%), and other (n=16, 21%). There was a significant (F=5.872, df=2, p=.004) relationship between visit time and payer source with Medicare visits averaging 47 minutes (sd=21.82), Medicaid visits averaging 39 minutes (sd=23.39), and visits to clients with other payers averaging 27 minutes (sd=12.47). The total number of tasks performed also varied significantly (F=5.428, df=2, p=.006) by payer source. An average of 11.3 tasks per visit were done for Medicare clients (sd=2.9), 10 tasks for Medicaid clients (sd=2.35), and 8.5 tasks for clients with other payers (sd=3.54). Frequency of visits was also found to be related (X^2=.012, df=4, p=.012, Ø=.294) to payer source with clients having non-governmental reimbursement requiring more frequent visits than Medicare or Medicaid clients. As might be expected, a strong positive (Ø=.446) relationship (X^2=29.796, df=4, p=.000) was found between age and source of payment. Eighty-nine percent (n=42) of Medicare clients were over 65 years of age (55 percent were over age 75), while 75 percent of Medicaid clients and 69 percent of clients with other payers were under 65.

When reimbursement source was reduced to two categories (Medicare, n=47; and non-Medicare, n=28) significant (p<.1) differences were found between visits made to clients with these two types of payers as follows: education time (F=5.51, p=.022), physical care time (F=3.09, p=.083), documentation time (F=3.34, p=.072), visit time (F=9.2, p=.003), total visit-related time (F=5.58, p=.021), clients' age (F=39.84, p=.018), referral source (F=4.61, p=.035), number of previous home visits (F=3.2, p=.078), number of total visits planned (F=5.99, p=.018), frequency of visits (F-2.7, p=.1), number of home health services involved (F=4.59, p=.036), total number of

tasks performed during the visit, length of time for blood draws (F=11.34, p=.044), home health aide coordination time (F=3.14, p=.084), number of clients confined to bedrest (X^2=3.84, p=.05, Ø=.226), housing type (X^2=7.13, p=.028, Ø=.308), willingness of caregivers (X^2=6.7, p=.002, Ø=.338), primary diagnosis (X^2=25.64, p=.081, Ø=.585), client physical endurance (X^2=3.84, p=.05, Ø=.226), client vision impairment (X^2=3.2, p=.072, Ø=.208), activity allowed (X^2=18.48, p=.001, Ø=.503), nurses' education (X^2=4.32, p=.038, Ø=.24), client's socioeconomic status (X^2=7.04, p=.03, Ø=.306), and use of a Home Health Aide (X^2=9.24, p=.002, Ø=.351).

Multiple regressions showed significant (p=.000, r_2=.453, SE=31.131) relationships between total visit-related time for Medicare visits (b_o=74.293, df=3, F=11.872) and initial visits (b=59.488, p=.000), one other health care provider (b=-25.87, p=.013), and number of home health services (b=-8.552, p=.093), predicting 45 percent of time variance. Total time variance of non-Medicare visits was significantly (p=.000) related (b_o=77.857, df=5, F=7.68) to visit complexity of one or two (b=-24.294, p=.011), daily visits (b=-33.598, p=.007), no caregiver available (b=-17.735, p=.061), age over 75 years (b=19.944, p=.053), and male clients (b=6.789, p=.075), predicting 64 percent of the variance (r_2=.636, SE=16.289).

This analysis indicates that Medicare visits are longer if they are initial rather than repeat visits, if the client has two or more other health care providers, and if two or more additional home health disciplines are providing services to the client. Non-Medicare visits are longer if visit complexity is three or four, if visits are at least two days apart, if a caregiver is available full or part time, for clients age 75 or over, and for male clients. Table 21 lists the characteristics of Medicare and non-

Medicare visits. Time allocation of visit profiles by payer are depicted in Figure 8.

Table 21

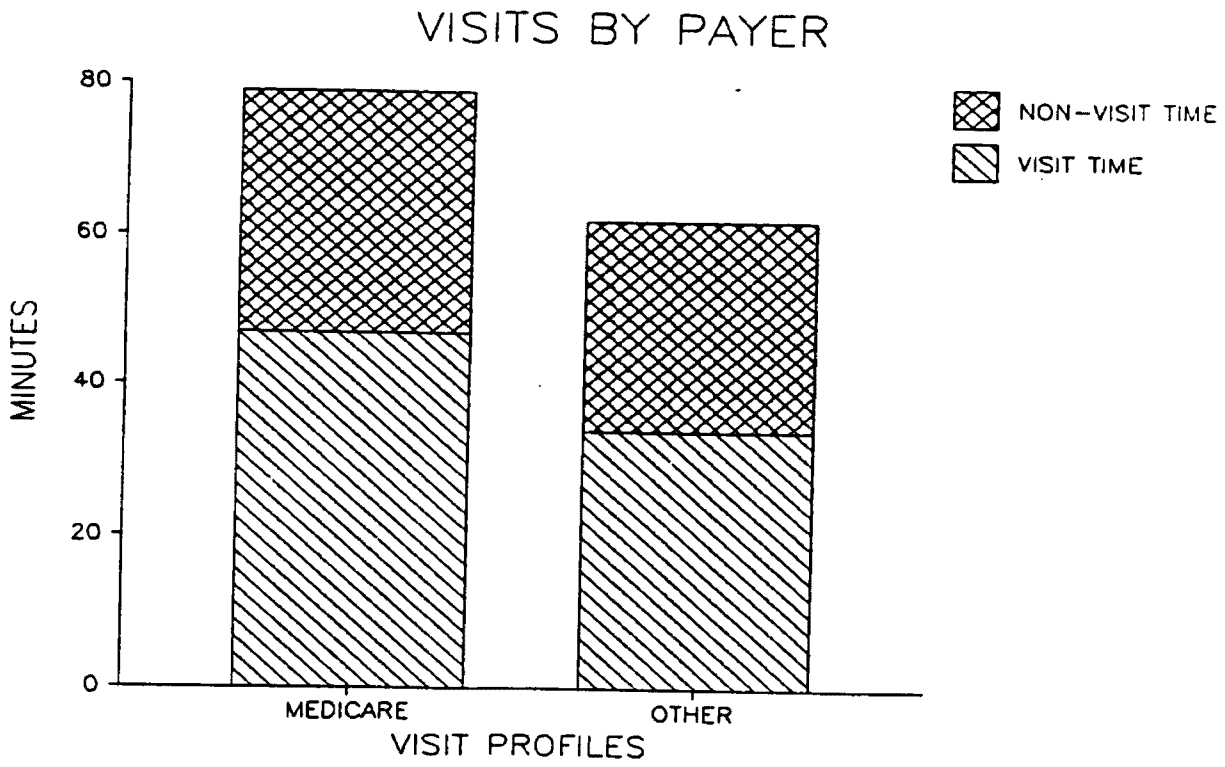
Visit characteristics by payer

Parameter	Medicare	Non-Medicare
N	47	28
Time (average minutes)		
Assessment	15	12
Education**	10	6
Physical care*	9	4
Psychosocial	8	6
Care coordination	5	5
Total visit**	47(39)	32(25)
Documentation*	22	14
Coord (non-visit)	12	14
Total visit-related**	81(64)	61(54)
Descriptors:		
Age**	89% <65	71% >65
Planned visits**	11	26
Visit frequency**	5 days	8 days
Tasks per visit**	11	9
Blood draw time**	14 minutes	5 minutes
HH Aide supervision*	3 minutes	6 minutes
Bedrest**	28%	7%
Nurse education**	53% AD/diploma	71% BS/MS
Urban/rural agency**	6% urban	35% urban
Vision impairment*	23%	7%
HH Aide involved**	57%	21%
Primary diagnoses*	26% circulatory 19% skin	18% skin 14% circulatory 14% endocrine
Predictors (.1 inclusion)	Initial visits 2+ providers 2+ HH disciplines	Complexity 3-4 Frequency 2+ days Caregiver avail. Age >75 Male clients

**p<.05
*p<.1

Figure 8

Medicare and non-Medicare home visits



Because initial/repeat visits and reimbursement source accounted for a high percentage of the variance of visit time, visits were classified into four groups according to these two categories: initial visits (Medicare and other) and repeat visits (Medicare and other).

Medicare initial visits (n=10) were significantly (F=3.317, df=14, p=.013) longer (total time X=125 minutes) than non-Medicare initial visits (n=5, total time X=66 minutes). Other differences included: travel time (F=5.16, p=.041), documentation time (F=11.32, p=.005), assessment complexity (F=3., p=.092), education complexity (F=5.74, p=.032), psychosocial support complexity (F=4.17, p=.062), clients' age (F=3.32, p=.092), admission status (F=10.11, p=.007), number of visits planned (F=6.04, p=.029), frequency of visits (F=8.1, p=.014), time-weighted complexity (F=8.83, p=.011), time spent establishing rapport (F=7.13, p=.044) and listening (F=6.25, p=.067, the number of clients confined to bedrest (X^2=2.73, p=.099, Ø=.426), activity allowed (X^2=6.75, p=.08, Ø=.671), ambulation limitations (X^2=4.62, p=.032, Ø=.555), and use of a Home Health Aide (X^2=7.35, p=.007, Ø=.7).

Multiple regressions showed a significant (F=7.756, df=9, p=.024) relationship (r_2=.492, SE=28.879) between the total visit-related time of initial Medicare visits (b_o=156.25, p=.000) and one additional health-care provider (b=-.702, p=.024) explaining 49 percent of the variance. Non-Medicare initial visits were found to have significant (F=5113.8, df=4, p=.000) relationships (r_2=.999, SE=.707) between total visit-related time (b_o=104.5, p=.000) and one to two physician orders (b=-69.0, p=.000), as well as frequency of visits (daily) (b=13.5, p=.004). A stepwise forward regression indicated that these two variables (physician orders and daily visits) accounted for nearly 100 percent (r_2=.999) of the variance of total

visit-related time of non-Medicare initial visits, with one or two physician orders predicting 98 percent of the variance.

