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Cost effectiveness of nurse case management compared with an existing system of care

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COST EFFECTIVENESS OF NURSE CASE MANAGEMENT COMPARED WITH AN EXISTING SYSTEM OF CARE

by

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TABLE OF CONTENTS

TABLE OF CONTENTS, cont'd.

TABLE OF CONTENTS, cont'd.

TABLE OF CONTENTS, cont'd.

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

The study evaluated the cost-effectiveness of community based Nurse Case Management (NCM) utilizing existing hospital information systems data. Program outcomes of intensive NCM were compared with those of existing hospital programs for a group at high risk for readmission. Thirty-one elderly patients were assigned to one of three groups. A retrospective pretest-posttest design was used and multivariate analyses were performed. Outcomes were measured at six month intervals before and after NCM. The intensive NCM group had a higher length of stay and inpatient costs than the other two groups. Direct costs of NCM were estimated at $1.55 per active case per day. The study found that cost-effectiveness of NCM cannot be determined accurately unless health risk assessments are quantified, NCM is clearly translated into categories of intervention, and direct costs of NCM are measured consistently. These factors must be integrated into routine hospital information system reports.

CHAPTER 1

OVERVIEW OF THE PROBLEM AND CONCEPTUAL FRAMEWORKS

This study was conducted to investigate the cost-effectiveness of nurse case management as a program strategy for a hospital seeking to reduce financial losses resulting from inadequately compensated admissions within a frail, chronically ill population of elderly with a cardiovascular diagnosis. Patients who were members of a managed care program and determined to be high risk were referred to the nurse case management program. The nurse case management program, a cooperative program with a sister hospital in the same city, is a relatively new program being evaluated by a 334 bed community hospital in the southwestern United States.

Nurse Case Management (NCM) can be characterized by the positioning of nurse care givers as case managers (Etheredge, 1989). As with all types of case management, NCM is rooted in the client-provider relationship (Agenda for Reform, 1991). The American Nurses' Association (1988) describes several designs for nurse case management. The model to be evaluated in this study is a community based model (Ethridge, 1990). In the community-based model, a professional nurse with educational preparation at least at the baccalaureate degree level is responsible for assessing and responding to client and family needs along the continuum of care from hospital to home (Lamb, 1988). The aim of

the case manager is to build a relationship with the client and family that allows for ongoing, timely physical and psychosocial interventions and for promoting appropriate access to care (Ethridge, 1990).

As health care costs have escalated at an unprecedented rate, the search for appropriate, cost effective strategies to deliver care has intensified. It has been estimated that in 1990 health care costs approached 12% of the U.S. gross national product and in 1991 health care was expected to cost over $756 billion (U.S. Dept. of Commerce, 1991). For hospital systems, in particular, the need to become more cost effective has never been more critical. Initial reimbursements under the prospective payment system were generous, but annual adjustments have not kept pace with inflation and the cost of new technology (Aaron & Swartz, 1990). The end result is that the net margin between hospital income and hospital expenditures is shrinking and this has endangered the financial viability of hospitals (Bocchino, 1990).

These trends have impacted the delivery of nursing care, for budgets are leaner and scrutinized ever more carefully. Nursing is a key player in the financial viability of institutions, and nursing leaders must work to foster cost-effective behavior while preserving quality of care (Sandella, 1990). Nurse case management has received much attention as a program that has the potential to be cost-effective without compromising quality (Etheredge, 1989). The Vice President for Patient Care Services at the hospital under study was able to allocate three positions for nurse case managers for a one year period, as a pilot

program, based on the data and experience of the sister facility (Ethridge, 1991). Specific goals for establishing the program were to reduce hospital admissions and readmissions, and non-reimbursable costs of caring for a group of chronically ill elderly patients in order to positively impact the financial bottom line of the hospital. There is a need to explicate cost data and program outcomes for NCM in order to determine whether or not the program goals have been achieved.

Cost-effectiveness is a relatively new concept in human services, however it is a powerful method of evaluation to assist decision-makers in the choice of programs (Prescott, 1987). In cost effectiveness analysis, evaluation research methods are combined with accounting methods to express the outcomes of programs in relationship to the cost of programs (Prescott, 1987).

Program outcomes to be included in the evaluation were limited to cost related data retrievable in the hospital information system, such as number of hospital admissions, number of hospital days, cost of hospital admissions, and number of emergency department visits. A comprehensive cost effectiveness evaluation also includes other measures of program outcomes such as client functional status, client satisfaction with the program, and family and caregiver satisfaction (Cummings et al, 1990, Jerrell & Hue, 1989). These outcomes were valued as fully as outcome data related to admissions and hospital reimbursement but were not included in this analysis for the following reasons: a) the urgency to address administrative goals for the program; b) fiscal and time constraints for the investigator; c) the need to create an evaluation that could be conducted on an

ongoing basis within the institution to determine if the program was meeting administrative fiscal goals; and d) the need to evaluate the hospital information system data base so that meaningful data could be retrieved and reported regularly. This preliminary work to determine the fiscal impact of the NCM program was expected to lay the groundwork for more comprehensive evaluations of the program.

Costs of nurse case management to be included was also limited to direct costs easily retrieved in hospital information systems such as salaries, benefits, education hours, mileage, and supplies. These costs were considered to be controllable and were easily measurable.

Purpose of Research

The purpose of this investigation was to compare the program outcomes and costs of community based nurse case management with those of the existing hospital program of organizing care for a group at high risk for frequent re-admission to the hospital. Those in the high risk group were members of a managed care program, were chronically ill elderly, and were diagnosed as having a cardiovascular condition.

Theoretical Orientation

This focus of this investigation centers around the cost effectiveness of nurse case management. The theoretical orientation related to each of the concepts will be described in the following paragraphs.

Nurse Case Management

The concept of case management, is centered in the client-provider relationship (American Nurses' Association, 1991). The underlying premise of nurse case management is that through thoughtful development of this relationship the nurse becomes one factor in the client's response to illness and movement toward health or a peaceful death.

A group of nurses at the study hospital, including clinical coordinators, directors, and clinical nurse specialists, collaborated in the selection of a theoretical orientation for nurse case management. Watson's (1988) Theory of Human Caring provided meaning and was logically consistent with the focus of the case management program which was to care for, rather than cure, a group of chronically ill frail elderly clients.

Watson (1988) maintains that caring is the core of nursing practice which separates nursing from the medical model of curing. Caring is defined as a moral ideal which consists not merely of performing procedures and technical tasks. It requires a will and a commitment to care on the part of the nurse (Boyd & Mast, 1989). The goal of nursing is to assist the person in gaining harmony within the mind, body and soul which generates self-reverence, self-healing, and self-care within the person (Watson, 1985). Nursing interventions associated with ten carative factors are defined by Watson, and are presented in Appendix A. Emphasis is placed on the use of self, on allowing for client-identified needs, and on personal growth.

The professional nurse case manager (PNCM) in the community cannot rely solely on the technologic and pathophysiologic aspects purported to nursing. Rather it is through incorporating the carative factors that the PNCM achieves therapeutic outcomes. Human caring and the moral ideals promoted in Watson's framework are very much present in the practice of nurse case management, however the carative factors have not yet been translated into specific interventions that can be measured and evaluated.

It is imperative that nurse case management be able to demonstrate to a health care system driven by the medical model of illness that the orientation of caring is also cost-effective. According to Lamb (1988), one goal of nurse case management is to decrease costs through reduced use of health services. The dominant theoretical framework for this study, cost-effectiveness analysis, addressed the NCM goal of decreasing cost.

Cost Effectiveness

Cost effectiveness analysis falls within the framework of evaluation research, and more specifically within the engineering model of evaluation. In the engineering model, the evaluator determines input variables, operationalizes these variables, conducts the program, and then measures the same variables through post-tests (Rezler & Stevens, 1978). Cost-effectiveness analysis is considered to be an appropriate model for financial decision-making, and can be applied when parts of a program are being evaluated (Rezler & Stevens, 1978). With the

engineering model, the unique focus is on the cost-effectiveness of a program. The model is depicted in Figure 1, and described in the following paragraph.

Input variables, or pretest scores, for this study included measurements of cost-related variables for a defined interval of time prior to the programmatic intervention of NCM. Examples of these variables were numbers of hospital admissions, numbers of emergency department visits, and the cost of hospital admissions.

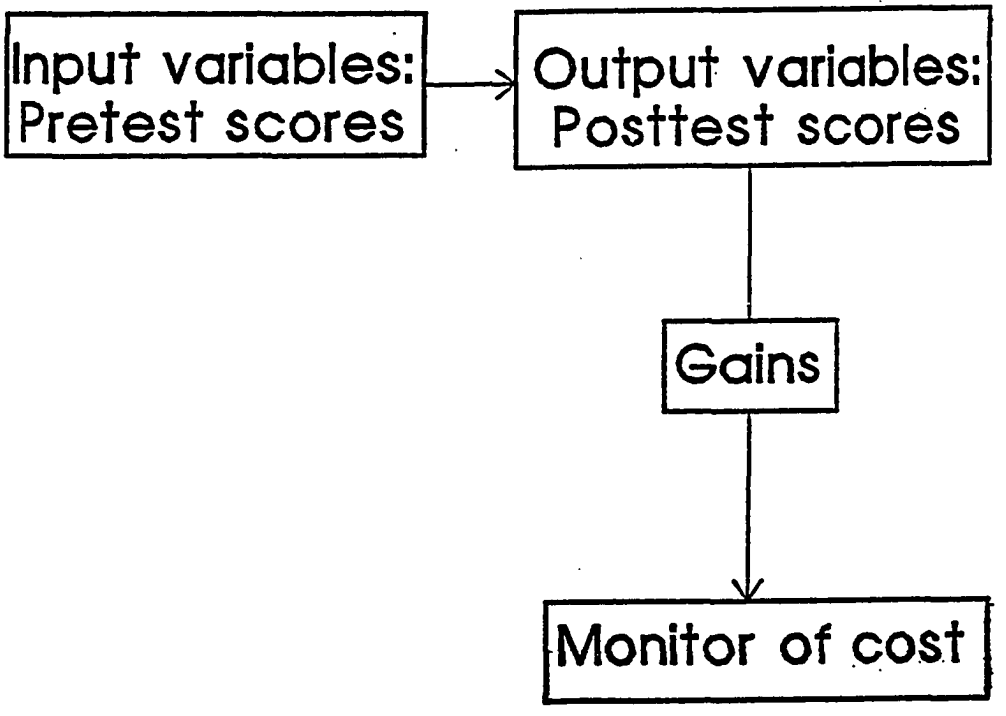

Figure 1. The engineering model of evaluation.

From Rezler & Stevens, 1978, p. 68.

After the program was initiated these same variables were measured again for the same time interval. Pretest and posttest measurements were compared, and net gains or losses calculated. Programmatic costs were monitored and then evaluated along with program outcomes.

The two theoretical threads (nurse case management and cost effectiveness) may not at first seem to be linked. However, in order for the nurse case management program to continue to be a source of human caring within existent health care systems, there must be evidence that program outcomes are worth the program costs.

Problem Statement

Evaluation of costs and program outcomes of nurse case management was needed so that the question could be addressed as to whether or not nurse case management is a cost effective intervention for the high risk elderly patient in the community. Nursing's Agenda for Health Care Reform (1991, p. 8) states "the health care system must assure that appropriate, effective care is delivered through the efficient use of resources." The following research questions were be investigated:

1. How do the program outcomes of nurse case management compare with those of an existing system of care for an elderly population with a cardiovascular diagnosis enrolled in a plan of managed care as measured by: a) number of hospital admissions; b) number of acute care days; c) number of intensive care days; d) LOS; e) number of emergency department visits; f) total

inpatient costs; g) total outpatient costs; h) net fiscal gain or loss for inpatient services; i) net fiscal gain or loss for outpatient services.

2. What are the direct costs for nurse case management per unit of service as measured by a) fixed costs of salaries and benefits, b) variable costs of mileage, c) supplies, d) rental of equipment, and e) purchased services.

Definition of Terms

Nurse Case Management

Nurse case management was conceptually defined as a system for provision of care to clients along the continuum of care from hospital to home (Lamb, 1988). The emphasis in NCM practice is on developing long term relationships with the client and family to enhance planning, promote access and appropriate utilization of health care services (Lamb, 1988). NCM is not unlike community health nursing but encompasses a broader spectrum of acute to chronic phases of care (Lamb, 1988).

Operationally, NCM began on the date the client was entered into the NCM computer information system under active status. Further, minimum intensity of nurse case management for inclusion in the study was defined as at least two documented visits per month by the nurse case manager for a minimum duration of two months. Only patients who received this level of NCM intervention were categorized as receiving intensive nurse case management.

High Risk

High risk conceptually referred to a population that was more likely to have unsatisfactory health outcomes and hospital readmissions. The risk involves two dimensions: 1) the potential for health problems and complications for the client, 2) the potential for the hospital provider for loss from uncompensated care (Rogers, Riordan, & Swindle, 1991). High risk for purposes of this investigation was defined as age 65 or older, the presence of a chronic heart disease, and history of at least one non-elective hospital admission related to a cardiovascular disease during an eighteen month period.

Managed Care

Managed care was conceptually defined as any system that manages the delivery of health care with the aim of controlling cost (Kongstvedt, 1989). Many types of managed care organizations exist, all with a structure designed to sell physician and hospital services to potential patients (Kongstvedt, 1989). Health maintenance organizations (HMO's), one type of managed care organization, are responsible to finance and deliver services to enrollees for a fixed, prepaid fee. Some HMO's opt to contract with the federal government to provide health care services for Medicare-eligible enrollees. In exchange for a prospective monthly capitated payment from the federal government for each Medicare member, the HMO must provide a full range of health care coverage (Kongstvedt, 1989). For purposes of this investigation, managed care was operationally defined as

enrollment in Family Health Providers (FHP) Senior Plan which is an HMO plan for Medicare recipients.

Cardiovascular Diagnosis

Cardiovascular diagnosis referred to a medical determination of pathology within the cardiovascular system. Under the Medicare Prospective Payment System (PPS), medical diagnoses have been further classified for the purpose of data collection and reimbursement. Medical Diagnostic Categories (MDCs) refer to the anatomical body systems affected most by the disease process (American Hospital Association, 1983). There are currently 23 MDC's with 473 subcategories called Diagnostic Related Groupings (DRGs) which further classify by information about principal diagnosis, secondary diagnoses, procedure, age, and discharge disposition (American Hospital Association, 1983). In this study, cardiovascular diagnoses referred to those clients classified under MDC 5 and under International Classification of Diseases, (Ninth Revision) ICD-9 code for chronic congestive heart failure. These categories were selected because of their importance to the study hospital; they represented high volume and high loss categories for the institution.

Existing System of Care

The existing system of care changed during the period of evaluation. From January 1990 through June 1990, the existing system of care allowed for discharge referrals to be made only to existing community services, and for home

health referrals under Medicare guidelines. No provision for the extending of care from the inpatient setting to the community was included.

From July 1990 through June 1991, the existing system of care was altered. All home care services were available, however, in addition, nurse case management was available for high risk individuals. The NCM services were embedded in a nursing health maintenance organization (HMO) that provided skilled nursing, private homemaking and case management. Patients could be referred for the traditional episodic Medicare model of home care but could also be referred for NCM. With the NCM program, there was opportunity to impact delivery of care not only in the home but also within the hospital, unlike the traditional model for home care. Cummings et al. (1990) report that hospital costs for high risk individuals can be reduced when there is a mechanism for continuity of care in and outside of the hospital.

Hospital Admissions

Hospital admission referred to the elements of hospitalization which were hospital care and hospital stay (Brooten, Brown, Munro, York, Cohen, Roncoli, & Hollingsworth, 1988). Hospital admissions were determined by the number of times that a patient was entered as an inpatient or a short stay patient in the hospital information system. Reducing readmissions is important, since payors may fail to reimburse if it is determined that the admission was unnecessary or that the patient had been discharged prematurely (Rogers et al., 1991).

Acute Care Days

An acute care day was defined as a hospital day not spent in the intensive care or rehabilitation unit.

Intensive Care Days

An intensive care day referred to all or part of a hospital day spent in the intensive care unit. This was a significant measure, for average costs in 1990 dollars of intensive care at the study hospital are $1500 per day, while average acute care costs were approximately $1000 per day (Hagenow, N., personal communication, May, 1991).

The number of intensive care days is closely related to the concept of the cost of hospitalization. Cummings et al. (1990) reported that a group receiving hospital based home care was significantly more likely to receive care in less costly patient units, even though there was no difference in numbers of days spent in the hospital.

Length of Stay

Length of stay was defined as the number of days that a patient is in the hospital for one hospital stay. Length of Stay (LOS) is an important variable recognized as influencing hospital costs. Under the Prospective Payment System (PPS) of Medicare each DRG classification has a designated LOS and fixed reimbursement. If the actual LOS exceeds this average the result is a loss of dollars for the hospital (Marchette et al., 1986).

At the time of the study, the hospital was reimbursed under a capitated contract by a managed care plan for seniors. That is, the hospital received in advance a fixed monthly payment for each enrollee and in return provides inpatient hospital care (Hagenow, N., personal communication, December 10, 1991). During the period of January 1990 through September 1991, reimbursement for the study hospital from the managed care plan was on a per diem basis. That is, the hospital received a fixed payment retrospectively for each day that an enrollee was hospitalized. A special rate was set to cover intensive care days.

Emergency Department Visits

Emergency department (ED) visits were defined by admission to the emergency department, not including those ED visits which led to hospital admissions. Emergency department (ED) visits are also related to cost, and frequent ED visits are related to rehospitalizations (Strong, 1987).

Total Outpatient Costs

Total outpatient costs were those costs incurred for services other than inpatient hospitalizations and are indirect reflections of health care utilization patterns. If inpatient hospital days are decreased accomplishing the stated goal of the NCM program (Ethridge, 1991), there may be a reallocation of health care utilization patterns to outpatient services and costs.

Operationally, total outpatient costs were defined as those outpatient costs retrievable through the hospital information systems for the interval of evaluation. These included costs for laboratory, outpatient surgery, radiology, physical therapy, and for other ancillary services.

Total Inpatient Costs

Total inpatient costs were those costs incurred for acute and intensive care days. Total inpatient costs were measured through data retrievable in the hospital information system during the interval of evaluation.

Net Fiscal Gain or Loss - Outpatient

This dollar figure reflected the difference between costs for a service and reimbursement for that same service. It was an essential piece of cost accounting information. Net fiscal gain or loss for outpatient charges was derived from the hospital information systems data relating outpatient costs to outpatient reimbursement for a given population over the time period of evaluation.

Net Fiscal Gain or Loss - Inpatient

The relationship between costs and reimbursement received was revealed in this dollar figure. Net fiscal gain or loss for inpatient charges referred to the hospital information systems data generated relating inpatient charges to inpatient reimbursement for a given population over the time period of evaluation.

Nurse Case Management Costs

Nurse case management costs for purposes of this investigation were defined as the following direct costs: salaries, benefits, education time, mileage costs, supply costs, rental costs, and purchased services. Supply costs included costs for any medical supplies or equipment charged to the NCM special account for FHP during the study period. Rental costs reflected the charges for rental of pagers and voice mail boxes for nurse case managers. Charges to the FHP subaccount for rental equipment for the evaluation period were included. Purchased services include the cost of cellular phone time which was charged to the FHP subaccount for purchased services.

Indirect costs have not been included for several reasons: a) many indirect costs are not controllable costs; b) at present NCM is a non-revenue producing program, and only revenue producing units have indirect costs of administration, information systems, etc allocated to their departments; and c) it is not feasible to make this determination for NCM given the current reporting system (Hagenow, N., Vice President for Patient Services, CSJH, personal communication, Jan. 2, 1991).

Summary

Trends in rising health care costs and shrinking reimbursement for services rendered have been threatening the survival of hospitals. Hospitals have been searching for strategies to reduce unnecessary recidivism that results in

uncompensated care. Chronically ill groups, such as the elderly with cardiovascular diagnoses, are more likely to have frequent readmissions. Community based NCM is one strategy for providing care along the continuum from hospital to home for this high risk population. A goal of the NCM program is to decrease costs through reduced use of health services. Therefore, hospital decision makers must possess data to substantiate the cost effectiveness of the program.

Cost effectiveness analysis combines evaluation research methods with accounting methods in order to express program outcomes in relationship to program costs. Program outcomes, for purposes of this investigation were narrowly defined and included data readily retrievable in existing hospital information systems. Cost data for NCM was restricted to direct costs that are traceable in hospital information systems.

Research questions were:

1. How do program outcomes of NCM compare with those of an existing system of care for an elderly population with a cardiovascular diagnosis in a system of managed care? Program outcomes were: a) number of hospital admissions; b) number of acute care days; c) number of intensive care days; d) LOS; e) number of emergency department visits; f) total inpatient costs; g) total outpatient costs; h) net fiscal gain or loss for inpatient services; i) net fiscal gain or loss for outpatient services.

2. What are the direct costs of NCM per unit of service as measured by: a) fixed costs of salaries and benefits, b) the variable costs of mileage, c) supplies, d) rental of equipment and e) purchased services?

CHAPTER 2

REVIEW OF LITERATURE

The review of literature was directed toward the two central concepts under study: community based nurse case management and cost-effectiveness analysis.

Nurse Case Management

Case management is a term which first was used in the field of social work in the 1970s. The term case management has been used to describe many different activities. Loomis (1988) identified the five common elements of case management as a) case finding or entry b) assessment c) goal setting and service planning d) care plan implementation, and e) monitoring and evaluation. The American Nurses' Association (1988) describes case management similarly as a system with the four elements of health assessment, planning, procurement and delivery of services, and monitoring to assure that multiple service needs are met.

Loomis (1988) identifies three models of case management into which any case management program may be classified: (1) social, (2) primary care, or (3) medical-social. The social model of case management has as its focus the support of well individuals in the community (Merrill, 1985). Primary care case management aims to provide appropriate care in a coordinated fashion, and includes a gatekeeper function of controlling access to care (Loomis, 1988;

Merrill, 1985). The primary care model of case management is used in many health maintenance organizations (HMOs) with the primary care physician as the gatekeeper for services. The medical-social model of case management focuses on clients already at risk and is designed to maintain clients in their homes and to prevent or delay institutionalization (Loomis, 1988; Merrill, 1985). An example of this program is the National Channeling Demonstration Project instituted between 1982 to 1985 with the goal of substituting case managed care at home for nursing home care (Kemper, 1990). Community-based NCM is also derived from this medical-social model of case management.

Community based NCM is one of four models of nurse case management which Curtin (1989) delineates. Community based NCM, which also is termed the Arizona Model by Curtin (1989), emphasizes care over the continuum from hospital to home. In this model, clients who meet established high risk criteria are referred to Professional Nurse Case Managers (PNCMs) who participate in discharge planning, coordinate care, and follow the client through various health care settings, including the home (Curtin, 1989). The three other models that Curtin (1989) identifies for nursing are: 1) the North Eastern Model credited to the New England Medical Center (Zander, 1987) which emphasizes critical paths, effective discharge planning, and facilitation of early discharge from the hospital; 2) the HMO model in which the emphasis is on coordination of care with hospital personnel in order to control utilization; and 3) the insurance-based case management model in which high cost outliers are identified and followed over

time. For purposes of this investigation, review of literature will be confined to the community based model for NCM. First, important health services research literature discussing community based case management models will be reviewed. This will include the National Channeling Demonstration Project, and Medicare Social Health Maintenance Organization literature. Then, literature and research related specifically to community based NCM will be discussed.

The National Channeling Demonstration Project

The channeling demonstration, also termed the National Long Term Care Demonstration Project, was a comprehensive national test of expanded public financing of home care conducted during the years 1982 to 1985 (Kemper, 1990). It was designed to be the definitive study on long term care case management cost-effectiveness (Weissert, 1988). The aim of the project was to substitute community care for nursing home care in order to reduce long-term care costs and to improve the quality of life of elderly clients and their families and caregivers (Carcagno & Kemper, 1988).

Two interventions were tested at five different sites with an overall sample size of 6,326 (Carcagno & Kemper, 1988). The two interventions consisted of a basic case management model to provide information, education and coordination, and a financial control intervention which added a funds pool and expanded service coverage to the basic case management model. The basic case management intervention was designed to test the idea that existing

community services were adequate but that more information and coordination were needed for clients to access the services. The financial control intervention was designed to test the concept that there was inadequate support and funding for community services, and that an expansion in services was needed in order to avoid more costly long term care. A randomized experimental design was used to assign those eligible for channeling to either a treatment or control group. The basic case management model and a financial control intervention were applied to the treatment group; the control group consisted of an existing system of community services.

Eligibility for the program was determined initially by a phone interview, and an in depth follow up assessment if criteria for eligibility were met. Age, functional disability, unmet needs or fragile support were all important criteria for eligibility (Applebaum, 1988).

Case management under the channeling program included the five core functions delineated by Loomis (1988). Case management, with and without other purchased services, was the main intervention (Carcagno & Kemper, 1988; Kane, 1988). Most of the actual case managers for this project had degrees and experience in social services; nurses were used as supervisors or consultants (Phillips, Kemper & Applebaum, 1988). With the basic case management intervention, case managers relied on the brokering approach to arrange service (Phillips et al., 1988). After an initial in depth evaluation, a formalized care plan

was developed and the case manager provided ongoing follow up, usually through telephone contacts.

Overall, findings reflected little difference between the treatment group and the control group (Kane, 1988; Kemper, 1988). The experimental group did not differ from the control group in terms of use of nursing homes, hospitals, physician services, or in mortality (Kane, 1988). Differences in functional status were small and inconclusive (Kane, 1988; Weissert, 1988). The major significant differences between the experimental and the control group were that caregivers were more confident in the care received, unmet needs were reduced, and there was improved satisfaction with life among clients and informal caregivers (Kane, 1988; Kemper, 1988).

The channeling project, because of its scope, was a highly visible study that provided a basis for future study and policies related to long term care. The channeling project helped to provide information on risk factors and was successful in identifying a frail group of elderly. However, it was unable to successfully predict those at-risk for actually entering a nursing home (Kane, 1988).