The two categories of repeat visits (Medicare and non-Medicare) were also found to have significant, although not as dramatic, differences. Actual visit time was significantly ($F=8.382$, $df=59$, $p=.005$) different with Medicare visit time averaging 42 minutes and non-Medicare visits averaging 29 minutes. Medicare repeat visits were slightly longer ($X=69$ minutes) than non-Medicare repeat visits (60 minutes). This difference, however, was not statistically significant. Other significant differences identified included: client age ($F=38.19$, $p=.000$), number of previous home visits ($F=3.05$, $p=.086$), number of planned home visits ($F=8.96$, $p=.005$), number of nursing tasks performed during the visit ($F=7.33$, $p=.009$), education time regarding a specific treatment ($F=3.39$, $p=.08$), use of a home health aide ($X^2=4.34$, $p=.037$ $\emptyset=.27$), use of an occupational therapist ($X^2=3.33$, $p=.069$, $\emptyset=.236$), activity allowed ($X^2=13.14$, $p=.011$, $\emptyset=.48$), caregiver willingness ($X^2=7.55$, $p=.023$, $\emptyset=.405$), nurse's education ($X^2=4.34$, $p=.037$, $\emptyset=.269$), type of housing ($X^2+5.74$, $p=.057$, $\emptyset=.31$), and agency location (urban/rural) ($X^2=9.28$, $p=.01$, $\emptyset=.393$). Table 22 summarizes the characteristics of the four types of initial/repeat visits by payer while Figure 9 depicts these visit profiles according to time usage.

Multiple regressions for these two types of repeat visits identified several predictors of total visit-related time. Time for Medicare repeat visits ($b_o=66.42$, $p=.000$) was shown to be significantly ($F=6.825$, $df=1$, $p=.013$) related ($r_2=.163$, $SE=30.222$) to the number of home health agency services provided to the client ($b=-13.218$, $p=.013$), explaining 16 percent of the total variance. Total visit-related time for non-Medicare repeat visits ($b_o=74.488$, $p=.000$) was shown to be significantly ($F=7.44$, $df=3$, $p=.002$)

Table 22

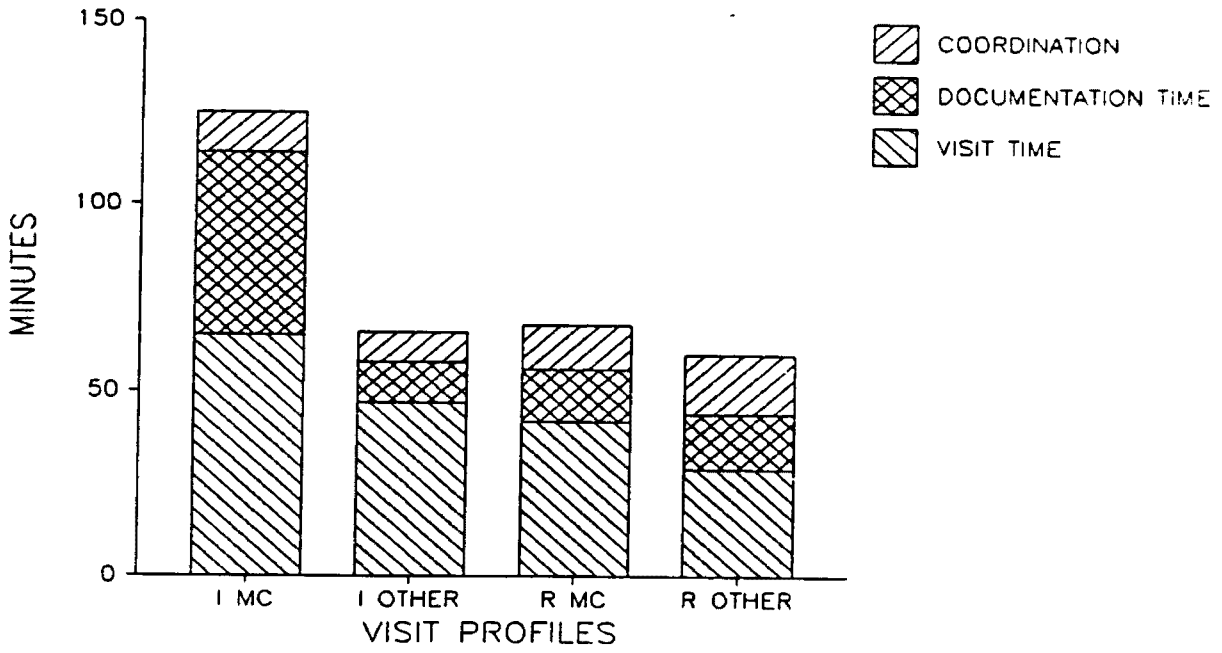
Characteristics of initial/repeat visits by payer

Parameter	Initial visits		Repeat Visits	
	Medicare	Non-Medicare	Medicare	Non-Medicare
N	10	5	37	23
Time (Minutes)				
Visit	65(64)	47(34)	42(38)**	29(25)**
Documentation	49**	11**	14	15
NV coordination	11	8	12	16
Total time	125(122)**	66(49)**	69(57)	60(60)
Complexity				
Assessment	3*	2.4*	2.9	2.9
Education	2.9**	2.2**	2.4	2.3
Psychosocial	2.8*	1.8*	2.2	2.4
Total visit	2.8	2.4	2.8	3.0
Significant Descriptors:				
Age	73*	54*	76**	51**
Previous visits	--	--	14*	34*
Planned visit	10**	4**	12**	34**
Visit frequency	3 days**	15 days**	6 days	7 days
Admission	70% readmit*	100% 1st *	67% 1st	70% 1st
Education time	15	6	9**	6**
Tasks (min.):				
Rapport	4.5**	1.8**		
Listen	4*	2.3*		
Ed treatment			5*	3*
Tasks (number)	12	10	11**	9**
Prior surgery	30%*	0*	27%	26%
HH Aide	90%**	20%**	49%**	22%**
OT			0*	9%*
Functional limitations:				
Bedrest	40%*	0*	24%	9%
Ambulation	100%**	20%**	84%	91%
Mental	30%*	0*	14%	17%
Activity	60% transfer*	80% indep*	43% transf**	87% indep**
Vision	30%	20%	22%*	4%*
Endurance	90%	100%	97%**	78%**
Urban/rural**			8% urban	39% urban
Nurse education**			51% BS/MS	78% BS/MS
Diagnosis**			Circul 22%	Endocrine 17%
			Skin 22%	Skin 22%

*p<.1 **p<.05

Figure 9

Initial/repeat visits by payer



related (r_2=.54) to three variables: one other health care provider (b=-31.919, p=.003), no available caregiver (b=-25.177, p=.008), and visit complexity of one or two (b=-14.275, p=.082) explaining 54 percent of the variance (r_2=.54, SE=16.136). A stepwise forward regression found that the variable indicating one other health care provider (the physician) predicted 19 percent of the variance (r_2=.194).

This indicates that initial Medicare visits are longer for clients with two or more other health care providers, and initial non-Medicare visits are longer for clients with three or more physician orders and for those receiving daily visits. Repeat Medicare visits are longer for clients receiving one or more additional home health services. Repeat non-Medicare visits are longer for clients with two or more other health care providers, those with caregivers available on a part or full time basis, and for visits of complexity level three or four. Table 23 lists the findings of the stepwise forward regression.

Table 23

Predictors of initial/repeat visits by payer

Predictors (.1 inclusion level)	Step	r_2	coefficient	significance
Initial Medicare visits:				
1 other provider (MD)	1	.492	-51.92	.024
Initial non-Medicare visits:				
1-2 physician orders	1	.976	-69.00	.002
Daily visits	2	.999	13.50	.004
Repeat Medicare visits:				
# Home Health services	1	.163	-13.22	.013
Repeat non-Medicare visits:				
1 other provider (MD)	1	.194	-31.92	.036
No available caregiver	2	.459	-25.18	.005
Visit complexity 1-2	3	.540	-14.28	.082

Initial/repeat visit clusters. A final attempt was made to cluster visits based on time and complexity, this time using the major predicting category identified above, initial and repeat visits. Separate cluster analyses were done for initial visits (n=15) and repeat visits (n=60) using two variables: total visit-related time (excluding travel time) and E-S visit complexity scores. This resulted in two distinct clusters of initial visits and three clusters of repeat visits. Initial visits were divided into a low time, low complexity group and a high time, high complexity group; while repeat visits were grouped according to (a) low time, low complexity; (b) low time, high complexity; and (c) high time, high complexity (see Figures 10 and 11).