An important issue raised by Kane (1988) related to the channeling project was of the lack of definition of the case management intervention. Intensity of case management was not continuously measured in the project. The case management intervention seemed to consist of a visit to arrange for services, a visit to monitor or assess services, and/or a visit from a comprehensive case

management agency (Kane, 1988). There was no measure of ongoing interventions, or of how actively case managers were involved with clients in planning for their care, or whether or not case managers were involved at crucial times such as hospitalizations (Kane, 1988).

SHMO Demonstration Project

A second major research effort involving a frail elderly population in the community involves the National Social Health Maintenance Organization (SHMO) Demonstration project. The SHMO project was designed to address two goals: 1) to expand nursing home and community benefits in a controlled setting, and 2) to link these chronic care services with the acute care system (Greenberg, Leutz, Greenlick, Malone, Ervin & Kodner, 1988). The project began in 1985 and is being conducted at four sites nationwide. The project was recently extended until 1992.

Medicare beneficiaries may voluntarily join the SHMO and receive as a benefit package not only the traditional Medicare services, but also supplemental benefits such as homemaker/personal aides, medical transportation, respite care, case management, skilled nursing facility (SNF) care, and intermediate care (ICF).

Case management which is not clearly defined in the SHMO model seems to fall into the primary care model of case management. Functions of case management mentioned in the review of literature are related to assignment of

benefits and management of high cost cases (Greenberg et al., 1988; Newcomer et al., 1990). Case management services are supplied to SHMO members as part of administrative costs and are not charged to the benefit limits. Greenberg et al. (1988) report the cost of case management for 1986 as ranging from $6.61 to $14.21 per member per month. The variation in cost was due to a combination of less efficient operations and a broader definition of tasks that case managers were to perform. At two sites, for example, case managers performed hospital discharge planning as part of their role. Expenditures for case management in 1987 were $7-16 per member per month, or about 2-4 percent of total expenditures (Newcomer, Harrington & Friedlob, 1990). As with the channeling project, the question was raised about how, specifically, the case management intervention was defined.

Abrahams, Capitman, Leutz, and Macko (1989) examined the process of how case managers made service allocation decisions at the four HMO demonstration sites. Care management practice or how case managers actually weigh external factors such as support systems and benefit structures was examined. Case managers were asked to follow the usual process of assessment and eligibility screening and make resource allocation decisions for seven member cases referred to all four sites. Since this was a preliminary exploratory study, it served to identify questions for further research, rather than present substantive conclusions. Findings did, however, indicate that there were major differences in service allocation for the same member across the four sites. Service plans

revealed varying intensity of intervention and use of services to meet the perceived client needs. For example, one client (identified as #7) had plans for service that ranged from no cost to $2,352 monthly cost among the four sites. Questions of significance for NCM were related to the differences in decision-making of individual case managers, and whether these differences were related to the professional background of the case manager or to the characteristics of clients (Abrahams et al., 1989).

Hospital utilization rates for all four SHMO sites were at or below capitation estimates for the year 1986 which seemed to be a positive indicator that the model could impact acute care usage (Greenberg et al., 1988). Expanded care service costs for homemaker, personal care, respite, adult day care and transportation also were either below or near capitation estimates in 1986 (Greenberg et al., 1988).

In both the channeling project and the SHMO demonstration project, the issue of functional ability screening was raised. For the channeling demonstration, applicants had to have at least moderate disabilities in two or more of the physical activities of daily living (ADL) and impairments in the instrumental activities of daily living (IADL) in order to be eligible for enrollment (Applebaum, 1988). IADLS include activities such as shopping, transportation, meal preparation and home maintenance management.

The SHMO's also have relied heavily on functional ability screening in order to protect themselves against long-term care costs (Newcomer et al., 1990).

SHMOs have been allowed to screen functional status on enrollment to the program in order to protect against the risk of adverse selection of a highly disabled population. Greenberg et al. (1990) define the following as important variables in comparing Medicare beneficiaries with the SHMO population: gender, age, living alone, ADLs and IADLs. Specific definitions of impairment were also included; for example, moderate impairment was defined as the presence of two or more limitations in IADLs, the use of a wheelchair or walker, or proxy report of severe memory loss (Newcomer et al., 1990).

The emphasis on definition and measurement of functional status in order to obtain needed services or to limit risk is an important concept for NCM as well. It is important that nurse case managed patients have a quantifiable functional status assessment that is consistent with the measures identified for these major national projects. In the following paragraphs literature specific to community based NCM will be reviewed.

Nurse Case Management

Community based NCM is grounded in the medical-social model of case management defined by Loomis (1988). Much of the nursing literature related to this model of case management has been generated from the experience of Carondelet St. Mary's Hospital (CSMH) in Tucson, Arizona. The goal of this program is to increase access to health care and the quality of care while decreasing costs (Lamb, 1988). Case management has been in existence at

CSMH since 1985 when a program was developed to offer direct nursing services to high-risk individuals across hospital and community settings (Newman, Lamb & Michaels, 1991). The program reflects Margaret Newman's theory of health and nurse client relationships, and emphasizes the primary importance of the process of developing a nurse-client relationship in order that patterns of health may be identified (Newman, Lamb & Michaels, 1991).

Strong (1986) evaluated the effectiveness of CSMH NCM through the measurement of ED visits, hospital readmissions and LOS. Independent variables were NCM, nursing time, and length of follow up. The study group consisted of 48 patients with chronic illnesses who received NCM, and was compared with a similar group of patients who did not receive NCM. Findings of the study suggested that patients who received NCM had a shorter LOS than the comparison group. Nursing time was the measure of intensity of illness, and was not found to be significant in predicting hospital LOS.

Ethridge and Lamb (1989) presented descriptive information about the CSMH Nursing Network, at the center of which is the Professional Nurse Case Manager (PNCM). The Network was composed of services for acute care, extended care, home care, hospice, ambulatory care, and nurse-managed wellness centers. At the center of this hub of nurse care-givers was the PNCM. An analysis of data from 1986 to 1988 was conducted to examine the variables of patient acuity and LOS for case-managed and non-case managed patients. Three groups identified were patients receiving total hip replacement, patients with

respiratory diagnoses, and a subgroup of respiratory patients with the diagnosis of chronic obstructive pulmonary disease (DRG #88). Criteria for inclusion in each of these groups were not made explicit, nor were group sizes reported in this publication (Ethridge & Lamb, 1989).

For all three groups, LOS was lower in the case-managed group than in the non-case managed group. Although average data were reported, other statistical measures were not included in this report which was based in Strong's work (1986). Figures from Strong's work (1986) comparing the total hip group LOS and acuity and the respiratory group LOS and acuity were included in the report, but there were no similar data reported for the years 1987 and 1988. Overall patient acuity at CSMH was reported to have declined in the years between 1986 and 1988, and acuity of nurse case managed patients in the respiratory DRG group was, on an average, lower than the non-case managed comparison group. The report identified the need for further work in determining the contributions of case management to these trends. No mention was made of the other players in the Nursing Network and their contributions to reductions in LOS or acuity.

Chapman (1990) focused on the relationship between hospital LOS and community based NCM at CSMH during the period of July 1, 1988 to June 30, 1989. The purpose of the study was to identify whether Medicare patients in the MDCs for respiratory and cardiovascular systems who had previous NCM had a shorter hospital stay than those who did not (Chapman, 1990, p. 16). Three

groups were compared; one group which had NCM prior to hospitalization (n=43), one group for which NCM was initiated during the hospital stay (n=23), and a third group which received no NCM (n=50).

Chapman (1990) found statistically significant differences at the < 0.05 level in LOS between the total sample and the individuals admitted with a circulatory system MDC, and differences between the NCM initiated during hospitalization group and the non-NCM group. NCM initiated during hospitalization had a longer LOS than the other two groups. The NCM prehospitalization group with a respiratory system MDC had a shorter mean LOS than the other two groups, and no patients in this group were admitted to the critical care unit. Although subgroup size for respiratory MDC was small (n=11), Chapman's work suggests that NCM was significant in bypassing costly critical care stays. For the cardiovascular system MDC subgroup, LOS was shortest for patients who did not receive NCM. However, nearly 60% of this non NCM group was admitted to the critical care unit. Differences were found between the two MDCs, and Chapman suggests that in further research each of these MDCs be treated separately. A background variable that proved statistically significant for increasing LOS was living situation. For the patient that lived alone, LOS was longer. No other measures of functional status were included in the background variables.

Rogers, Riordan and Swindle (1991) reported on the first eight months of a one year pilot study on 38 chronically ill patients who had a history of

frequent readmissions and who received NCM. The study was initiated in the spring of 1989 at St. Joseph's Hospital in Wichita, Kansas. The NCM model used was also the Carondelet St. Mary's community based model. The Rogers et al study (1991) had a pretest-posttest design, comparing the numbers of hospital admissions, length of stay, and net reimbursement before and after NCM during equal time periods. The time periods were four to eight months, raising the question of whether or not greater effects would be measured if the study were extended.

NCM cost of care was calculated at $36 per hour and included administrative costs, salary, benefits, and mileage. Preliminary findings suggested that net hospital admissions decreased following NCM, and net reimbursement per patient also decreased along with decreasing LOS.

Ethridge (1991) followed up with a report on the CSMH Nursing Network and its experience in contracting to provide services for a senior plan HMO in a capitated reimbursement arrangement. For a one-year period between June 1990 through May of 1991, a group of nurses organized to deliver nurse case management, home health care, personal and respite care, and care for home-infusion therapy (Falk, 1991). During this year, services were arranged through this nursing health maintenance organization (HMO) for more than 700 enrollees. Nurse case managers identified patients in the hospital or community at highest risk and designed nursing services to meet acute or chronic care needs

(Michaels, 1991). Costs for providing all outpatient nursing services to 15,000 enrollees were estimated at $4.85 per member per month.

A comparison is made between utilization patterns of Senior Plan enrollees in 1990 and utilization patterns of SHMO enrollees for the years 1985 to 1989. Additional comparisons are made of utilization patterns of Medicare recipients in 1989, and Arizona Medicare recipients in 1988. Although Senior Plan data compares favorably with the above groups, there is an obvious question about the validity of comparing these data sets when utilization patterns have been changing steadily during each year since the introduction of the prospective payment system. Whether or not the favorable effect can be attributed to the NCM of approximately 5% of the high risk patients enrolled in the Senior Plan is questionable.

All of the above studies of community based NCM cited here used descriptive or quasi-experimental design with the obvious limits in attributing a causal relationship between NCM and outcome measures. However, results indicate a potential for cost savings with NCM. Costs of NCM seemed to vary considerably. Common program outcomes identified were hospital admissions, LOS, and reimbursement. Background variables used to evaluate risk are age, sex, living situation, history of hospital admissions, and presence of a chronic illness.

Cost-Effectiveness

Literature related to cost-effectiveness, the second major concept for investigation in this study, is outlined in the following section. With the growing concern over containing the rising costs of health care, cost-effectiveness analyses have received new emphasis.

An article frequently cited in medical effectiveness literature is by Roper, Winkenwerder, Hackbarth, and Krakauer (1988). The report identifies the failure of the health care system to evaluate and communicate about appropriateness and effectiveness of many medical practices to physicians or consumers. The Health Care Financing Administration (HCFA) agenda to take an active role in improving the quality of data on effectiveness of treatments was reviewed by Winkenwerder and colleagues (1988). HCFA planned four types of projects to systematically improve the quality of data available. These included: 1) use of Medicare systems data to monitor trends and assess effectiveness of specific interventions, 2) Medicare data files were made available for appropriate research, 3) clinical research was funded to provide data about the appropriateness and effectiveness of various procedures and interventions and 4) efforts were made to improve the methodology of conducting research on outcomes, including studies of severity of illness measures and health status adjustments. The authors (Roper et al., 1988) went on to discuss application of effectiveness research to the specific procedure of coronary revascularization.

The interventions of coronary artery bypass, angioplasty, and a combination of these two procedures were compared in a sample of over 3,000 patients. The importance of the work of Roper et al. (1988) for nursing is not necessarily in the specific outcomes reported for coronary revascularization. Rather nursing must be aware of the magnitude of this work, and seek measurements that are consistent, whenever possible, with the vast national data bases to evaluate outcomes. For example, if NCM becomes a nationally recognized intervention that is reimbursable under Medicare for the high risk elderly it will be essential that functional and health status measures are consistently used and reported.

Prescott (1978) has been a leader in applying cost-effectiveness analysis methods in evaluating nursing programs. She defines cost-effectiveness analysis as "a method which combines evaluation research methods with cost accounting methods to produce a system able to express outcome of programs relative to cost of programs" (Prescott & Sorenson, 1978). She emphasizes that the purpose in measuring outcome is to compare like groups of clients along certain common dimensions rather than to identify unique outcomes of varied individual clients. In the 1978 article, cost effectiveness analysis was defined, and the steps in the analysis were systematically identified. Program costs important to include in analyses were defined, and several examples were reviewed. This article served to operationalize the concept of cost-effectiveness to a specific nursing program such as NCM.