Figure 10

Initial/repeat visit clustered by time and complexity

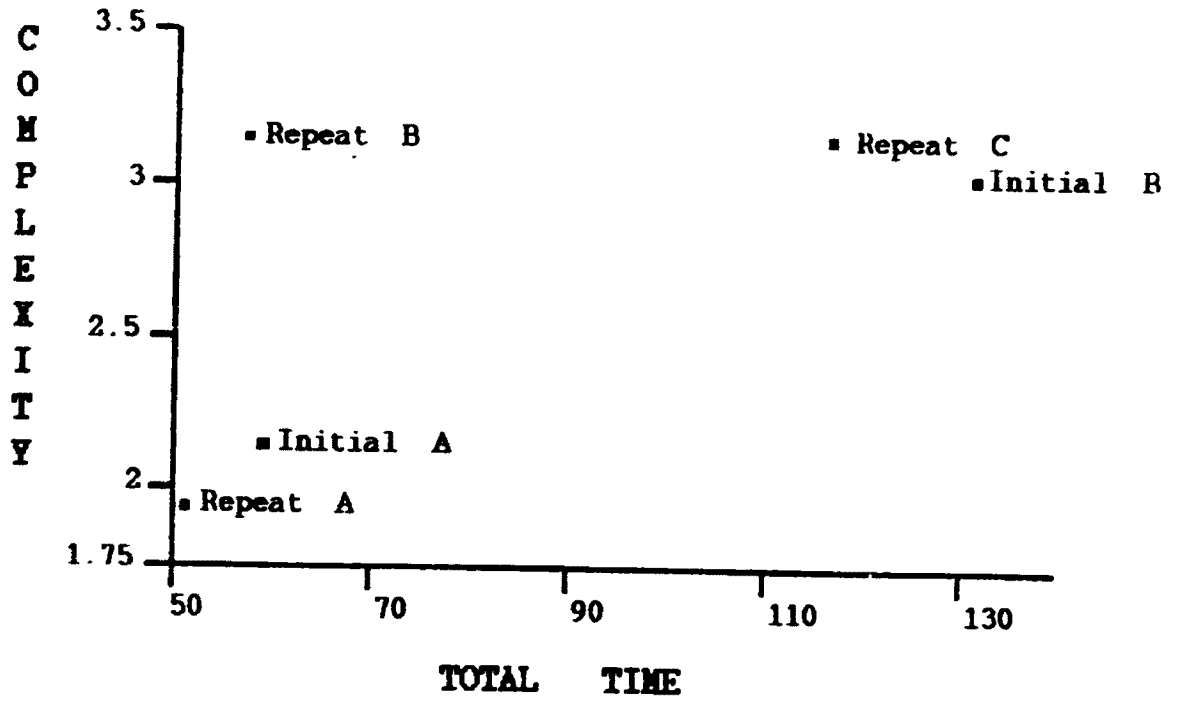
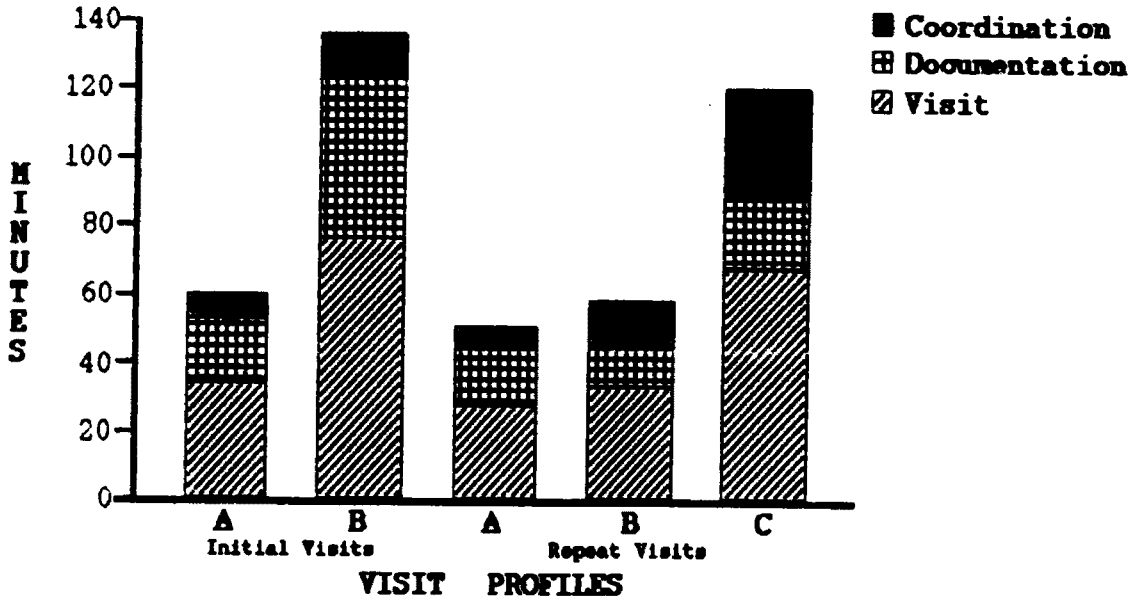


Figure 11

Initial/repeat time-complexity clusters



The two initial visit clusters have several significant ($p<.1$) differences. Group A (n=6) can be characterized as short (visit time=34

minutes, total time=61 minutes) and non-complex (E-S=2.2, time weighted=2.4). An average of four visits are planned to these clients, with a planned frequency of 11 days between visits. An average of 10 tasks are performed during the visit. Clients have good housing conditions and 100 percent had pets. Nearly the total variability (r_2=.999, SE=1.773) in visit-related time (b_o=47.286, F=486.52, df=3, p=.002) is predicted by three variables: age over 75 (b=57.429, p=069), daily visits (b=-43.286, p=.014), and admission status (b=-12.429, p=.017).

Group B (n=9) initial visits are long (visit time=76 minutes, total time=135 minutes) and complex (E-S=3, time-weighted=2.9). An average of 11 visits are planned for these clients and an interval of four days before the next visit. Thirteen tasks were performed during the visit. Clients had more than three physician orders for nursing care. Over half (56%) had a primary diagnosis involving the circulatory system, and 33 percent had mental limitations. The majority (r_2=.999, SE=.511) of total time variability (b_o=120.96, F=3375.3, df=6, p=.000) can be predicted by the following variables: one to two physician orders (b=54.391, p=.032), nurses' education--less than Bachelor's degree (b=17.391, p=.013), admission status (b=-18.174, p=.02), two other health care providers B=16.87, p=.007), visit complexity of 1 to 2 (b=8.652, p=.018), and visit complexity of 3 (b=1.739, p=.068).

Repeat visits were clustered into three groups with significant (F=75.339, df=59, p=.000) differences in total visit-related time (excluding travel) and complexity (X^2=56.468, df=4, Ø=.585, p=.000). Group A visits (n=17) were short (visit time=28 minutes, total time=50 minutes) and uncomplicated (E-S=1.9, time-weighted=2.3). Significantly (p=.004) less time was spent on physical care activities (1 minute) and a higher percent of time (p=.002) was spent in assessment activities (43%). Clients tended to be

older (60% over 75 years) than in the other two groups (X^2=8.213, df=4, Ø=.261, p=.084). Multiple regressions identified two variables, available caregiver (b=16.541, p=.079) and age over 75 (b=10.984, p=.064) accounting for 37 percent of the total visit-related time variance (b_o=38.262, F=4.176, p=.038, r_2=.374, SE=9.521).

Group B (n=33) repeat visits can be characterized as short (visit time=50 minutes, total time=57 minutes) and complex (E-S=3.2, time-weighted=3.0). This group of visits showed significant (p<.1) differences from the other two groups of repeat visits in the following areas: high number of planned visits (X=27), high percent of visit time spent in coordinating care (X=15%), and number of clients with paralysis (33%). Sixty-six percent of the variability of total time (r_2=.656, SE=9.482) of Group B visits (b_o=59.744, F=8.271, df=6, p=000) can be predicted by six variables: poor prognosis (b=9.877, p=.021), one other health care provider (b=-15.728, p=.014), caregiver availability (b=11.442, p=.089), number of home health services (b=-4.467, p=.052), visit complexity of three (b=-13.95, p=.099), and sex (female) (b=6.789, p=.036).

Group C (n=10) repeat visits were long (visit time=68 minutes, total time=120 minutes) and complex (E-S=3.2, time-weighted=3.1). The most significant (p=.058) differences between Group C visits and the other two groups of repeat visits were in the length of time spent in medication assessment (F=10.25, df=33), and use of a home health aide (80%, X^2=9.118, df=2, Ø=.39, p=.011). Eighty percent of clients had pets (X^2=11, p=.004, Ø=.429). Few medications (b=61.75, p=.032), and age under 65 years of age (b=21.15, p=.083) predict 66 percent (r_2=657, SE=15.565) of the variance of total time (b_o=103.25, F=6.695, df=2, p=.024) for Group C visits. Tables 24 and 25 summarize characteristics of the initial/repeat visit clusters.

Table 24

Characteristics of initial/repeat time-complexity visits

	Initial		Repeat		
	A	B	A	B	C
N	6	9	17	33	10
Time:					
Assessment	17**	33**	11**	9**	16**
Education	7	16	7**	6**	12**
Physical care	2	7	1**	8**	19**
Psychosocial	6	11	6**	5**	15**
Coordination	3	10	2*	5*	6*
Visit time:	34**	76**	28*	33**	68**
Documentation	19**	48**	16*	12*	20*
NV Coordinat.	7	12	6*	12**	32**
Total time:	61**	135**	50**	57**	120**
Complexity	2.2**	3**	1.9*	3.2*	3.2*
Planned visits	4**	11**	10*	27*	11*
Tasks done	10*	13*	10**	10**	13**
HH services		60% PT*			80% HHA*
Functional limitations:					
Mental	0*	33%*	24%	12%	10%
Endurance	36%	64%	77%*	97%*	90%*
Paralysis	0	22%	12%**	33%**	0
Hearing	0*	33%*	29%	9%	20%
Ambulation	67%*	100%*	82%	88%	90%
Diagnoses	33% pregn*	56% circ*	24% circ	30% skin	--
Surgery	0*	33%*	18%	33%	20%
Pets	0*	44%*	58%**	24%**	80%**
# Medications	3**	7**	7	6	8
Physician orders	3	6	4	4	5
Nursing problems	2**	3**	3	4	4
Medicare	50%**	78%**	65%	58%	70%
Agency	100% prop*	44% prop**	Hosp.	Vol/hosp	Vol/hosp
RN education	--	--	AD/dip**	BS/MS**	BS/MS**
Housing	100% good**	67% poor**	65% good	64% good	60% good

*p<.1 **p<.05

Table 25

Predictors of initial/repeat time-complexity visits

Predictors (.1 inclusion level)	Step	r_2	Coefficient	Significance
Initial Visits:				
Group A (short/easy):				
Age <75	1	.604	57.43	.069
Daily visits	2	.959	-43.29	.014
Admission status	3	.999	-12.43	.017
Group B (long/complex):				
1-2 physician orders	1	.507	-18.17	.032
Nurse's education	2	.839	17.39	.013
Admission status	3	.951	120.96	.020
2 other providers	4	.994	16.87	.007
Visit complexity 1-2	5	.999	54.39	.018
Visit complexity 3	6	.9999	8.65	.068
Repeat Visits:				
Group A (short/easy):				
Caregiver available (PT)	1	.192	16.54	.079
Age <75	2	.374	10.98	.064
Group B (short/complex):				
Poor prognosis	1	.161	9.88	.021
1 provider	2	.318	-15.73	.014
Caregiver available (PT)	3	.505	11.44	.089
# Home Health services	4	.570	-4.47	.052
Complexity 3	5	.614	-13.95	.099
Sex (female)	6	.677	-6.79	.036
Group C (long/complex):				
0-3 medications	1	.456	61.75	.032
Age 65-75	2	.657	21.15	.083

To summarize the variations in visit-related time, Group A initial visits are longer for clients age 75 and over, those with visits less frequent than daily, and those having more than one admission to the home health agency. Group B initial visits are longer for clients with three or more physician orders, when done by nurses with less than baccalaureate education, clients being admitted to the agency for the first time, clients with two other health care providers, and visits with complexity levels of one, two, and three.

Group A repeat visits are longer for clients with caregivers available part time, and those age 75 and over. Group B repeat visits are longer for clients with a poor prognosis; those with two or more providers; clients with caregivers available part time; those receiving two or more additional home health services; visits with complexity levels of one, two or four; and visits to female clients. Group C repeat visits are longer for clients receiving up to three medications, and clients age 65 to 75.