A third article that provided a guide for economic analysis of case management in long term care was by Davidson, Penrod, Kane, Moscovice, and Rich (1991). The work presented four dimensions for classifying case management programs: 1) the nature of case management services provided, 2) the goals of the case management decision-making unit, 3) the reimbursement mechanism for case management, and 4) specific constraints that are operating in the system.

After systematically gathering data from 48 models of case management programs, Davidson and colleagues (1991) identified five existing models for analyzing case management costs. The broker model of case management seemed to be most consistent with the NCM model being evaluated in this study in the following ways. In the broker program, similar to NCM, the goal of case management is to minimize institutional care among clients at risk of nursing home admission through access to available community-based long-term care, and solving the problems of lack of information and uncoordinated services. Reimbursement is typically on a fixed budget based on cost experience, which has been the pattern for reimbursement of NCM services.

Determinants of case management costs identified by Davidson et al. (1991) included the nature of case management services provided, the client case mix, labor costs, geographic dispersion of service areas (travel time), organizational arrangements and the local environment for community services. The study also suggested that in order to control for client case mix, one or more

functional measures would be desirable. These determinants provide a framework for NCM to begin to systematically identify costs.

Case Management and Cost-effectiveness

Two important studies deserve mention because they related the two concepts of community based nurse managed care and cost effectiveness.

The first involved a randomized pretest and multiple post-tests as an experimental study which was designed to examine the cost-effectiveness of a Veteran's Administration hospital-based home care program that managed inpatient and outpatient care (Cummings et al., 1990). This study involved a large sample size of patients (n=419) who were assigned to either a program of hospital-based home care or a program of customary care during the period of 1984 to 1987. Patients were included in the study who had two or more functional impairments or a terminal illness. The Hospital Based Home Care (HBHC) program differed from conventional Medicare reimbursed home care in that the physician was an active part of the home care team, that team members participated not only in home care but also in inpatient care, and that the care provided was more comprehensive and continuous (Cummings et al., 1990).

Program outcomes evaluated were comprehensive and involved one month and six month follow up measurements. All inpatient and outpatient costs were monitored, including VA and private sector hospital use, nursing home and emergency department use, home health services, and ambulatory care. In

addition each client's cognitive and functional status, morale, and satisfaction with care were measured.

Program costs were recorded and included salary costs for each discipline and administrative overhead. Costs of hospital and nursing home stays were calculated according to national average per diem rates.

Important findings of the study suggested there was no significant difference in total hospital days between the two groups. However, patients receiving HBHC had significantly fewer days on acute care units than patients who did not receive HBHC ($p < 0.03$). A significant difference was observed in use of VA outpatient facilities; the HBHC group had fewer outpatient clinic visits than the control group ($p < 0.0001$). Total institutional cost also differed by group; the HBHC group saved $1145 or 26% in total institutional costs compared with customary care. The average total cost of private sector health care services was more than double for control group subjects than for the HBHC group ($1638 v. $680). Home health care costs for the HBHC group were 47% higher than the control group ($p < 0.0001$). Overall the HBHC group had 10.7% lower costs per patient than the control group. An analysis of the functional status and satisfaction with care outcomes revealed significantly higher satisfaction for patients and caregivers in the HBHC group, and no adverse effects on functional status.

This study provides the most solid support to date that the use of a team to improve continuity of care between hospital and home for a group who are

high users of services can reduce costs. Although the study does not use the term case management, the description of the functioning of the nurse on the team is very similar to the role of the community based NCM.

The final study to be reviewed was the first study known to compare two styles of case management within a group of patients with identical characteristics, services and environments during the years 1983-85 (Eggert, Zimmer, Hall, & Friedman, 1991). The study was a randomized controlled study which compared neighborhood team case management with a traditional centralized individual case manager model.

The purpose of the team model was to combine case management and direct service delivery functions such as nursing care, education,and counselling to provide a more personalized and efficient approach to serving clients. Case managers in the team model were either community health nurses or social workers who carried a case load of 40 to 45 clients. For the traditional centralized case management model, client assessment and care planning was done by community health nurses with case loads of 120 clients or more. Case management costs for the neighborhood model were $3.63 per case per day and $2.38 for control cases. This cost is similar to that reported in the channeling demonstration project.

There were significant positive differences in health outcomes for the neighborhood team model. Average annual costs for team cases were 13.6% less than for the centralized case model. Lower costs were due to reductions in

hospital days (26% fewer hospital days per year) and in home care (17% fewer home care hours). The reduction in hospital days was not due to fewer admissions but to shortened lengths of stay. Nursing home use, however, was 48% higher for the team group than for the individual model group. The intervention appears to have reduced overall estimated health care expenditures in comparison with the centralized control model of case management.

This study by Eggert and colleagues (1991) represented a step forward in identifying the actual elements of case management interventions, and the results were surprisingly different from those of the national channeling demonstration. The team model for case management described in many ways is similar to the NCM under investigation here; a nurse served as the case manager who provided some elements of direct care but also served to educate as well as coordinate other services.

Summary

Case management, a term derived from the field of social work, consists of case finding, assessing, planning, implementing, and monitoring care to ensure that service needs are met (Loomis, 1988). Community based nurse case management (NCM), one of four models of case management, emphasizes care over the continuum from hospital to home (Curtin, 1989). The role of the Professional Nurse Case Manager (PNCM) in the community model is to

participate in discharge planning, coordinate care, and follow the client through various health settings including the home (Curtin, 1989).

Important health services research related to community based case management includes the National Channeling Demonstration Project and Medicare Social Health Maintenance Organizations. The National Channeling Project, or the National Long Term Care Project, was designed to reduce long-term care costs and improve the quality of life of elderly clients and their families (Carcagno & Kemper, 1988). Case management, with and without other purchased services, was the main intervention in the channeling project. The channeling project helped to gather information on risk factors, however, overall findings reflected little difference in patterns of health service utilization between the treatment and control group (Kane, 1988; Kemper, 1988). The SHMO project, a national project conducted at four sites, was designed to expand nursing home benefits, and to link chronic care services with the acute care system for Medicare beneficiaries. Case management was provided to assign benefits and manage high cost cases. There were significant differences in cost of case management and how services were allocated across the four sites (Newcomer, Harrington and Friedlob, 1990).

Community based nurse case management literature is largely based in the Carondelet St. Mary's Hospital experience. Strong (1986), Chapman (1990), and Ethridge and Lamb (1990), in their retrospective analyses of the NCM program at CSMH, all suggested that patients who received NCM had shortened

hospital stays. Common program outcomes identified were hospital admissions, LOS, and reimbursement. Results of all the above studies indicate a potential for cost savings with NCM.

Cost effectiveness analysis combine evaluation research methods with cost accounting methods to express outcomes of programs relative to cost of programs (Prescott & Sorenson, 1978, p. 19). Cost effectiveness and case management were related in two experimental studies. A randomized study examined the cost effectiveness of a Veterans Administration hospital based home care program (HBHC) (Cummings et al., 1990). A team was used to improve continuity of care between hospital and home for high users of services, and findings suggested that this team approach can reduce costs.

A final randomized controlled study compared two styles of case management (Eggert, Zimmer, Hall & Friedman, 1991). A neighborhood team model was compared with a centralized traditional case management model. There were significant positive differences in health outcomes for the team model. Average annual costs for team cases were 14.6% less than for the centralized model (Eggert, Zimmer, Hall & Friedman, 1991). The neighborhood team model described was similar to NCM practice, and the positive findings in this study lend support for the premise that NCM is a cost-effective intervention.

CHAPTER 3

METHODOLOGY

The purpose of the study was to compare the program outcomes and costs of community based nurse case management with those of an existing system of care for an elderly population with a cardiovascular diagnosis in a system of managed care.

Research Design

The study design was a retrospective evaluation research design with two components. The primary research design, consistent with the engineering model of evaluation was a pretest-posttest comparison group design (Figure 2). A retrospective record review methodology was used to examine the pre and post-test results in the study group which received intensive nurse case management (Group 1). The focus of this component of the research design was on changes in pretest and posttest results following the intensive NCM intervention. The interval of evaluation was defined as six months prior to the initiation of NCM (Time Period 1) and six months after the initiation of the NCM intervention (Time Period 2); pretest and posttest measurements were between the dates of June 1990 and June 1991.

	Measurement of Dependent Variables	Independent Variable	Measurement of Dependent Variables
Study Group Group 1 Intensive NCM	**Pretest Measurement** Time Period 1	——>**Treatment**——> NCM	**Posttest Measurement** Time Period 2
Comparison Group Group 2 No intensive NCM	**Pretest Measurement** Time Period 1	——————————>	**Posttest Measurement** Time Period 2

Figure 2. Pretest-posttest with comparison group design

A non-equivalent comparison group (Group 2) which did not receive intensive NCM, but which met the information systems criteria for inclusion in the study sample was also evaluated. Patients in Group 2 could have received no additional services, home health care only, or limited contact by a nurse case manager. For the comparison group, the interval of evaluation was a twelve month time period between the dates of June 1990 and June 1991. Pretest and posttest results for the no intensive NCM Group 2 were compared with the pretest and posttest measurements of Group 1 which received NCM.

The second component of the retrospective research design involved a posttest only design comparing measurements of three non-equivalent groups (Figure 3). In order to address changes in NCM over time in the research setting, a third group that met criteria for inclusion in this study was evaluated. During the time period of January 1, 1990 to June 1990, NCM was not yet

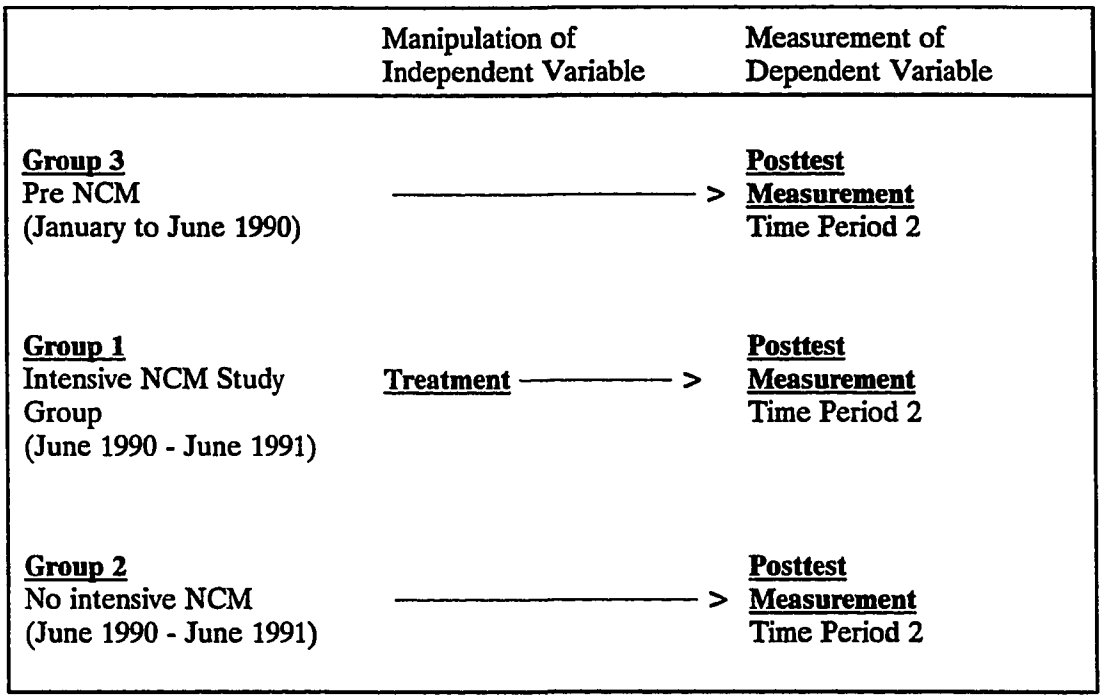

Figure 3. Posttest only design with non-equivalent groups.

available to FHP enrollees. Group 3 was composed of these subjects. For the pre NCM group (Group 3), the interval of evaluation was the six month period between January and June 1990. Posttest measurements of Group 3 were compared with posttest measurements of Groups 1 and 2 (Figure 3).

Variables

A description of independent and dependent variables and how they were measured for purposes of this investigation are presented in the following paragraphs.

Independent Variable

Nurse Case Management, the independent variable, which was measured by determining the date that a client was entered into the NCM computer information system under active status. Those patients who received at least two documented NCM visits per month during the six month period after initiating NCM were classified as receiving intensive case management. This measurement was verified by a record review of NCM client record.

Dependent Variables

The dependent variables and the methods for measuring each of the variables was as follows:

1. Number of hospital admissions was determined by the number of times that a patient was entered into the hospital information system as either a short stay or inpatient during the interval of evaluation. The term short stay refers to an admission that is expected to be less than 72 hours duration.

2. Number of acute care days was measured as the number of days a patient was hospitalized, excluding intensive care days and rehabilitation days, during the interval of evaluation.

3. Number of intensive care days referred to those hospital days in which all or part of the day was spent in the intensive care unit during the interval of evaluation. These data were retrieved through a review of the patient chart since it could not be obtained from computer information system data.

4. Length of stay was measured by counting the number of days that a patient was in the hospital for one hospital stay. LOS was be measured for all hospital admissions during the period of evaluation.

5. Emergency department visits were measured by counting all admissions to the emergency department that did not lead to hospital admission during the period of evaluation.

6. Total outpatient costs were be measured by totalling all outpatient costs retrievable through CSJH information systems for the interval of evaluation. These costs include the following:

7. Total inpatient costs were measured by totalling all inpatient costs retrievable in the hospital information systems for each admission during the interval of evaluation.

8. Net fiscal gain or loss for outpatient services was measured through information systems data that related outpatient costs to outpatient reimbursement for each client during the interval of evaluation.

9. Net fiscal gain or loss for inpatient services was measured through information systems data that related inpatient costs to inpatient reimbursement for each admission during the interval of evaluation.

10. Nurse case management costs were measured by retrieving cost accounting data for the direct costs for all PNCMs assigned to the FHP account for the fiscal year July 1, 1990 to June 30, 1991. These direct costs included fixed costs of salaries and benefits. In addition variable costs of mileage, supplies,

rental of equipment, and purchased services were also retrieved for this same time period for NCM. The direct costs were divided by the average number of active clients served by NCM during the year June 1990 to June 1991. An estimate of direct costs per unit of service was calculated.

Research Questions

The NCM program was expected to be a cost effective intervention for managing a group of elderly high risk patients with a cardiovascular diagnosis when compared with an existing system of care. The research questions are restated below:

1. Are there differences between NCM and an existing system of care in the following outcome measures for a group of high risk elderly client with a cardiovascular diagnosis in system of managed care:

   a) Number of hospital admissions

   b) Number of acute care days

   c) Number of intensive care days

   d) LOS

   e) Number of emergency department visits

   f) Total inpatient costs

   g) Total outpatient costs

   h) Net fiscal gain or loss for inpatient services

   i) Net fiscal gain or loss for outpatient services

2. What are the direct costs for nurse case management per unit of service as measured by: a) direct costs are fixed costs of salaries and benefits, b) variable costs of mileage, c) supplies, d) rental of equipment, and e) purchased services? Cost per unit of service referred to the cost for each patient designated as active in the NCM computer system.

Setting

The study took place in a non profit community hospital of 325 beds in the southwestern United States. Occupancy averaged 50% or less with an average daily census of 160 patients. Medicare represented the largest payor for the hospital and accounted for approximately 60% of the patients admitted. The hospital also had a contractual agreement with a managed care plan called Family Health Plan (FHP) which was directed toward the Medicare population. This payor group represented approximately 12% of hospital admissions.

The setting for NCM changed significantly during the period of evaluation January 1990 to June 1991. For a six month period (Jan to June 90) NCM was not available to FHP enrollees. For the remainder of the period of evaluation, NCM services for FHP clients were embedded in a nursing health maintenance organization (HMO). Case managers served as coordinators of care for community nursing services for 5% of FHP Senior Plan considered to be at risk. A capitated monthly fee was paid by FHP to the Carondelet system for skilled nursing, private homemaking services and case management.

Data were collected from several hospital computer information systems, including the hospital case mix system, billing, NCM, and quality assurance information system. In addition, patient records from CSJH and from the NCM records were reviewed.

Subjects

The study samples consisted of patients, age 65 years and older, enrolled in the FHP Senior Plan between the dates of January 1990 and July 1991. Other criteria for inclusion in the study sample were as follows: a) history of at least one admission to CSJH between January 1990 and July 1991, b) primary diagnosis within MDC 5 for cardiovascular diseases, c) ICD9 code 250.01 for chronic congestive heart failure and DRG 127, d) did not receive hospice care, and e) survived the study period. A total sample of 31 subjects were evaluated and assigned to one of 3 groups based on dates of enrollment in FHP and whether or not they received intensive NCM.

Procedure

Data were collected from a series of reports generated by computer information systems. First a report was generated using the following parameters to identify patients for the study group: a) all FHP Senior Plan patients, b) the study hospital only, c) age 65 or over, d) primary diagnosis related to chronic congestive heart failure DRG code 127 and ICD 9 code 250.1, e) during interval of July 1, 1990 to July 1, 1991, f) sorted numerically by medical record number.

In this report, all inpatient and outpatient episodes with corresponding charges and LOS were reported. This information was recorded on the data form. Reimbursement data for each episode was retrieved through the hospital case mix information system.

Second, medical records for all patients were obtained from the Medical Records Department. Number of intensive care days was validated through a review of patient medical records.

Third, from the NCM information system, those patients who received NCM and the active date for NCM were identified. The number of nurse case manager visits per month were retrieved from the NCM patient record. This information was recorded on the data form.

Finally, NCM costs were retrieved through a report from cost accounting systems at the study hospital. Only direct costs of NCM were recorded.

Instruments

A nineteen item tool (Appendix B) was developed to organize data representing the two concepts of this study and descriptive data for the three groups of patients. All of the information was retrieved retrospectively from computer printouts, hospital records, and NCM patient records.

Data Analyses

Summary statistics were used to describe background data of gender, age, marital status and race. Measurements of central tendency and standard deviation were obtained for all other dependent variables.

Data analyses for the two components of the research design were employed to identify differences among the groups at the two time periods. Analyses of variance (ANOVAs) were performed on all dependent variables to detect differences between the NCM intensive group and the no intensive NCM group. Hotelling's T^2 test was conducted to detect significant differences between Time Period 1 and Time Period 2 within Groups 1 and 2. Hotelling's T^2 test is a multivariate t-test used to analyze differences between two groups measured on two or more variables considered as a set, taking into account the correlations among the variables. If an overall significant difference between the two groups is found, independent t-tests can then be used to test for significant differences between the groups on individual variables.

To analyze data from the second component of the research design, three way ANOVAs were performed. Level of significance for the analysis was established at < 0.10 using two tailed tests. A post hoc analysis, Scheffe's test, was performed to determine the location of significant differences following ANOVAs for the three groups.

A statistical software package (SAS) was employed for all data analyses.

Internal Validity

The most serious threat to the internal validity of the study was the strong intervening variable of health status. Elderly patients with chronic illnesses are very likely to experience a decline in health status during a one year study interval unrelated to NCM. To reduce this threat, all patients who expired or who received hospice care during the evaluation period were excluded from the sample.

A second threat to the validity of the study was the fact that risk status criteria were not quantified in information systems data. Group 2 (no intensive NCM) may not have been at the same level of risk as the intensive NCM group. For this reason Group 2 was considered a comparison group rather than a control group. Since patients referred for NCM were to have been the highest level of risk, Group 2, if different, should reflect a lower overall risk.

A third threat to the internal validity of the study was whether or not subjects had been continuously enrolled in FHP for the duration of the period of evaluation. If subjects were not within the system of managed care for the entire period of evaluation, hospital utilization and cost data would be invalidate since patients could have received care at other hospital settings. Enrollment data was obtained from FHP. However, it was not possible to determine the accuracy of the information obtained.

A final threat to the validity of the study was the length of time selected for evaluation of effects of NCM. Six months is a brief time period for evaluating cost and utilization issues related to long term care.

Assumptions

A major assumption underlying the study was as follows: high risk elderly individuals are more likely to incur cost in all care settings than those not classified as high risk.

A second assumption was that patients referred for NCM were, indeed, at higher risk than those who were not case managed.

Limitations

Generalizability of this study beyond this particular population and sample is very limited. One major conceptual limitation was in the narrow definition of cost effectiveness for this study. Cost-effectiveness was strictly defined to meet hospital organizational criteria for cost-effectiveness, and program outcomes were measured only in terms of information readily retrievable in hospital information systems. A broader definition of effectiveness would include program outcomes related to a patient's functional status, quality of life, satisfaction with the program, and caregiver satisfaction, to mention only a few. A more comprehensive definition of cost would involve direct and indirect costs of NCM.

Methodological limitations that restrict generalizability of the study are as follows: a) data were all collected at one hospital and findings may be restricted to that hospital only, b) data were collected only through a retrospective review of records, c) the sample was small and was a nonrandom sample, and d) the comparison groups were not randomly selected and may not represent the severity of illness of the treatment group.

Protection of Human Subjects

This study was submitted for review and was approved by the University of Arizona Human Subjects Committee (Appendix C). The study proposal was also submitted to the Research Committee at Carondelet St. Joseph's Hospital and approved (Appendix D). Anonymity and confidentiality of subjects were maintained. Access to the computer information systems required a special security code which further served to protect confidentiality of data. All subjects were assigned a numerical code; no names were recorded.

CHAPTER FOUR

PRESENTATION OF DATA

The presentation of data and analysis of the study's findings are included in Chapter Four. The purpose of this investigation was to compare the program outcomes and costs of a community based nurse case management with those of the existing hospital program of organizing care for a group at high risk for frequent re-admission to the hospital. Those in the high risk group were members of a managed care program, were chronically ill, elderly, and with a cardiovascular diagnosis. The study took place in a non profit community hospital of 325 beds in the southwestern United States. The study sample consisted of 31 chronically ill cardiovascular patients, age 65 years and older, enrolled in a managed care plan for seniors between the dates of January 1990 and June 1991. These subjects were assigned to one of three groups based on dates of enrollment in the managed care plan and whether or not they received intensive NCM.

A nineteen item tool (Appendix B) was developed to organize data. All information was retrieved retrospectively from computer printouts, hospital records and NCM patient records. Data were collected related to patient demographics and outcome measures that were important for evaluating cost-effectiveness of NCM. These outcome measures included the following: a) number of hospital admissions, b) number of acute care days, c) number of intensive care days, d) LOS, e) number of emergency department visits, f) total

inpatient costs, g) total outpatient costs, h) net fiscal gain or loss in inpatient charges, i) net fiscal gain or loss in outpatient charges. These outcomes were measured for a six month period pre and post the NCM intervention.

Data were also collected from hospital information systems to measure the direct cost of nurse case management per unit of service. Direct costs of salaries and benefits and variable costs of mileage, supplies, rental of equipment, and purchased services were collected for the one year period of July 1990 through June 1991.

Description of the Sample

The study sample consisted of 31 patients who had at least one non-elective inpatient admission to the hospital for chronic congestive heart failure during the period of evaluation (January 1990 to July 1991). Although 57 subjects fit the information system criteria for inclusion, 24 were excluded because of admissions to hospice or death during the evaluation period, or less than a six month enrollment in FHP. Thirty of the 57 subjects were listed as active in the NCM information system. Only 15 of these, however, met the criteria for intensive NCM (two visits per month for two months). Two other subjects who met all inclusion criteria were later excluded after initial evaluation of data revealed that they were statistical outliers in numbers of acute care days and inpatient costs. An outlier was defined as being more than three standard deviations from the mean of the other subjects. The 31 subjects were placed in

one of three groups according to enrollment dates in FHP and whether or not they received NCM. Group 1 which received intensive NCM had ten subjects and Group 2 which did not receive intensive NCM had eleven subjects; both of these groups were enrolled in FHP during the year of June 1990 to June 1991. Group 3 consisted of ten subjects who were enrolled in FHP during the six month period between January and July 1990 when NCM was not available to patients.

Age and Sex

The mean ages for each group within the sample and for the total sample are illustrated in Table 1. The mean age of the pre-NCM group was highest at 81 years; the mean age for the other two groups was 77 years. Age categories and frequency of occurrence within the groups and the total sample are presented in Table 2. Group 3 (pre-NCM) had the highest percentage of subjects age 85 to 94, with 40 percent in this category. Within Group 1 (intensive NCM) 20 percent of patients were in the 85-94 category, and 9 percent of Group 2 (no intensive NCM) fell into this age group.

There was a higher percentage(60 percent) of males in the pre-NCM group. The intensive NCM group and no intensive NCM group were evenly divided between males and females (Table 3).

Table 1.

Age of total sample, groups (n = 31).

Group	n	Mean	Standard Deviation	Range
1 - Intensive NCM	10	77	7.1	66 - 87
2 - No intensive NCM	11	77	6.3	68 - 86
3 - Pre-NCM	10	81	8.0	67 - 93
Total	31	78	7.7	66 - 93

Note. NCM = Nurse Case management.

Table 2.

Age categories of groups, total sample (n = 31).

Age	Group 1 Intensive NCM %	n	Group 2 No intensive NCM %	n	Group 3 Pre-NCM %	n	Total %	n
65 - 69	20	(2)	18	(2)	10	(1)	16	(5)
70 - 74	20	(2)	27	(3)	30	(3)	26	(8)
75 - 79	20	(2)	27	(3)	0	(0)	16	(5)
80 - 84	20	(2)	19	(2)	20	(2)	19	(6)
85 - 89	20	(2)	9	(1)	10	(1)	13	(4)
90 - 94	0	(0)	0	(0)	30	(3)	10	(3)
	100%	(10)	100%	(11)	100%	(10)	100%	(31)

Note. NCM = Nurse Case management.

Table 3.

Sex of total sample, groups (n = 31).

Group	Male		Female	
	%	n	%	n
1 - Intensive NCM (n=10)	50	5	50	5
2 - No intensive NCM (n=11)	45.5	5	54.5	6
3 - Pre-NCM (n=10)	60	6	40	4
Total (n=31)	48.4	16	51.6	15

Note. NCM = Nurse Case Management.