Critical Indicators

As reported above, critical indicators were identified for various dependent variables through the use of stepwise forward regression including: visit time, total visit-related time, visit and non-visit activities, percent of time spent in visit activities, visit complexity, initial and repeat visits, Medicare and non-Medicare visits, initial and repeat Medicare and Medicare visit model, and initial and repeat time/complexity visit model. These predictors are summarized below and also outlined in Table 26.

Initial/repeat visits. Initial visits had longer visit and total visit-related time, assessment time, percent of time spent in assessment, education time, care coordination time, and documentation time than repeat

visits. Initial Medicare visits were longer than non-Medicare initial visits, and more tasks were performed by nurses during initial versus repeat visits.

Payer type. Visits reimbursed by Medicare had longer visit and total visit-related time, educational time, and documentation time than visits reimbursed by all other payers. Clients with Medicare or Medicaid reimbursement had longer initial visits compared with initial visits reimbursed by other payers.

Providers. The number of additional health care providers was significantly related to several variables. Clients with no other providers except their physician had longer total visit-related time, less time and percent of visit time spent in education, had shorter initial visits, shorter Medicare visits, shorter initial Medicare visits, shorter repeat non-Medicare visits than clients with additional health care providers, and shorter repeat group B visits. Those clients with two health care providers (physician and one other) had shorter documentation time and longer initial group B visits than those with only one provider or more than two providers. Clients with three or more providers had longer visit time than clients with less than three providers.

Physician orders. The number of physicians' orders was indicative of differences in time and complexity as well. Clients with one to two physician orders had shorter visit time, lower visit complexity, a lower percentage of time spent in assessment and physical care activities, less time spent in care coordination, more nursing tasks performed during the visits, and shorter Medicare initial visits as well as shorter initial Group B visits, compared with clients having more than two orders for care. Clients with three to five physician orders had shorter initial visits than those with less than three or more than five orders for care. Clients with six or

more physician orders had higher documentation time than those with less than six other providers of health care.

Complexity. A visit complexity level of one or two was predictive of shorter total visit-related time, repeat visits, non-Medicare visits, and repeat non-Medicare visits than visits with complexities of three or four. A complexity level of three was predictive of shorter repeat group B visits than complexity levels of one, two, or four. A visit complexity of level four was indicative of shorter initial group B visits than complexity levels of three or less.

Age. Clients age 75 or over had lower complexity visits, longer non-Medicare visits, longer initial group A visits, and longer initial group B visits than younger clients. Clients age 65 to 75 had a higher percentage of visit time spent in education, and longer repeat group C visits than clients of other ages.

Agency type. The type of agency was significantly related to a number of variables. For instance, voluntary and health department agencies had more complex visits, spent a lower percentage of time in assessment activities, a high percentage of visit time in physical care and care coordination activities, more time in care coordination activities, and had shorter repeat visits than proprietary or hospital-based agencies. Proprietary agencies spent a lower percentage of visit time in assessment and physical care activities, less time doing assessments, and had shorter initial home visits than voluntary agencies, health departments, or hospital-based agencies.

Visit frequency. Frequency of visits was predictive of a number of variables. Visits to clients receiving daily visits were judged to be more complex, had less time spent doing assessment activities, shorter non-

Medicare visits, longer non-Medicare initial visits, and shorter initial group A visits, and had fewer nursing tasks performed than visits with intervals of two or more days. Visit intervals of two to three days was predictive of shorter travel time than visits with intervals of more than three days. Four day or more visit intervals was predictive of a higher percentage of time being spent in psychosocial support and a lower percentage of time spent in physical care activities than for visits made more frequently.

Nurse's education. The education of the nurse was shown to have several significant relationships. Nurses with less than baccalaureate education (LPN, AD, diploma) spent a higher percent of visit time in education, and had longer initial Group B visits. Bachelor's and master's prepared nurses had more complex visits, spent a higher percent of visit time coordinating care, and had more visit and non-visit time coordinating care.

Sex. Visits to male clients had a higher percentage of time spent in psychosocial support activities, and more time spent in assessment and psychosocial activities, had more nursing tasks during the visit. Initial visits and non-Medicare visits were longer for males than for females. However, repeat group B visits were longer for females than for males.

Caregivers. The availability of a caregiver was also predictive. Clients with no available caregiver had shorter non-Medicare visits and shorter repeat non-Medicare visits. Clients with part time caregivers available had more non-visit time spent on care coordination, and longer repeat group A and group B visits. Clients with full time caregivers had higher complexity visits.

Medications. The number of prescribed medications a client was taking was indicative of several factors. Clients receiving up to three

medications had longer repeat group C visits. Those with four to seven medications had higher complexity visits, a higher percent of visit time spent on care coordination, and longer visit time spent in psychosocial support and care coordination than clients with less than four or more than seven medications. Clients with eight or more medications had a higher percent of time spent in assessment activities and a lower percent of time spent in physical care activities than those with fewer medications.

Surgery. Clients who had surgery prior to their home health care admission had higher complexity visits, more time spent in assessment activities, and longer initial visits than clients without prior surgery.

Activity. Clients restricted to bedrest or with bathroom privileges only had a higher percentage of time spent in physical care activities than clients who could be up as tolerated.

Prognosis. A fair prognosis was predictive of a higher percentage of visit time being spent in educational activities and a lower percentage spent in psychosocial support activities, more actual visit time spent is assessment, and education and care coordination than other prognoses. A client with a poor prognosis had longer psychosocial support time during the home visit, more non-visit care coordination time, and longer repeat group B visits.

Home health services. The number of home health disciplines providing services to the client in addition to nursing predicted a number of dependent variables. Clients with two or more additional services had longer total visit-related time, longer psychosocial support visit time, longer non-visit care coordination time, longer repeat visits, longer Medicare visits, longer Medicare repeat visits, longer repeat group B visits than those

with less than two other services and more nursing tasks performed during the visit than clients with one or less additional services.

Admission status. Clients with no previous admissions to the agency had more complex visits, longer visit care coordination time and longer initial B visits than those with a history of previous admission(s). Readmission clients had a high percentage of time spent on psychosocial support activities, and longer initial group A visits.

Table 26

Critical indicators

Variable	Predictive of:
Initial visits	Longer visit time
	Longer total visit-related time
	Higher percent assessment time
	Longer assessment time
	Longer education time
	Longer care coordination time
	Longer documentation time
	Longer Medicare visits
	More tasks performed
Payer type:	
Medicare	Longer visit time
	Longer total visit-related time
	Longer education time
	Longer documentation time
Medicare and Medicaid	Longer initial visits
Number of additional providers:	
One (Physician only)	Longer total visit-related time
	Lower percent education time
	Shorter education time
	Shorter initial visits
	Shorter Medicare visits
	Shorter initial Medicare visits
	Shorter repeat non-Medicare visits
	Shorter repeat group B visits

Table 26—continued

Two providers	Shorter documentation time Longer initial group B visits
Three or more	Longer visit time
Physician orders:	
1-2 orders	Shorter visit time Less complex visits Higher percent assessment time Lower percent physical care time Shorter care coordination time Shorter Medicare initial visits Shorter Initial group B visits Fewer tasks performed
3-5 orders	Shorter initial visits
6 or more orders	Longer documentation time
Visit complexity:	
Levels 1-2	Shorter total visit-related time Shorter repeat visits Shorter non-Medicare visits Shorter repeat non-Medicare visits
Level 3	Shorter repeat group B visits
Level 4	Shorter initial group B visits
Client age:	
Age 65 to 75	Higher percent education time Longer repeat group C visits
Age 75 and over	Less complex visits Longer non-Medicare visits Longer initial group A visits Longer repeat group A visits
Agency type:	
Voluntary/health dept.	Higher complexity visits Lower percent assessment time Higher percent care coordination time Longer care coordination time
Proprietary agencies	Lower percent physical care time
Hospital-based	Longer assessment time Longer initial visits Longer repeat visits

Table 26—continued

Visit frequency:	
Daily visits	Higher complexity visits Higher percent physical care time Shorter assessment time Shorter non-Medicare visits Longer non-Medicare initial visits Shorter initial group A visits Fewer tasks performed
2-3 days	Shorter travel time
4 days or more	Higher percent psychosocial time Lower percent physical care time
Nurse's education:	
LPN/AD/diploma	Higher percent education time Longer initial group B visits
BS/MS/MPH	Higher complexity visits Higher percent care coordination time Longer care coordination time Longer non-visit coordination time
Sex:	
Males	Higher percent psychosocial time Longer assessment time Longer psychosocial time Longer initial visits Longer non-Medicare visits More tasks performed
Females	Longer repeat group B visits
Caregiver availability:	
None available	Shorter non-Medicare visits Shorter repeat non-Medicare visits
Part time	Longer non-visit coordination time Longer repeat group A visits Longer repeat group B visits
Full time	Higher complexity visits

Table 26—continued

Medications:	
0-3	Longer repeat group C visits
4-7	Higher complexity visits Higher percent care coordination time Longer physical care time Longer care coordination time
8 or more	Higher percent assessment time Lower percent physical care time
Prior surgery:	Higher complexity visits Longer assessment time Longer initial visits
Activity level:	
Bedrest/BRP	Higher percent physical care time
Prognosis:	
Fair	Higher percent education time Lower percent psychosocial time Longer assessment time Longer education time Longer care coordination time
Poor	Longer psychosocial time Longer non-visit coordination time Longer repeat group B visits
Home health services:	
2 or more	Longer total visit-related time Longer psychosocial time Longer non-visit coordination Longer repeat visits Longer Medicare visits Longer repeat Medicare visits Longer repeat group B visits More tasks performed
Admission status:	
First admission	Higher complexity visits Longer care coordination time Longer initial group B visits
Repeat admission	Higher percent psychosocial time Longer initial group A visits

CHAPTER V

CONCLUSIONS

Discussion

This exploratory study was designed to develop a quantification model for measuring home health care nursing visits. The feasibility of using the five E-S activity categories (assessment, education, physical care, psychosocial support, and care coordination) to classify nursing services provided during home visits was tested; resultant data yielded four potentially useful classification models. Of these the most practical model appears to be the classification of visits as initial and repeat. While the results are only suggestive, several interesting findings emerged. These will be addressed according to the eight research questions identified in chapter one.

Research Questions

What service categories can be used to group client care activities? From the viewpoint of the observer, activities easily fell into the five E-S categories and, although provision was made for an "other" category, its use was not required. Staff nurses easily understood and supported the categorization strategy, expressing pleasure that they were being "given credit" for doing more than providing physical care only. There was also a consensus among staff nurses that non-visit activities related to a specific

client (documentation and care coordination) should be included in total visit-related time.