Race

Twenty nine (94 percent) of the total sample were Caucasian, and two (6 percent) were Hispanic. No other ethnic subgroups were represented in the sample.

Marital Status

For the total sample, twenty (65 percent) were married, ten (32 percent) were widowed and one (3 percent) was single. No subjects were divorced. The no intensive NCM group had the most widowed subjects. Four (36 percent) of this group were widowed, in comparison with 30 percent of Groups 1 and 3 who were widowed (Table 4).

Table 4.

Marital status of total sample, groups (n = 31).

Group	Married %	n	Widowed %	n	Single %	n	Divorced %	n
1 - Intensive NCM (n = 10)	70	7	30	3	0	0	0	0
2 - No intensive NCM (n = 11)	55	6	36	4	9	1	0	0
3 - Pre-NCM (n = 10)	70	7	30	3	0	0	0	0
Total (n = 31)	65%	20	32%	10	3%	1	0	0

Note. NCM = Nurse Case Management

Description of the Variables

Number of Hospital Admissions

Table 5 illustrates the mean, standard deviation and range of the number of hospital admissions by group and time period of evaluation. For both Group 1 and Group 2, the mean number of hospital admissions increased between the Time 1 measurement and Time 2. The intensive NCM group had the largest mean number of hospital admissions with 1.4 admissions for the pretest measurement and 1.5 admissions for the posttest measurement. Group 2 which did not receive intensive NCM had 0.8 admissions for the pretest measurement and 1.2 hospital admissions for the posttest measurement, a difference which was not found to be statistically significant. Group 3, the pre-NCM group, had a posttest only measurement of 1.2 mean hospital admissions.

Number of Acute Care Days

Acute care days for the groups are reported in Table 5. The group receiving intensive NCM had an average of 4.8 acute care days at the pretest measurement and 8 acute care days for the posttest measurement. Group 2, which received no intensive NCM, averaged 4.3 acute care days at Time 1 and 5.5 days at Time 2. For both the intensive NCM group and the no intensive NCM group, the number of acute care days increased over the one year period of evaluation. This was a significant difference for Group 1 (intensive NCM) when pretest and posttest means ($p < 0.07$) were analyzed with t-test for correlated

Table 5.

Summary of data related to inpatient admissions by group and time period.

Variables Related to Inpatient Admissions	STUDY GROUPS														
	Intensive NCM (Group 1)						No Intensive NCM (Group 2)								
	Pretest (T_1)			Posttest (T_2)			Pretest (T_1)			Posttest (T_2)			Pre-NCM (Group 3)		
	$\bar{X}$	SD	R	$\bar{X}$	SD	R	$\bar{X}$	SD	R	$\bar{X}$	SD	R	$\bar{X}$	SD	R
Number of hospital admissions	1.4	.7	2	1.5	.8	2	.8	.9	2	1.2	1.1	3	1.2	.8	2
Number of acute care days	4.8	2.7	10	8	3.3	10	4.3	5.2	14	5.5	4.9	14	5.7	5.1	18
Number of intensive care days	.1	.3	1	.6	1.3	4	.5	1.0	3	.1	.3	1	.8	1.3	3
Average length of hospital stay	3.7	1.8	5	5.9	1.7	5	3.0	3.4	9	3.5	2.5	8	3.9	3.0	9
Total inpatient costs in dollars	5442	2329	6871	15,680	14,808	45,214	6895	10,995	37,734	5345	4182	11,231	7797	6744	18,783
Net fiscal gain/loss inpatient in dollars	-1539	865	2795	-7180	9891	31,246	-2878	6089	21,345	-1799	1515	4370	-3167	4425	14,872

Note: $\bar{X}$ = mean
SD = standard deviation
R = range
NCM = Nurse Case Management
Pretest = Time period 1
Posttest = Time period 2

samples (Table 6). No significant difference was found between pretest and posttest measurements for the no intensive NCM group. The posttest measurement for the pre NCM group was 5.7 acute care days.

Number of Intensive Care Days

A summary of the mean, standard deviation, and range for number of intensive care days for each group are reported in Table 5. The pre-NCM group measurement for the posttest had the highest mean number of ICU days at 0.8. There was an increase in mean number of ICU days for the NCM group between Time 1 (mean days 0.1) and Time 2 (mean days 0.6). Group 2, the no intensive NCM group had 0.5 days for the pretest measurement and 0.1 days for the posttest measurement. These differences were not found to be significant for either group (Table 6).

Average Length of Stay

Group 1 (intensive NCM) averaged 3.7 days for length of hospital stay for Time 1. For Time 2, the posttest measurement, LOS increased to a mean of 5.9 days. Group 2 (no intensive NCM) had an average LOS of 3.0 days for Time 1 and 2 showed an increase over the one year period of evaluation between pretest and posttest measurements. There was a significant difference between means of T1 and T2 for the intensive NCM group when Hotelling's T2 test was applied ($p < 0.06$) (Table 6). For the no intensive NCM group, however, the difference was not significant ($p < 0.10$). Group 3 (pre NCM) posttest

Table 6.

Correlated samples t-tests between time period one and time period two by group.

Variable	Group 1 Intensive NCM (n = 10)			Group 2 (n = 11) No intensive NCM		
	Mean Difference Between time one and time two	t value	Probability >|T|	Mean Difference between time one and time two	t value	Probability >|T|
Number of hospital admissions	0.10	0.256	0.81	0.36	0.770	0.46
Number of acute care days	3.20	2.058	0.07	1.18	0.487	0.64
Number of ICU days	0.50	1.103	0.30	-0.36	-1.077	0.31
Average length of hospital stay	2.20	2.157	0.06	0.55	0.367	0.72
Number of ED visits	-0.10	-0.361	0.73	-0.27	-1.150	0.28
Total inpatient cost in dollars	10238	2.118	0.06	-1550	-0.377	0.71
Net fiscal gain/loss - inpatient in dollars	-5640	-1.796	0.11	1079	0.513	0.62
Total outpatient - cost in dollars	-70	-0.117	0.91	-513	-1.49	0.17
Net fiscal gain/loss outpatient in dollars	45	0.35	0.74	138	1.40	0.19

Note: NCM = Nurse Care Management
ICU = Intensive Care Unit
IP = Inpatient
LOS = Length of Stay
ED = Emergency Department
OP = Outpatient

measurement for mean LOS was 3.9 days. The 5-test between Groups 1 and 3 at time two determined that the mean LOS for Group 1 which received intensive NCM was significantly higher than Group 3 ($p < 0.08$).

Emergency Department Visits

Mean number of emergency department visits by group is illustrated in Table 7. For the intensive NCM group pretest average was 0.6, and for the posttest was 0.5. The no intensive NCM group for time period one averaged 0.4, and was slightly lower for time period 2 at 0.2. When analyzed for significance with correlated samples t-test, the differences were not found to be significant for either group. Mean number of ED visits for group 3 was 0.6.

Total Inpatient Costs

On Table 5 mean inpatient cost data is reported. Group 1 which received intensive NCM had the highest average cost during time period 2 at $15,680. This was a change from the Group 1 measurement at time one which was $5,442. The difference in means was significant at the $p < 0.07$ level when analyzed by correlated samples t-test. Although there were also increases in mean inpatient costs for Group 2 between time period one (mean cost $6895) and time period two ($10,995), these differences were not significant at the $p < 0.10$ level. Mean inpatient costs for Group 3 were $7,797.

Table 7.

Summary of data related to outpatient admissions by group and time period.

Variables Related to Outpatient Admissions	STUDY GROUPS														
	Intensive NCM (Group 1)						No Intensive NCM (Group 2)								
	Pretest (T_1)			Posttest (T_2)			Pretest (T_1)			Posttest (T_2)			Pre-NCM (Group 3)		
	$\bar{X}$	SD	R	$\bar{X}$	SD	R	$\bar{X}$	SD	R	$\bar{X}$	SD	R	$\bar{X}$	SD	R
Number of ED visits	.6	1	3	.5	.5	1	.4	.7	2	.2	.4	1	.6	1	3
Total Outpatient Cost in dollars	924	937	2300	854	1372	4380	863	1390	3992	351	404	1078	706	695	2020
Net Fiscal Gain/Loss Outpatient in Dollars	-220	208	592	-175	281	886	-212	353	1114	-74	99	254	-250	295	574

Note: $\bar{X}$ = mean
SD = standard deviation
R = range
NCM = Nurse Case Management
Pretest = Time period 1
Posttest = Time period 2

Total Outpatient Costs

Total mean outpatient costs (Table 7) were highest for the intensive NCM group at the pretest measurement (mean cost of $924). The mean total cost dropped slightly at the posttest measurement which was $854. For the no intensive NCM group, mean costs were $863 for time period one, and dropped to $351 for time period two. A correlated samples t-test analyses demonstrated that these were not significant differences (Table 6). Group 3 outpatient costs averaged $706 for the posttest measurement.

Net Fiscal Loss - Inpatient

For all three groups, inpatient costs exceeded reimbursement and involved fiscal loss. Group 1, the intensive NCM group, which had significantly higher number of acute care days, LOS, and inpatient costs for time period two also had the greatest net fiscal loss for inpatient costs at -$7,180. The mean loss figure for Group 1, time period one was -$1,539; the difference in means for Group 1 between the two time periods was significant at the $p < 0.10$ level. At time period one the no intensive NCM group had average losses of -$2878; the losses decreased for time period two (mean loss of -$1,799). For Group 2 this difference in means was not significant ($p < 0.10$).

Net Fiscal Loss- Outpatient

For outpatient services, costs also exceeded reimbursements and involved net fiscal losses. There were not significant differences between the intensive

NCM group and the no intensive NCM group ($p < 0.10$). Table 7 presents the mean, standard deviation and range of losses for the three groups at pretest and posttest measurements. Average losses for outpatient services ranged from -$74 to -$250 in the three groups.

Nurse Case Management Costs

Costs for nurse case management for the fiscal year July 1990 through June 1991 are presented in Table 8. An average of 4.2 full time equivalent (FTE) positions, including productive and non-productive hours, were charged to the FHP NCM account during this period of evaluation. The average hourly rate of pay was approximately $18 per hour in 1991 dollars. The total cost for salaries, including straight time, call, overtime, and paid time off was $160,119 for the year, or an average of $13,343 per month for salaries. Variable costs are also reported on Table 8. Costs for pharmaceuticals, equipment rental, telephone time and mileage totalled $24,811 for the year, or an average of $2,068 per month. Direct costs per NCM FTE per year were $41,300, or $3442 per month per NCM FTE.

Table 8.

Costs of NCM for fiscal year July 90 through June 91.

Fixed Costs		Variable Costs	
Straight time	144,616	Operating supplies	7,968
Overtime & call	1,342	Pharmaceuticals	885
Paid time off	11,976	Lease/rental equipment	893
Other salary	2,185	Telephone	6,628
		Local mileage	8,437
Total fixed costs	$160,119	Total variable cost	$24,811

Findings and Discussion Based on Research Questions

The first research question was, " How do program outcomes of NCM compare with those of an existing system of care for an elderly population with a cardiovascular diagnosis?" Program outcomes measured were a) number of hospital admissions, b) number of acute care days, c) number of intensive care days, d) LOS, e) number of ED visits, f) total inpatient cost, g) total outpatient cost, h) net inpatient fiscal gain or loss, and i) net outpatient fiscal gain or loss.

The intensive NCM group (Group 1) had significantly higher averages for number of acute care days, LOS, inpatient costs and net fiscal gain or loss ($p < 0.10$) between pretest and posttest measurements when correlated samples t-tests were computed (Table 6). The no intensive NCM group (Group 2) showed no statistically significant differences between pretest and posttest measurements for any of the variables. When posttest only t-tests were performed for the intensive

NCM group and the pre NCM group (Group 3), the only significant differences found were in average LOS. Mean LOS for the intensive NCM group (Group 1) was higher than for the pre-NCM group (Group 3) ($p < 0.08$). The t-tests between Groups 1 and 3 for one other variable approached significance; total inpatient costs were higher for Group 1 at time period two ($p < 0.15$).

When ANOVAs were performed to follow up on the significant differences between means of Groups 1 and 2 for both pretest and posttest measurements, several significant differences were found. Number of hospital admissions for the intensive NCM group were significantly higher than for the no intensive NCM group ($p < 0.06$) (Table 9). LOS was significantly higher for the intensive NCM group ($p < 0.01$) (Table 10). Other differences which approached significance between Groups 1 and 2 were: a) number of acute care days was higher for the intensive NCM group ($p < 0.18$), and b) total inpatient cost was higher for the intensive NCM group ($p < 0.11$).

To analyze the posttest only data for the three groups, three way ANOVAs were performed. Significant differences were found in average LOS ($p < 0.07$), and total inpatient costs ($p < 0.05$). Approaching significance was the difference found in net fiscal gain for inpatient services ($p < 0.14$). In order to determine the direction of significant differences among the three groups, follow up analyses (Scheffe's test) were conducted. LOS again was significantly higher for the intensive NCM than for the no intensive NCM group at the 0.10

Table 9.

Analysis of variance for time and group effects for number of hospital admissions, (Group 1 and Group 2). (n = 21).

Source of Variation	Sum of Squares	df	Mean Square	F	F Probability
Main effects					
Group	2.121	1	2.121	3.86	0.064
Time	.563	1	.563	.54	0.470
Interaction					
Group x time	0.182	1	0.182	0.18	0.680

Table 10.

Analysis of variance for time and group effects for length of stay, (Group 1 and Group 2). (n = 21)

Source of Variation	Sum of Squares	df	Mean Square	F	F Probability
Main effects					
Group	27.432	1	27.432	7.40	0.014
Time	19.741	1	19.741	2.23	0.152
Interaction					
Group x time	7.170	1	7.170	0.81	0.380

confidence level. Total inpatient cost was also higher for Group 1 than Group 2 ($p < 0.10$).

The second research question was, " What are the direct costs of NCM per unit of service?" Direct costs of NCM were defined as the fixed costs of salaries and benefits, and the variable costs of mileage, purchased supplies, and leasing of equipment. Direct costs per NCM FTE were calculated as $3422 per month for fixed and variable costs. Data related to clients served by NCM during the same period was collected, however, a detailed account of numbers of patients served and numbers of case management visits was only available for the three month period of January 1991 to March 1991. These data are presented on Table 11. For the three month period, NCM visits in the hospital and community averaged 300 visits per month, or 71 visits per NCM FTE per month. The average monthly number of patients served by NCM for FHP was approximately 600, which averages into a caseload of 143 clients per FTE. Since the number of clients actively being seen by PNCMs averaged only 52% of the caseload, a more accurate reflection of NCM case load was 74 clients per FTE. Cost of NCM per active client was estimated at $46.50 per month based on the figure of 4.2 FTEs for NCM for that time period.

Summary

Thirty-one elderly patients with at least one hospital admission for chronic congestive heart failure were assigned to one of three groups in order to

Table 11.

Activity report for NCM January through March 1991 by month.

	January	February	March	Mean
Number of FHP enrollees	13,595	13,910	14,407	13,971
Number of FHP clients served by NCM	545	599	663	600
Percent of NCM clients classified as active	55%	53%	49%	52%
Number of NCM hospital visits	99	73	53	75
Number of NCM community visits	222	215	229	222
Total NCM visits	321	288	282	300

Note: NCM = Nurse Case Management
FHP = Senior Managed Care Plan

compare the program outcomes of community based NCM with those of the existing hospital method of organizing care. Group 1 received intensive NCM, Group 2 did not receive intensive case management, and Group 3 consisted of patients who met criteria for inclusion but no NCM program was available to them. Program outcomes evaluated were number of hospital admissions, number

of acute care days, number of intensive care days, average LOS in the hospital, number of ED visits, total inpatient cost, total outpatient cost, net fiscal gain or loss for inpatient services, and net fiscal gain or loss for outpatient services.

Pretest and posttest measurements were made of these program outcomes for Groups 1 and 2, and posttest only measurements were made for Group 3.

When t-tests were performed to determine differences between Group 1 and 2 for pretest and posttest measurements, the intensive NCM group had significantly higher means for number of acute care days, LOS, inpatient costs and net fiscal gain or loss at the posttest measurement ($p < 0.10$). There were no significant differences in means for the pretest and posttest measurements within the no intensive NCM group.

When Group 1 and Group 2 outcomes were compared through ANOVAs, Group 1 which received intensive NCM had significantly higher mean number of hospital admissions ($p < 0.06$) and greater LOS ($p < 0.01$) period two than the no intensive NCM group.

Posttest measurements of outcomes for the three groups were analyzed by three way ANOVAs. Significant differences were found in average LOS ($p < 0.07$) and total inpatient costs ($p < 0.05$). Post hoc analyses (Scheffe's test) were conducted to determine the direction of differences. LOS and total inpatient costs were significantly higher for the intensive NCM group than for the no intensive NCM group ($p < 0.10$). T-tests performed to evaluate the differences

in means between Groups 1 and 3 had similar result, and LOS was significantly higher for the intensive NCM group than for the pre-NCM group ($p < 0.08$) and total inpatient costs were higher for Group 1 than Group 3 ($p < 0.15$).

Direct costs of NCM per unit of service were also calculated in order to address the second research question of "What are the direct costs of NCM per unit of service?" Direct costs for each NCM FTE were $3442 per month; this figure included fixed costs of salaries and variable costs of equipment and supplies. Average active caseload was calculated to be approximately 74 clients per NCM FTE. Cost of NCM per active client was estimated at $46.50 per month.

CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

Introduction

A discussion of the findings reported in Chapter Four are presented in Chapter Five. The limitations of the study are discussed, and implications for nursing practice and nursing research are presented.

This retrospective study was conducted to investigate the cost - effectiveness of nurse case management program as a strategy for a hospital seeking to reduce unnecessary recidivism that results in uncompensated care. Chronically ill groups such as the elderly with cardiovascular diagnoses are more likely to have frequent readmissions. Community based NCM, a program which provides care along the continuum from hospital to home for a high risk population, seeks to decrease costs through reduced use of health services.

The theoretical orientation for the investigation was the engineering model of evaluation. Cost effectiveness analysis falls within the engineering model and combines evaluation research methods with accounting methods in order to express program outcomes in relationship to program costs. Cost effectiveness analysis for this study was narrowly defined to address organizational fiscal goals for the program. Only program outcomes that were retrievable in hospital information systems were measured.

Subjects for the study were 31 chronically ill cardiovascular patients, age 65 years or older, enrolled in a managed care plan for seniors between the dates of January 1990 and June 1991. The subjects were assigned to one of three groups according to enrollment dates in FHP and whether or not they received intensive NCM. The study design consisted of two components: a pretest posttest comparison group design comparing program outcomes of a group which received intensive NCM with a group which did not receive intensive NCM , and a posttest only design comparing three groups which all met information systems criteria for inclusion in the study.

Interpretation of the Findings

The first research question was," How do the program outcomes of nurse case management compare with those of an existing system of care for an elderly population with a cardiovascular diagnosis enrolled in a plan of managed care?"

Comparison of Pretest and Posttest Measurements by Group

First, the group receiving the intensive NCM intervention was evaluated for changes in outcomes between the six month period before NCM and the six month period after NCM was initiated. A comparison group which did not receive intensive case management, but which met information systems criteria for selection was also examined for differences in outcome measurements between the pretest period and the posttest period. No significant differences were found between pretest and posttest measurements for either the intensive NCM group

or the no intensive NCM group for number of hospital admissions, number of intensive care days, number of emergency department visits, total outpatient costs, or net fiscal loss for outpatients. The only significant differences between pretest and posttest measurements occurred in the intensive NCM group. That is, posttest measurements for the intensive NCM group were significantly higher than pretest measurements for variables related to inpatient services (Table 5); number of acute care days, average length of hospital stay, total inpatient costs, and net fiscal loss for inpatient services were all higher for the six month period post NCM intervention. The comparison group which received no intensive NCM had no significant changes for any of the outcome measures over time.

These results were not expected. Previous studies utilizing a similar pretest posttest retrospective research design report significant decreases in length of stay and number of acute care days for patients who received NCM for similar time periods. (Chapman, 1990; Ethridge & Lamb, 1989; Rogers, Riordan & Swindle, 1991). The method of selection of the study group may explain some of the difference in findings between this study and previous studies. Chapman (1990) evaluated circulatory and respiratory patients, but the diagnoses involved 15 different Diagnostic Related Groupings (DRGs). Rogers, Riordan and Swindle (1991) selected patients for NCM strictly by patterns of heavy hospital utilization and cost, regardless of diagnosis. This was the first study to attempt to look at a carefully defined diagnostic subgroup involving one medical DRG. First, subjects were selected by computer information systems according to diagnosis of

chronic congestive heart failure. Criteria for inclusion required that the subject must have had at least one admission with a primary diagnosis of chronic congestive heart failure (CHF) during the period of January 1990 to June 1991. All ten subjects in the group receiving intensive NCM had at least one hospital admission for CHF as either a primary or secondary diagnosis during the six month pretest measurement, indicating the presence of a chronic disease. No other measure of acuity or risk was retrievable in hospital information system data, however, and it is possible that this group of patients did not reflect the same severity of illness as NCM recipients in other studies.

Second, the studies cited above involved only Medicare patients while this investigation included only patients enrolled in a specific managed care plan. This is an important difference, for the FHP Senior Plan in California has demonstrated reduced LOS for admissions than national averages for Medicare recipients. This reduced LOS may be attributed to tighter discharge planning and utilization management as well as the greater control over physician practice patterns that is possible in a system of managed care. Mean LOS was highest (5.9 days) for the NCM group at the posttest measurement; mean LOS for all groups at the posttest measurement was 4.39 days. Chapman (1990) reported a mean LOS of 6.28 days for a group of Medicare patients with a circulatory diagnosis who had received NCM prior to hospital admission, and an overall mean LOS of 5.46 days for all patients within the circulatory MDC. This suggests

that for the managed care group LOS was already reduced and that NCM may not be able to impact LOS as significantly as for a group of Medicare clients.

Comparison of Intensive NCM Group and No Intensive NCM Group

The second set of analyses were directed toward comparing the group which received NCM and the no intensive NCM group. ANOVAs comparing the two groups reinforced previous findings. The intensive NCM group had a significantly higher number of hospital admissions and increased LOS than the group which did not receive intensive NCM. Although the differences did not approach statistical significance, the data suggests that the intense NCM group may have tended toward more admissions, hospital days and a longer LOS at the pretest measurement than did the no intensive NCM group. Again, the fact that risk status was not quantified in the information systems data makes it difficult to ensure that the no intensive NCM group was at the same level of risk as the intensive NCM group. Since the LOS and numbers of hospital admissions were higher for the NCM group, it is possible that they represented a group at higher risk for readmission.

Comparison of Posttest Only Measurements of Three Groups

Three way ANOVAs to determine differences among the intensive NCM group, the no intensive NCM group and the pre-NCM group determined that LOS and total inpatient costs were higher for the intensive NCM group than for the no intensive NCM group.

Although a t-test between the intensive NCM group (Group 1) and the preNCM group (Group 3) revealed a significantly higher LOS for Group 1 this difference was not significant when three way ANOVA was followed by Scheffe's test.

The second research question was, "What are the direct costs of NCM per unit of service?"

Direct Cost of NCM

Measurement of the direct costs of NCM are summarized on Table 8. Cost of NCM per active client was estimated at $46.50 per month based on a figure of 4.2 FTEs allocated to FHP NCM for the one year period of July 1990 through June 1991. Active caseload for each NCM was estimated to be 74 clients.

These figures differ from the data related to NCM program cost found in the literature. It is difficult to calculate comparative data for cost because of differences in reporting cost of NCM. Rogers, Riordan and Swindle (1991) estimated costs of NCM to be $36 per hour including salaries, benefits, administrative costs and mileage. SHMO literature reported NCM costs to range from $7 to $16 per member per month at the four demonstration sites (Newcomer, Harrington, and Friedlob, 1990).

Ethridge (1991) reported a cost of $4.85 per member per month for all outpatient nursing services for FHP for the period of June 1990 through April

1991. Eggert and colleagues (1991) reported that case management costs for the neighborhood team model of case management which is most like community based NCM was $3.63 per case per day. The monthly NCM cost of $46.50 per active case translates into a cost of $1.55 per case per day.

Case load information reported in the literature also varied. Case loads for the neighborhood team model were 40 to 45 clients per community based case manager (Eggert et al., 1991). Ethridge and Lamb (1989) reported that the average caseload for a nurse case manager was 40 active clients and another 40 to 50 inactive clients. This raises questions of whether or not caseloads for NCMs changed greatly during the time that NCM services were embedded in a nursing health maintenance organization (HMO), or whether more NCMs were actually serving FHP clients than the reported 4.2 FTEs. If the average caseload for FHP NCMs consisted of 40 active clients, 7.8 FTEs would be required to provide care. Costs per active client would be about 85% higher, or $2.87 per case per day. If caseloads for NCMs had dramatically increased during the period of capitated contracting with FHP, it is also possible that NCMs were not able to provide the same intensive level of nursing intervention. This could also be one explanation for the increased LOS and inpatient costs for patients receiving NCM reported in this investigation.

Interpretation of Findings

For both the intensive NCM group and the no intensive NCM group there was an increase over time in mean number of hospital admissions, acute care days, and LOS. For the intensive NCM group, measurements of program outcomes of LOS and inpatient costs were higher for the six month period after initiating the NCM intervention than the measurements six months prior to the NCM intervention. A secondary finding was that posttest measurements of number of hospital admissions, average LOS, and inpatient costs were higher for the group receiving intensive NCM than a comparison group. The group receiving intensive NCM did, however have a higher mean number of hospital admissions at the pretest measurement than did the no intensive NCM group. Finally, posttest measurements only for three groups indicated that the intensive NCM group had a higher average LOS and total inpatient cost than the other two groups. Direct costs of the nurse case management intervention for clients considered active in the NCM system were calculated at $1.55 per day per active case, a figure which is considerably lower than reported at other national sites. An estimate of active caseload for each NCM was 74 clients per FTE; this caseload is almost twice the caseload reported in the literature for other similar community based case management programs. These findings cannot be generalized beyond the nurse case management program and the small study group of elderly cardiovascular patients enrolled in a system of managed care at the study hospital.