Difficulties which did arise in assigning activities to the five E-S categories usually occurred between the assessment and education categories which, on occasion, shifted back and forth. For example, nurses reviewing medications might be assessing compliance and/or potential side effects one minute and teaching the client about the medication the next. The only other categorization dilemma involved placement of blood draws, in assessment or physical care. While blood is drawn from clients for assessment purposes, the nurse does not actually do the assessment (or analysis). Therefore, this activity was considered a physical care task and classified accordingly.

Use of the E-S categories allows for a division of nursing service activities without requiring the identification and timing of individual tasks. Assessment of the content of a visit by these five categories plus the two non-visit categories allowed for an examination of the content of nursing visits which could be useful in developing quality assurance measures and in identifying nursing practice patterns. The relationships noted among these seven areas should be studied further to ascertain whether trends identified in this study can be supported. For instance, does the strong relationship found between assessment time, documentation time, and total visit time allow for time predictions of one of these categories knowing the time of another? It should be remembered that this study recorded actual time spent in each category. Future studies may want to look at optimal time for each activity type.

No relationship was found between travel time and other visit characteristics. Therefore, it seems reasonable for productivity and pricing

purposes that travel time be calculated separately, by specific agency or nurse. The high variability of time for each of the visit and non-visit activity categories suggests the need for further division of visits according to the amount of time utilized in each category.

The visit profiles developed from clustering the percent of time spent in each category give a good indication of typical visit types. All but the two types of physical care visits involved a high percentage of time spent in assessment activities. Educational components were dominant in three of the six categories. An easy visit typology might be as follows: (a) assessment/education visits, (b) two types of physical care visits--with and without education, (c) care coordination visits, and (d) two types of psychosocial support visits--with and without education. While the length of the visit was not a factor in this analysis, these visit profiles may be useful for the development of quality assurance measures, especially if assumptions regarding the covariance of the assessment and education components can be supported in further studies.

What dimension(s) best describe nursing services for productivity and pricing measurement purposes? This study tested the usefulness of three variables for quantifying nursing home visits: time, complexity, and type of activity. Attempts at cluster analyses by the time and complexity of these five categories did not result in definable visit profiles because of a number of outlyer visits. This was possibly due to the small sample size of the study and further study is indicated in this area. The high correlation between time and complexity for four of the five categories (excluding assessment) suggests that time alone may be the best dimension for productivity and pricing measurement purposes.

The results of the two cluster analyses based on total time and complexity, however, raise some questions since both analyses identified groups of visits where time and complexity were not related. This is an area where additional research is needed. Nursing needs to decide what value to place on skills required for service delivery. Currently, the cost of care is translated directly into time. Only if a nurse receives higher compensation due to her/his skills and/or experience, does skill level affect cost. The question arises as to whether the complexity of care should also carry a price tag. Also, can productivity of nurses giving high time, high complexity care by compared with nurses giving low time, low complexity care? In any case, complexity measures are useful in describing a nurse's caseload and in supervisory planning. If they are ever to be used in a price/productivity context, it would be essential that objective definitions be refined for each complexity level.

What is the strength of the relationship between home visit time and complexity? As noted above, the activity/complexity taxonomy showed a strong relationship between time and complexity for each of the five activity categories with the exception of assessment. Time utilized for assessment appeared to remain fairly constant regardless of the complexity of the assessment. Spearman rho correlations ($p=<.001$) showed a strong positive relationship between time and complexity for the same four activity categories as well as for total visit-related time.

There appear, however, to be some visits which do not reflect this relationship as evidenced by the two cluster analysis profiles in which visit groups were identified with low or average time and high complexity, and high time with average complexity suggesting that, although there may

generally be a strong relationship between over-all visit time and complexity, there are identifiable groups of visits which fall outside this pattern.

A new complexity measure, time-weighted complexity, was developed and utilized in this study. Significant differences were not shown, however, between it and the E-S complexity scale. While a time-weighted complexity scale may be valuable in defining visit complexity, adaptation by home health agencies could be more complex due to the calculations required. Its usefulness, validity, and reliability needs further study.

What typical visit types or "profiles" can be identified? Four different classifications of visit profiles were suggested from this study: (a) visit content profiles based on the percent of time spent in each type of activity, (b) visit time/complexity clusters, (c) initial/repeat visits by payer, and (d) initial/repeat visits clustered by time and complexity. Visit content groupings, as discussed above, may be useful in caseload management and quality assurance endeavors. Their usefulness for productivity and pricing measurement needs further study.

The time/complexity clusters, while interesting, lack a sufficient number of visits in at least two visit clusters to be significant. In addition, clear, objective descriptors were not found which could be used for easy identification of visit types. The use of only two cluster variables also raises methodological questions. The interesting aspect of this analysis, however, is the fact that visit groups were identified with no relationship between time and complexity: Group C--average time, complex; and Group D--long, moderate complexity.

Classifying according to initial and repeat visits showed distinct differences and provided objective, clearly recognizable classification criteria. Further division by payer source also developed visit profiles with objective descriptors. For this reason, these four visit categories (initial Medicare visits, initial non-Medicare visits, repeat Medicare visits, and repeat non-Medicare visits) could be easily adapted by home health agencies. The implications of this type of division, however, are staggering. If the findings of this study can be supported and Medicare visits are found to indeed be longer (and possibly more complex), it is reasonable to expect that reimbursement should be adjusted accordingly. It should be noted that while total visit-related time was significantly longer for Medicare initial visits, only actual visit time was significantly longer for Medicare repeat visits compared with non-Medicare repeat visits. There was, however, a significant difference in total visit-related time when classifying all visits according to Medicare and non-Medicare reimbursement.

Questions should be raised as to why these differences occur. Initial visits were shown to have high concentrations of time in assessment, education, and documentation as could be expected. Medicare visits tended to have more time spent in education, physical care, and documentation. More tasks were performed per visit during Medicare visits, visits were less frequent, fewer visits were made per client, and clients had more functional limitations. Can this difference be attributed to the fact that Medicare clients may be older and sicker than non-Medicare clients? Or, are nurses attempting to do more during a Medicare visit due to regulatory requirements aimed at reducing the total number of Medicare visits per client? This position could be supported by the fact that Medicare visits are less frequent than non-Medicare visits and fewer visits are made per

case, yet visits are longer, clients are sicker, and more tasks are performed per visit. It would also be well to question whether the increase in time and task performance might be due to specific Medicare requirements, and certain activities may not be actually deemed necessary by the nurse and, therefore, not done for non-Medicare clients.

The dramatic difference between payer types is seen in initial visits where total visit-related time for Medicare clients is nearly twice as long as for non-Medicare clients. The major differences occurred in assessment, education, and documentation time. Again, the question can be raised as to whether a difference in type of client requires additional time spent in these areas, or is this a result of regulatory requirements? In any case, if the results of this analysis are accepted, it appears that initial visits and Medicare visits are more time-consuming, and therefore, more costly than non-Medicare and repeat visits. Since Medicare reimburses agencies based on an average cost per visit, it would appear that non-Medicare payers are subsidizing Medicare visits because, not only are Medicare visits longer, but since there are fewer visits made per case for Medicare clients, the ratio of initial to repeat visits is higher for Medicare clients resulting in a higher percentage of Medicare visits being the lengthy initial visits.

The final classification model identified five visit profiles based on the time and complexity of initial and repeat visits. While some of the same limitations apply to this cluster analysis, each visit cluster consists of more visits (n=6 in the smallest group) than the time/complexity model. The fact that the largest visit cluster (n=33) was categorized as short and complex repeat visits strongly suggests that further study is indicated. While categorizing visits as initial or repeat is easy, additional objective

criteria need to be developed to order to clearly identify the visit subcategories.

These four models are ideal for testing in a demonstration project. In addition, while the cluster analyses using the time and complexity variables for the five activity categories contained a number of outlyers, a larger study is needed in order to adquately test their usefulness.

In summary, four different classification profiles were developed, three of which might have usefulness in productivity/pricing methodologies. Only one, initial/repeat visits by payer, has objective descriptors to make it easy to implement in home health agencies currently. Further study needs to be done before either of the cluster analysis profiles can be adapted for use.

What are the critical indicators (predictors) for home visit profiles, visit time, non-visit time?

Critical indicators for visit profiles, visit time and non-visit time were identified through stepwise forward regression as reported above. Forty-one percent of the variance of total-visit related time can be predicted by initial visits, number of home health services, complexity level, number of other health care providers (physician only), and Medicare reimbursement. Non-visit activities directly related to the home visit were also found to have critical indicators. Forty-five percent of the variance of documentation time is predicted by the initial visit, number of physician orders (six or more), Medicare reimbursement, and number of health care providers. Thirty percent of non-visit care coordination time variance was found to be predicted by four variables: nurses' education (BS/MS), number

of home health services (two or more), a poor prognosis, and part time caregiver availability.

Critical indicators were also found for the major visit profile developed, initial/repeat visits. Nearly all the total time variance of initial visits (99%) can be predicted by Medicare reimbursement, Medicaid reimbursement, number of other health care providers (6 or more), proprietary agencies, prior surgery, and male clients. Twenty-seven percent of the total time variance of repeat visits is explained by the number of home health services (two or more), visit complexity (3-4), and type of agency (voluntary/health department).

The two models which were based on the initial/repeat visit division, were also found to have several critical indicators. These are compared in Table 27.

Is there a relationship between agency and/or nurse characteristics and visit characteristics? Several significant relationships were noted between visits and nursing/agency variables, specifically nurses' educational preparation and the type of agency. Multiple regressions and/or analysis of variance indicated that baccalaureate and master's prepared nurses spent more time coordinating care, both during the visit and following the visit; had more complex visits, and made more repeat visits. Nurses with less than baccalaureate education (LPN, AD, diploma), spent a higher percentage of visit time in education, made more initial visits, and had longer initial cluster B visits (long and complex).

Visits made by voluntary agencies and health department agencies were more complex, had a lower percent of time spent in assessment activities, a higher percent of time spent in care coordination activities, as

well as longer time spent coordinating care during the visit than visits made by proprietary or hospital-based agencies. Proprietary agency visits

Table 27

Critical indicators of initial/repeat visit models

	Payer Model	Time/Complexity Model
Initial visits:	Medicare 1 provider (shorter)	Group A (short, easy) Age >75 (longer) Daily visits (shorter) 1st admission (shorter)
	Non-Medicare 1-2 orders (shorter) Daily visits (longer)	Group B (long, complex) 1-2 orders (shorter) Nurse ed (AD/Dip) (longer) 1st admission (longer) 2 providers (longer) Complexity 4 (shorter)
Repeat visits:	Medicare 2+ HH services (longer)	Group A (short, easy) Part time caregiver (longer) Age >75 (longer)
	Non-Medicare 1 provider (shorter) No caregiver (shorter) Complexity 1-2 (shorter)	Group B (short, complex) Poor prognosis (longer) 1 provider (shorter) 1-2 orders (shorter) Part time caregiver (longer) 2+ HH services (longer) Complexity 3 (shorter) Sex (female) (longer)
		Group C (long, complex) 0-3 medications (longer) Age 65-75 (longer)

had a lower percent of time spent in physical care activities than voluntary, health department, or hospital-based agencies. Hospital-based agencies spent more time doing assessment activities and had longer initial and repeat visits than other types of agencies.

Whether or not these findings are accidental should be the subject of further study. However, they suggest that nurses with more educational preparation tend to spend more time coordinating care with other providers and make more complex visits. Associate degree and diploma prepared nurses, however, tended to make longer, complex initial visits. Exploring the validity of these findings and the reasons for them, could be very useful. Does it take AD/diploma nurses longer to handle complex needs? Did BS/MS nurses deliver more complex care because client needs differed or did the more highly educated nurses recognize the complex client needs better? Since proprietary agencies tended to hire nurses with less educational preparation than voluntary/health department agencies, a question is raised as to whether the differences were the result of the nurse's preparation or the agency's philosophy.

An explanation of the significant difference in the number of initial visits for proprietary agencies could be the fact that some of the proprietary agencies used full time staff to do initial visits and open the case to the agency, and then assigned repeat visits to a fee-for-service or contract nurse. The observed visits included in this study were more likely to be made with the full time staff nurse, hence a greater chance of including a higher percentage of initial visits for proprietary agencies. It could also be that voluntary agencies and health departments with outside funding sources tend to keep clients longer, making more visits per case, resulting in a higher ratio of repeat visits to initial visits than other agency types.

The findings indicating that hospital-based agencies had longer initial and repeat visits as well as longer assessment time during their visits raises questions regarding a possible difference in client characteristics which

deserves further investigation. However, since hospital related agencies are more likely to have easier access to clients and hospital records than freestanding agencies, it seems that they would have the opportunity to reduce duplication of assessments done prior to home health agency admission, thereby reducing visit length.

Which model emerges from the data to best describe nursing services for use in productivity management and pricing? Three classification approaches were used: timed tasks, activity/complexity taxonomy, and visit profiles. The timed task approach, in order to be useful for productivity and pricing, needs considerably more study. All types of tasks would need to be identified, median times and/or weightings established. When implemented, a checklist would need to be completed by nurses for each visit which would be tallied to obtain the time/weight for each visit. This could add considerable paperwork burden to both the agency nurse and the clerical staff. The large variability in times for each task suggests that something other than the task itself influences the length of time required, such as certain client characteristics. For this reason, plus the fact that it may be difficult to operationalize areas other than physical care tasks, this approach may be less than optimal.

The activity/complexity taxonomy is useful in helping to answer questions about how nurses spend their time. It is interesting to note that only assessment time did not show a strong relationship to complexity suggesting that a certain amount of time is utilized for assessment activities regardless of the complexity of the assessment. Since no assessment activities were categorized as complexity level one, it may be

assumed that all visits required assessment skills of at least moderate complexity.

Some additional interesting trends are also revealed by the taxonomy. For example, education time showed the largest variation among the four complexity levels (1=1 minutes, 4=21 minutes). Physical care time had the highest cell variability (sd=33.1 for level 2). The longest times per cell were in physical care. This is in concurrence with the findings of the timed tasks, where physical care tasks were generally longer than tasks in other activity areas. Physical care complexity levels three and four showed little difference in median times (3=14 minutes, 4=15 minutes), the largest distinction being between levels two and three, a difference of eight minutes. Time for psychosocial support activities remained constant (4 to 5 minutes) for the first three complexity levels, jumping six minutes from level three to level four. Care coordination showed a gradual increase in time as complexity increased. This was also true for the visit as a whole.

While the results of the taxonomy provide an in-depth description regarding visit content, its usefulness in productivity and pricing measurement is questionable for two reasons. First, there was considerable time variability within each of the activity/complexity dyads suggesting that this categorization of visits did not adequately explain time variance. Secondly, neither objective descriptors nor significant visit profiles utilizing the taxonomy were developed.

The development of four classifications of visit profiles was described above. Of these, the most practical model appears to be classification of visits as initial or repeat. Secondarily, sub-grouping visits by payer source (Medicare and non-Medicare) appears to be indicated by the data. This model has advantages in that it is objective, simple, and would be easy to

use in developing agency-specific times and/or weights. The clustering of visits according to time and complexity under the two major categories of initial and repeat visits is, perhaps, the most interesting model with the greatest potential. However, the small sample size and the lack of objective predictors, precludes adoption of this model without further study.

How can home visits be measured? The final research question, which is the fundamental question addressed in this study, requires a synthesis of the responses to the other questions. Study findings suggest that it is possible to measure activities, complexity, and time. However, for productivity and pricing purposes, it appears that time may be the best way to quantify nursing visits until or unless further studies confirm complexity to be significantly different from time in certain types of visits. If this finding is supported, the weighting of complexity as it relates to time will need to be addressed.

Units of time representing 15 minute increments could be a feasible method of measuring visits for pricing and productivity, thus eliminating the need to precisely measure each visit separately. Service units (15 minutes) could be assigned to each visit type based on individual agency, program, or nurse time studies. Units accounting for travel time should be added to the visit service units. Productivity standards could then be developed by calculating the number of units expected of each nurse after other workload responsibilities are considered. Table 28 shows how such a standard could be developed. Nurses' productivity performance can be monitored by calculating the number of service units provided in a specific time period and comparing that result with the standard.

Table 28

Calculation of a monthly nurse-specific productivity standard

Hours available this month		168
Scheduled time:		
Personal time (vacation, etc.)	8	
Supervisory Conferences	2	
Staff meetings	2	
Committees	3	
Continuing education/in-service	3	
Other assignments (hospital liaison, field advisor, etc)	5	
Total scheduled time:		23
Hours available for home visits:		145
Number of basic service units possible (multiply hours available by four):		580

Costing of visits can be accomplished in a similar manner. Direct nursing costs (labor, fringes, supplies) can be divided by the number of units of service provided for a specified time period (month, year) to find an average cost per basic service unit. This "unit cost" can then be multiplied by the number of units assigned to each type of visit to find the average cost per visit type. Table 29 provides an example of these calculations for the initial/repeat payer model.

Other Findings

While the purpose of this research was to explore methods of quantifying home visits made by nurses, other findings emerged from the client, agency and nurse data which warrant notice. These data were not analyzed exhaustively, however, descriptive analyses did reveal several areas of interest.

Table 29

Calculation of cost per basic service unit and cost per visit type

Cost per basic service unit:

Direct nursing costs	$ 10,000	
Service units provided	1,000	
Average cost/service unit		$ 10

Cost per visit profile (excluding travel):

Visit type	Minutes	Units	Cost
Initial Medicare visits	125	8	$ 80
Initial non-Medicare visits	66	4	$ 40
Repeat Medicare visits	69	5	$ 50
Repeat non-Medicare visits	60	4	$ 40

The picture that emerges from the data of the "typical" home health client provides some interesting insights. According to the study data, the average home health client is a 68 year old white female, married, of middle socioeconomic status, living in detached housing which is considered clean and safe. She lives with at least one other person and has an available, willing caregiver, capable of providing moderately heavy care. Her primary diagnosis is likely to be circulatory, skin, or cancer related. She takes an average of six prescribed medications, has at least three identified nursing problems, four physician orders for care, and a prognosis ranging from guarded to good. Functional limitations include endurance and ambulation, requiring some mechanical assistance with walking and specific safety precautions. Her mental status is considered normal. She will have approximately 15 home nursing visits with an interval of six days between

visits. This is her first admission to the agency for home care, and she will likely receive one other home health service. She has been referred to the home health agency by a hospital, and care is being reimbursed by Medicare.

The majority of home care nurses are female. Voluntary and proprietary agencies were most likely to hire AD and diploma prepared nurses. Half of the home care nurses have had additional special training. It is interesting to note that 20 percent of the nurses were master's prepared and an equal number were AD prepared. This raises questions regarding the effects of education on areas such as cost, efficiency, and client outcomes.

Implications

Study data indicate that initial visits are longer than repeat visits. This was true not only for total visit-related time, but also for the actual visit time, assessment time, education time, care coordination time, and documentation time. Initial visits contain more tasks than repeat visits and have a higher percentage of visit time devoted to assessment as might be expected. Implications are that home health agencies either (a) need to recognize the difference between initial and repeat visits and make allowances in productivity and pricing, and/or (b) develop ways to improve the efficiency of initial visits, avoiding duplicative duties. This becomes even more important from an economic viewpoint in light of the fact that clients are experiencing shorter episodes of care (fewer visits per client), thus increasing the ratio of initial visits to repeat visits. In other words, because clients have fewer of the less costly, less time consuming repeat visits, costs per case are rising, and overall nursing productivity declines.

The major difference in visit time by payer suggested by study data has several potential implications. If Medicare visits, especially initial visits, are longer and therefore more costly to home health agencies, should not higher fees be charged Medicare clients? Since Medicare currently reimburses on a cost basis, averaging costs among all types of visits means that Medicare pays less than the actual cost of a Medicare visit. This becomes extremely important in light of the fact that Medicare clients are the largest component of most intermittent home health agencies' caseload. It certainly should become an issue as prospective pay initiatives are developed for home care. It should also be noted that this study dealt only with nursing time per visit. If, as supported by the data, documentation time is longer for Medicare visits and there is a higher ratio of initial visits to Medicare clients, it stands to reason that this will result in increased administrative costs as well.

As stated earlier, it is also important to question why Medicare visits are longer than non-Medicare visits. Is it a function of differing client characteristics, or regulatory requirements. If it can be shown that Medicare clients do, indeed, require more care, longer visits may be justified. This could be due, in part, to recent Medicare initiatives restricting services to sicker clients. On the other hand, if visits are longer because additional paper work and/or assessment protocols are required to meet documentation standards, questions regarding who should cover the cost (the agency or Medicare) need to be raised.

As noted above, the Medicare visits included in this study not only had longer visit and total visit-related time, more time was spent in education and documentation activities than visits reimbursed by other payers. While attempting to increase reimbursement from Medicare to cover

the increased costs associated with longer visits may, indeed, be warranted, in reality, home health nurses need to look for legitimate ways to reduce the length of Medicare visits. Can documentation be streamlined to improve efficiency? Can more efficient (and effective) methods of education be developed? Can other means of monitoring and assessing clients be developed such as on-site monitors and telephone calls. The nursing profession needs to ask how it can be proactive in assuring quality services to Medicare clients without unnecessary documentation and evaluation activities.

The relationship of complexity of care to time needs further study. However, it appears that while there is generally a positive relationship between complexity and time, there are groups of visits where this is not true. An issue facing nursing, as it has faced other professions, is what value to place on complexity. Is time the only "valuable" dimension of nursing service? Currently, time is directly translatable to cost since nurses are generally paid according to time worked. Even when paid by the visit, fees are based on average visit times. While this study has focused on quantifying the home visit specifically, questions need to be raised as to what are the dimensions of value for nursing. Should nurses be reimbursed and clients/payers charged for the complexity of care indicated, and for the skills required of the nurse?

The fact that, in general, clients with more outside health care providers had longer visits implies that this type of client may be sicker. It also can alert nurses to focus on ways to improve the efficiency of care to these clients, while maintaining quality. The same could be true for clients with high numbers of physician orders.

The differences between visits made by different types of agencies may be reflective of their general service area, their sources of referral, client care needs, the type of nurses they hire (differences in education and/or experience), or their general philosophy. This is an area that certainly warrants additional study, especially as it relates to hospital-based agencies longer initial and repeat visits.

In general, it can be said that the more frequently clients are seen, the more complex is their care, the higher the percentage of time spent in physical care, the shorter the length of the visit, and the fewer tasks are performed. This appears reasonable since clients which require daily visits are likely to be more unstable or require frequent physical care tasks. Since the nurse sees them so often, less time may be necessary to monitor progress between visits.

The differences in nursing education have also been discussed earlier. Many agencies are using associate degree and diploma nurses. The major difference noted in this study was that the less educated nurses spent a higher percent of time in client education, while more educated nurses spent more time in care coordination. Since community health education is part of the curriculum of baccalaureate programs, this finding supports the concern that nurses without this type of preparation may not be adequately dealing with the community aspects of client care. The finding which suggests that nurses with more education have more complex visits also needs additional study to determine whether this is a result of (a) intentional matching of client needs to nurse preparation, or (b) more highly educated nurses being better able to recognize and respond to clients complex needs. Additionally, exploration of the practicality of differentiated practice models could lead to cost reductions.

In general, male clients had longer visits, received more nursing care tasks, and had more time spent in psychosocial and assessment activities than female clients. Males were also more likely to have caregivers available than females, which may raise the question as to whether the longer visits are because males may be sicker, because the nurse needs to educate and support the caregiver, because female nurses tend not to tolerate female client problems as well as males, or because, for some other reason, visits to male clients just take longer.

The relationship of caregiver availability was an unexpected finding. Visits tended to be longer and more complex as caregiver availability increased. While at first glance this result may not appear to make sense, it could be that caregivers were available for the sicker clients, and increased time was a result of the complexity of care required rather than the fact that a caregiver was available. However, the high availability of caregivers in the home raises questions as to what happens to those individuals without caregivers available? Again, to reduce costs and improve efficiencies, the availability of such a high percentage of caregivers raises questions regarding what type of approaches to care can be taken to improve caregiver capability and reduce nursing time.

Surgery prior to admission also indicated longer and more complex visits. This finding, if supported by other studies, could be an objective factor to use in further identifying visit types. Implications for nurses are that attention could be given to the development of more efficient protocols for providing care to post-surgical clients, and the need for improved discharge planning and transfer of hospital information.

The variance of visit and activity time with changes in prognosis does not seem to follow a specific pattern, except that, as could be

expected, clients with poor prognoses utilized more visit time in psychosocial support.

Another interesting finding of the study was that the clients with more home health services tended to have longer visits and required more tasks. This could be due to a higher acuity level for these clients.

The client profile resulting from study data provides some interesting insights into the type of client receiving home nursing services. The average client age was over 65. While there is support for the fact that the elderly are major users of health care services and can certainly benefit from home health care, questions can be raised about the availability and affordability of services to younger clients.

As has already been stated, the findings of this study have several potential implications for nursing. First of all, it has given support to the idea that there are different types of visits, and although further study is needed to more clearly define the types, the results of this study are suggestive that weighting visits according to initial and repeat status is appropriate. This is a simple, objective classification scheme which would not be difficult to implement even in small agencies and could be a first step in being able to plan, monitor, and evaluate nursing productivity. It also provides a mechanism for more accurate costing of care and could be used for planning and evaluation purposes as well as for pricing of services, especially to non-governmental payers.

A look to the future means looking at alternative reimbursement systems for home care and alternative approaches to providing effective, efficient care. Productivity management will maintain, and possibly increase, its importance. It will likely go beyond identifying how many visits are made per nurse per day, but will need to look much more closely

at what type of visits are being made. How efficient are they? How effective are they? How necessary are they? What type of service mix is most effective and efficient in achieving specific client outcomes? Is it possible to put a price on client outcomes? If reimbursement was received for assisting a client to reach certain outcome criteria, would services be structured differently? Effectiveness of service would become much more important in this scenario.

Recommendations

The four visit profile models identified in this study need additional testing with larger samples for refinement of descriptors and critical indicators and to assess their reliability and validity. Study findings strongly suggest that categorizing visits according to initial and repeat visits is appropriate. Further, subcategories by payer, Medicare and other, are also significant. The development of productivity management systems and/or costing mechanisms around these visit profiles should be studied.

Further, the suggestion supported by the cluster analyses identifying a group of low time, high complexity visits needs additional study. If objective descriptors of these types of visits can be identified, and if a value can be placed on nursing skill requirements, this type of classification of visits could be useful in looking beyond time utilized for care related activities and include a measure of the complexity of care as well.

The potential uses and refinement of the activity groupings, the taxonomy, and the complexity scale are all areas requiring additional study. Studies with larger samples could further evaluate the feasibility of using these measures in quality assurance and/or productivity management and could identify more objective descriptors.

As was stated at the beginning of this paper, time is not always a good indication of effectiveness, the slowest or fastest nurse may not be the most effective. This study identified average (and median) times for different types of visits. Future studies need to focus on optimal times. Through observation of 26 different nurses, it became apparent to the researcher that some nurses are more effective and efficient than others. Reasons for this difference need to be studied. The addition of quality assurance measures would allow study of various strategies of improving efficiency while maintaining or improving effectiveness.

Because home care is fast moving towards some change in reimbursement system, consideration should be given regarding the visit profiles suggested by this study and their potential usefulness in an alternative payment mechanism. Case mix profiles also need to be developed in order to identify which types of clients use what mixture of visit types. In that way costs per case can be determined.

In addition, further study of several additional areas are strongly indicated by study findings, including: (a) improving efficiencies during initial visits, (b) ascertaining why Medicare visits are longer than visits for other payers, (c) determining the effect of nursing education on visit efficiency and effectiveness, (d) further clarifying reasons for differences noted according to type of agency, (e) development of more objective criteria for visit complexity, (f) further evaluation of the usefulness of the E-S activity categories in identifying visit profiles, and (f) determination of the weight the complexity of care deserves in relationship to time.

APPENDICES

APPENDIX A

EASLEY-STORFJELL INSTRUMENTS FOR CASELOAD/WORKLOAD ANALYSIS

Difficulty Determination

Assign the highest numerical categorical rating (most difficult) in which the case meets two or more of the criteria. Based on:

A. Clinical judgment
B. Teaching needs
C. Physical care
D. Psychosocial needs
E. Multi-agency involvement
F. Number and severity of problems

1. MINIMAL:

A. Requires limited judgment, use of common sense, observation of fairly predictable change in patient status.

B. Requires basic health teaching.

C. Requires none or simple maintenance care.

D. Requires ability to relate to patients and families.

E. Few or uncomplicated problems.

2. MODERATE:

A. Requires use of basic problem-solving techniques, ability to make limited patient assessments.

B. Requires teaching related to common health problems.

C. Requires basic rehabilitation or use of uncomplicated technical skills.

D. Requires use of basic interpersonal relationship skills.

E. Requires limited involvement of two other agencies/providers.

F. Several problems with limited complexity.

3. GREAT

A. Requires use of well-developed problem-solving skills enhanced by comprehensive knowledge of physical and social sciences, ability to make patient and family assessments.

B. Requires teaching related to illness, complications and/or comprehensive health supervision.

C. Requires use of complicated technical skills.

D. Requires professional insight and intervention skills in coping with psychosocial needs.

E. Requires extensive involvement of at least one other agency/provider or coordination of several agencies/providers.

F. Several complicated problems.

4. VERY GREAT

A. Requires use of creativity, ability to initiate and coordinate plan for patient or family care, use of additional resources and increased supervisory support, ability to make comprehensive patient and family assessment.

B. Requires teaching related to unusual health problems or teaching/learning difficulties.

C. Requires knowledge of scientific rationale which underlie techniques and ability to modify care in response to patient/family need.

D. Requires ability to intervene in sever psychosocial problems.

E. Requires extensive coordination of multiples agencies/providers.

F. Numerous or complicated problems requireing agumentation of the knowledge base.

APPENDIX B-1

QUANTIFICATION OF HOME CARE NURSING

Nurse's Consent to Participate in Study

I agree to participate in a research study conducted by Judith Storfjell of the University of Michigan. The purpose of this study is to collect data to be used in developing a system to measure and categorize home health care nursing visits which will help nurses and administrators set appropriate productivity standards. I understand that an observer will spend one to three days with me timing my activities. She will also ask me a series of questions about each client and my opinion regarding the difficulty of care provided to each client. In addition, I understand that it will take me about 10 minutes to complete a questionnaire about my professional background. I understand that data collected during this study will be identified by code number only and that after collection, anything identifying names with code numbers will be destroyed.

I realize that participation in this study is voluntary and that I can stop participation at any time during the observation period. If I should have any questions regarding this study, or wish to have my data withdrawn from the study, I can contact the nurse researcher by calling or writing the address listed below.

By_____
(Home Health Nurse)

_____
(Agency)

_____
(Date)

By_____
(Judith I. Storfjell, MS, RN)

[redacted]

_____
(Date)

APPENDIX B-2

QUANTIFICATION OF HOME CARE NURSING

Agency Consent to Participate in Study

I agree to participate in a research study conducted by Judith Storfjell of the University of Michigan. The purpose of this study is tc collect data to be used in developing a system to measure and categorize home health care nursing visits which will help nurses and administrators set appropriate productivity standards. I understand that an observer will spend one to three days with one or two nurses who have agreed to participate. She will time their activities and will also ask them questions about each client and their opinion regarding the difficulty of care provided to each client. The nurses will also complete a short questionaire regarding their professional background. It may also be necessary for the nurse researcher to collect patient information from the agency's medical record. In addition, I understand that it will take me about 10 minutes to complete a questionnaire about the agency. I understand that data collected during this study will be identified by code number only and that after collection, anything identifying names with code numbers will be destroyed.

I realize that participation in this study is voluntary and that I can stop participation at any time during the observation period. If I should have any questions regarding this study, or wish to have my data withdrawn from the study, I can contact the nurse researcher by calling or writing the address listed below.

By_____
(Administrator)

_____
(Agency)

_____
(Address)

_____
(Date)

By_____
(Judith I. Storfjell, MS, RN)

_____
(Date)

APPENDIX B-3

QUANTIFICATION OF HOME CARE NURSING

Client Information

Thank you for agreeing to participate in a research study conducted by Judith Storfjell of the University of Michigan. The information from this study will be used to better plan home visits to clients. I understand that the information collected is strictly confidential. I understand that all of the information collected from many home visits will be added together and name(s) will not be identified.

I realize that participation in this study is voluntary. If I should have any questions regarding this study, or wish to have my data withdrawn, I can contact the nurse researcher by calling or writing the address listed below.

Judith I. Storfjell, MS, RN
[redacted]

APPENDIX B-4

QUANTIFICATION OF HOME CARE NURSING

Client Informed Consent

The following statement will be read to clients/families prior to the observed home visit:

> I am making visits today with your nurse to study what happens during home visits. I am interested in observing and timing what she does. This information will help us know how to better plan visits to clients. I will stay out of the way and won't interfere with the visit. Your decision to allow me to observe is strictly voluntary and if you feel uncomfortable at any time I will be happy to leave. The information I collect is strictly confidential. All of the information I collect from many home visits will be added together and your name(s) will not be identified. Is it all right for me to stay?
>
> Additional information that will help me to understand better what is going on during this visit is available on your health record. May I have your permission to review it?

APPENDIX C-1

N__ __ __

QUANTIFICATION OF HOME CARE NURSING

A__ __ __

RN Questionaire

Directions: Please answer each of the following questions in the space provided.

1. Year of birth: 19 ___ ___ 2. Sex: Male ___

3. Basic nursing education (check one): Female ___

   A.D. _____

   Diploma _____

   B.S. in nursing _____

4. Highest educational degree (check one):

   A.D. _____

   B.S. _____

   M.S. _____

   M.P.H. _____

   Other (specify) _____

5. Years of experience:

   a. Total number of years employed as a nurse ___ ___

   b. Total number of years employed in home health care___ ___

   c. Total number of years in present position ___ ___

6. Have you received additional training/education for specialized nursing skills? Yes_____ No_____

   If so, please specify_____

7. Employment status: Full time _____ Part time_____

8. How are you paid for your services? (check one)

   Salary/hourly____ Fee for service_____ Subcontract____

Name_____ Date_____

APPENDIX C-2

#__ __ __

QUANTIFICATION OF HOME CARE NURSING

Agency Questionaire

1. Name of Agency_____

2. Address_____ 3. Telephone_____

_____

4. HCFA region ___ ___

5. Years in operation ___ ___

6. Type of Agency (check one):

Community based (freestanding):

Voluntary _____

Private, non-profit _____

For profit _____

Hospital based _____

7. Indicate organizational structure of agency (check one):

Free-standing agency _____ Sub-unit agency _____

Subdivision agency _____ Other (specify) _____

8. Are services other than Medicare-certified types of service offered by this agency? yes_____ no_____

If yes, list services_____

9. Are non-Medicare type services provided through a sister organization? yes_____ no_____

10. Indicate the type of population served by the agency (check one):

Urban/suburban (only) _____

Rural (only) _____

Both _____

___ ___ ___

11. Indicate statistics for patients served in last fiscal year:

    a. Total number of patients/clients served (unduplicated) __ __ __ __

    b. Total number of admissions (cases) __ __ __ __

    c. Total number of visits made __ __ __ __ __

    d. Indicate total number of visits by payor source:

PAYOR SOURCE:	NUMBER OF VISITS:
Medicare	__ __ __ __ __
Medicaid	__ __ __ __ __
Other 3d party payors	__ __ __ __ __
Self-Pay	__ __ __ __ __
Free	_____
Other	_____

12. Approximately what percentage of your client population falls into the following age categories:

Under 1	___ ___%	Age 65-74	___ ___%
Age 1-19	___ ___%	Age 75-84	___ ___%
Age 20-44	___ ___%	Over age 85	___ ___%
Age 45-64	___ ___%		

Person Completing Form _____

Position _____

Date _____

APPENDIX C-3

C__ __ __

A__ __ __

N__ __ __

QUANTIFICATION OF HOME CARE NURSING

Client Data

1. Patient Number _____ 2. Birth date ___ ___ ___

3. Race: White____ Black____ Hispanic____ Oriental____ Other____

4. Sex: Male____ Female____

5. Payment Souce: Medicare A____ Medicare B____ Medicaid____

   BCBS____ Other Ins._____ Self____ Free____ Other_____

6. Referral Source: Self____ Family____ MD____ Hospital____

   Health Dept____ Other (specify)_____

   Posthospitalization only: acute care_____ Nsg home____

   Rehab_____ other_____

7. Admission status: First____ Repeat____

8. Number of previous nursing visits made this admission: ___ ___

9. Total number of nursing visits proposed this admission: ___ ___

10. Other agency services required: PT____ OT____ SP____ MSW____
    HHA____ Other (specify)_____

11. Number of other agencies/service providers involved:___ ___

List:_____

ENVIRONMENTAL SITUATION:

12. Quality: a. clean____ cluttered____ dirty____

    b. safe____ unsafe____

13. Housing: Detached____ Row/Town____ Apartment____ Other____

14. Pets: yes____ no____

15. Marital status: single____ Married____ widowed____ sep/div____

16. Living situation: alone____ spouse only____ spouse/others____

    other single_____ other group (specify)_____

17. Availability of caregivers: Full time____ partial____ none____

18. Willingness of caregiver: high____ moderate____ low____

19. Capability of caregiver: heavy care___ moderate care____

light care____ none____

20. Socioeconomic status: low____ middle____ high____

21. Speaks English: yes____ no____

PHYSICAL CARE INFORMATION:

22. Primary diagnosis: Name_____ ICD code_____

23. Other pertinent diagnoses:

Name_____ ICD code_____

Name_____ ICD code_____

Name_____ ICD code_____

Name_____ ICD code_____

24. Functional limitations:

Amputation _____ Ambulation_____

Incontinence_____ Mental_____

Contracture_____ Speech_____

Hearing_____ Vision_____

Paralysis_____ Respiratory_____

Endurance_____ Other_____

25. Activities permitted:

Bedrest: complete_____ BRP_____ Up as tolerated_____

Crutches_____ Cane_____ Wheelchair____ Walker_____

Transfer bed/chair_____ No restrictions_____

Exercises prescribed_____ Other (specify)_____

Partial weight bearing____ _____

Independent at home_____ _____

26. Number of orders for services & treatments_____

27. Total number of different medications_____

28. Safety measures: oxygen____ IV____ catheter____ other_____

29. Mental status: oriented____ forgetful____ depressed____

disoriented____ lethargic____ agitated____ other____

30. Diet: regualar____ bland____ diabetic____ low salt____

low calorie____ low fat____ soft____ NPO____ other_____

31. Number of medical supplies and/or DME ordered: _____

32. Prognosis: Poor____ guarded____ fair____ good____ excellent____

33. Number of Nursing problems listed: _____

34. Frequency of visits (interval) _____ (days)

35. Prior surgery _____yes _____no

Date_____

APPENDIX C-4

DATE_____ RN#_____ Pt.# _____ PAGE #___ OF ___

MIN.	ASSESSMENT	EDUCATION	PHYSICAL CARE	PSYCHO-SOCIAL	CARE COORD.	OTHER
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
otals						

APPENDIX C-5

QUANTIFYING HOME CARE NURSING

Home Visit Content Analysis Summary

Client__ __ __ Agency__ __ __ Nurse__ __ __ Date___ ___ ___

COMPLEXITY RATINGS:

	Observer:	Staff Nurse:
Assessment	1 2 3 4	1 2 3 4
Education	1 2 3 4	1 2 3 4
Physical Care	1 2 3 4	1 2 3 4
Psycho-Social	1 2 3 4	1 2 3 4
Care Coordination	1 2 3 4	1 2 3 4
Total Visit	1 2 3 4	1 2 3 4

REASONS:

_____ _____

_____ _____

TOTAL VISIT TIME:	Pg 1	Pg 2	Pg 3	Total	Time Usage Low	Ave.	High
Assessment	_____	_____	_____	_____	_____	_____	_____
Education	_____	_____	_____	_____	_____	_____	_____
Physical Care	_____	_____	_____	_____	_____	_____	_____
Psycho-Social	_____	_____	_____	_____	_____	_____	_____
Care Coordination	_____	_____	_____	_____	_____	_____	_____
Other	_____	_____	_____	_____	_____	_____	_____
Total Visit Time:				_____	_____	_____	_____

NON-VISIT PT. RELATED TIME:

Travel _____

Documentation _____

Care Management _____

Total _____

TOTAL VISIT RELATED TIME:

Non-Visit _____

Visit _____

Total _____

APPENDIX D

GLOSSARY OF SYMBOLS

b	Non-standardized regression coefficient
b_o	Dependent variable regression coefficient
df	Degrees of freedom
F	Statistic following the F distribution
N	Number of subjects or observations
p	Probability
r	Pearson's product-moment correlation coefficient
r_s	Spearman's rank-order correlation coefficient
r_2	r squared
sd	Standard deviation
SE	Standard error
$\bar{X}$	Sample mean
X^2	Chi-square test
Ø	Cramer's phi
%	Percent

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