It is not possible to conclude that NCM is a cost-effective intervention from the information systems data currently being collected at the study hospital. The results of this investigation contradict previous analyses of the fiscal impact of community based NCM of a chronically ill populations. Possible explanations for the differing outcomes are summarized as follows:

a) The increases for the intensive NCM in LOS, number of hospital admissions and total inpatient costs between pretest and posttest measurements may be due to the selection of a managed care population for study, or may be due to selection of a group at a higher level of health risk. The targeting of one cardiovascular DRG was a decision by the investigator, and another DRG may show quite different results of NCM.

b) Differences between the group which received NCM and the comparison group which did not receive NCM again could be explained by the lack of adequate information systems data to determine risk. A stated assumption was that patients referred for NCM are at a higher level of health risk than those who are not offered NCM. The differences between the intensive NCM group and the group which did not receive intensive NCM may simply be validation of this assumption. Nurse case managers would have then been intervening with the most ill clients.

c) The pre-NCM group was expected to be more like the intensive NCM group in terms of health risk because NCM services were not available to address problems of the frailest group. In t-test comparison of posttest outcome

measures for these two groups, again LOS for the NCM group was significantly higher than the pre-NCM group. Otherwise differences between these two groups were not significant. If risk is not measured, it must be considered that the two groups may have been at differing levels of illness. An alternate explanation would be that NCM does not affect LOS, and that previous studies attributed changes to the NCM intervention which may have been due to other factors such as physician practice patterns or discharge planning.

d) One explanations of the low cost of the NCM program are that the program costs were underestimated, and more FTEs were actually allocated to the program than originally reported in the literature. An alternate explanation was that caseloads for NCMs nearly doubled under the managed care contract, and that the NCM intervention changed. NCMs may not have been able to spend adequate time with clients in order to effect changes in patterns of hospital stay.

Recommendations

This investigation would have been stronger methodologically if a larger sample of patients had been evaluated. A comparison of patients with a specific cardiovascular diagnosis with a specified group of respiratory patients would have been interesting, since previous work (Chapman,1990) suggests that NCM is most successful in working with chronic respiratory patients. Perhaps cardiovascular patients were not as likely to be affected by NCM. More stringent criteria for

health services utilization patterns prior to the NCM intervention would also have helped in selecting a group with subjects at comparable levels of risk.

Enrollment dates in the system of managed care were an important consideration, and nearly one third of the group originally selected had to be eliminated because of too brief a period of enrollment. The period of evaluation was minimal for assessing outcomes related to chronic illness. In several instances patients had admissions just prior to or immediately following the six months pretest and posttest measurements. Ideally, the investigation should have spanned at a full year or more before the NCM intervention and a equivalent interval after the NCM intervention.

The NCM intervention itself is not well defined, and a categorization of level of NCM intervention would help to make certain that subjects had received similar treatments. The criterion for intensive NCM (two documented visits per month for at least two of the six month posttest period) was arbitrary. Several clients who did not receive intensive NCM according to the above definition did have minimal contact with NCMs but were placed in the no intensive NCM group. Nurse case managers may actually have had some effect on the health status of the comparison group, but the effect could not be measured in this study.

Finally, the difficulty in assessing risk has been repeatedly mentioned; the study would have been much stronger if a valid measure of risk for readmission were available.

Implications for Research

This study was an attempt to utilize existing hospital information systems data in order to evaluate retrospectively the fiscal outcomes and costs of a program of nurse case management for a group of elderly cardiovascular patients. Ideally, evaluation of these fiscal outcomes for the program could be conducted on an ongoing basis within the organization so that decision makers would be able to determine if the program was meeting administrative goals.

This investigator was not able to replicate the findings of previous studies of NCM with Medicare populations which suggested that NCM was related to reducing LOS and inpatient costs. It is important to understand why this study group was different. Three areas need to be addressed in order to lay groundwork for more comprehensive and reliable evaluations of the program.

First, the hospital information system must include a quantifiable risk status assessment on every hospital admission. This might include living status, limitations in performing activities of daily living (ADLs) or limitations in instrumental ADLs so that a picture of health status over time can be created. If risk can not be quantified, NCM impact cannot be reliably measured.

Second, the NCM program must be more clearly translated into categories of intervention. Community based NCM was a program designed to work with the chronically ill over time, and through the building of caring relationships to influence patterns of health, health service utilization, and cost. The NCM intervention for some clients consisted of intensive involvement for two

to three weeks, and for others many months of regular contact. The specific ways and length of time that nurse case managers intervene in order to change patterns need to be identified. A first step toward doing so would be to develop levels of intervention that could be included in the NCM information system.

Third, direct costs of NCM relative to active caseload must be defined and measured consistently. This investigator could not accurately and reliably determine the actual costs of NCM for this small group of clients. It is important that measures of program costs are standardized so that comparisons can be made among NCM programs nationwide. Client case mix, labor costs, and community and organizational structures all contribute to the costs of case management. These variables must be considered and measured in order to systematically identify the cost of case management.

Although in this study the focus was on fiscal and health service utilization outcomes, further work needs to be directed toward qualitative concerns such as client functional status, client satisfaction with the program and family and caregiver satisfaction.

Implications for Nursing

The national emphasis on cost-effectiveness in health services will only increase during the next decade as the cost of health care becomes a national priority. The community based model of NCM has received much attention as a strategy to reduce the high cost of caring for the chronically ill, and the model is

now being replicated at many sites across the nation. NCM is a uniquely nursing intervention with an emphasis on caring, teaching, wellness, and relationships rather than technologic interventions. Although intuitively NCM makes sense, it is essential that NCMs own the responsibility to demonstrate cost-effectiveness, and seek to continually refine measurements of cost and outcomes.

This study was an attempt to compare outcomes of a group receiving NCM with a group receiving an existing system of delivering care. Findings suggest that LOS and inpatient cost for the group receiving NCM were greater than the groups that did not receive NCM. For other outcomes such as number of emergency department visits and total outpatient cost, there were no differences between the groups. Risk status criteria were not well quantified and may have resulted in selection of a comparison group that was at a lower level of risk than the comparison group. These findings contrasted with previous analyses of community based NCM which suggested that LOS and costs are reduced through NCM. The importance of this investigation was in identification of variables that must be refined and consistently measured in order to begin to relate program outcomes of NCM with national outcome research.

Nursing must be attentive to the national trends in evaluation of cost and outcomes. Nursing interventions must be integrated into national data bases to evaluate outcomes, and must use measures that are consistent with other health services research. NCM will no doubt become a reimbursable healthcare

intervention. Careful groundwork in evaluating costs and outcomes will hasten that eventuality.

APPENDIX A

WATSON'S TEN CARATIVE FACTORS

Watson's Ten Carative Factors

THE FORMATION OF A HUMANISTIC-ALTRUISTIC SYSTEM OF VALUES

Humanistic values include kindness, empathy, concern and love for others. Humanistic-altruistic feelings and acts provide the basis of human caring and promote the best professional care.

NURTURING OF FAITH AND HOPE

Patient's beliefs and values are encourage and respected as significant influences in promoting and maintaining health. Even when there is nothing left to do medically, the nurse can nurture a patient's faith and hope in something or someone beyond his or her self.

CULTIVATION OF SENSITIVITY TO ONE'S SELF AND OTHERS

Sensitivity to self is the recognition and acknowledgement of feelings. Nurses use their sensitivity to promote comfort, recovery, and wellness in others.

DEVELOPMENT OF A HELPING-TRUSTING, HUMAN CARING RELATIONSHIP

A helping-trusting human relationship evolves from a certain quality of communication. It connotes a high regard for the whole person and their "being-in-the-world". It is an ideal of intersubjectivity in which both persons are involved.

PROMOTION AND ACCEPTANCE OF THE EXPRESSION OF POSITIVE AND NEGATIVE FEELINGS

Feelings alter thoughts, behavior, and experience, and they need to be acknowledged and considered in the human caring process. The caring relationship can move to a deeper, more honest level when the nurse acts on this carative factor.

USE OF CREATIVE PROBLEM-SOLVING PROCESSES

Within the nursing process are the full use of self and all domains of knowledge, including empirical, aesthetic, intuitive, affective, and ethical knowledge. All knowledge is valuable and accessed within the caring process to "pull it all together".

PROMOTION OF TRANSPERSONAL TEACHING-LEARNING

Learning is dependent upon the nurse's ability to accurately-assess another's perceptions and feelings. The caring process requires openness to others' knowledge and creative problem-solving abilities and ideals.

PROVISION FOR A SUPPORTIVE, PROTECTIVE, OR CORRECTIVE MENTAL, PHYSICAL, SOCIOCULTURAL, AND SPIRITUAL ENVIRONMENT

The purpose of providing a supportive, protective, or corrective environment is quality health care. The factors relevant to providing such care are: Comfort, Privacy, Safety, and Clean aesthetic surroundings.

Watson's Ten Carative Factors (Continued)

ASSISTANCE WITH GRATIFICATION OF HUMAN NEEDS

Assistance with daily activities is an important as facilitating growth and development. Needs include survival (food, fluid, elimination, ventilation); functional (activity, sexuality); integrative (achievement, affiliation); and growth-seeking (inter and intrapersonal, spiritual and self-actualization).

ALLOWANCE FOR EXISTENTIAL-PHENOMENOLOGICAL-SPIRITUAL FORCES

Existential, phenomenological, and spiritual forces are related in that they all support a subjective appreciation for the inner world of the experiencing person. Based on the assumption that each person must find their own meaning in life, and that each person has their own frame of reference, each self can progress to a higher degree of consciousness, inner strength and transcendence. This carative factor not only helps the one being care fore, but also brings focus and meaning to the nurse's personal and professional life as well.

Source: Watson, Jean, "Nursing Science and Human Care," (National League of Nursing: New York: 1988).

APPENDIX B

DATA FORM

DATA FORM

	6 month Pre NCM (dates)	6 month Post NCM (dates)
Name		
Medical Record #		
Age		
Sex		
Marital Status		
NCM date		
Active 2 mo. of 6		
Group #		
FHP enrollment dates		
Inpatient Admission #		
Acute Care-Days #		
ICU days #		
Average LOS		
# ER visits		
# OP visits		
Total inpatients costs		
Net fixed gain/IP		
Total OP costs		
Net fiscal gain/OP		

APPENDIX C

HUMAN SUBJECTS

Human Subject Committee

THE UNIVERSITY OF
ARIZONA
HEALTH SCIENCES CENTER

1690 N. Warren (Bldg. 526B)
Tucson, Arizona 85724
(602) 626-6721 or 626-7375

February 17, 1992

Jean B. Doerge, BSN
College of Nursing
Arizona Health Sciences Center

RE: COST EFFECTIVENESS OF NURSE CASE MANAGEMENT COMPARED WITH AN EXISTING SYSTEM OF CARE

Dear Ms. Doerge:

We received documents concerning your above cited project. Regulations published by the U.S. Department of Health and Human Services [45 CFR Part 46.101(b)(5)] exempt this type of research from review by our Committee.

Please be advised that approval for this project and the requirement of a subject's consent form is to be determined by your department.

Thank you for informing us of your work. If you have any questions concerning the above, please contact this office.

Sincerely yours,

William F. Denny, M.D.
Chairman,
Human Subjects Committee

WFD:sj

cc: Departmental/College Review Committee

College of Nursing

THE UNIVERSITY OF
ARIZONA
HEALTH SCIENCES CENTER

Tucson, Arizona 85721
(602) 626-6154

MEMORANDUM

TO: Jean B. Doerge, BSN

FROM: Leanna Crosby, D.N.Sc., R.N., Director of Intramural Research

DATE: February 20, 1992

SUBJECT: Human Subjects Review: "Cost Effectiveness of Nurse Case Management Compared with an Existing System of Care"

Your research project has been reviewed and approved by William Denny, M.D., Chairman of the University of Arizona Human Subjects Committee, and deemed to be exempt from review by their full committee. You will be receiving a confirmation letter from Dr. Denny. In addition, your project has been reviewed and approved by the College of Nursing Human Subjects Review Committee. At the completion of you research, please bring your signed consent forms to the Office of Nursing Research.

We wish you a valuable and stimulating experience with your research.

LC/ga

APPENDIX D

ST. JOSEPH'S HOSPITAL

Carondelet St. Joseph's

December 23, 1991

Ms. Jean Doerge
2702 E. 7th St.,
Tucson, AZ 85716

Dear Jean:

Your study proposal "Costs & Financial Benefits Associated with Nurse Case Management" has been approved by the CSJ Research Committee. Please remember that we do require that results of your study be shared with the Research Committee and appropriate staff upon completion of your study.

I will be serving as your primary contact during your study. Good luck with this project and please let us know if we can be of further assistance.

Sincerely,

Carol

Carol Mangold, RN, MSN
Chair
Research Committee

CM:sm

350 North Wilmot Road
P. O. Box 12069
Tucson Arizona 85732
(602) 296-3211

LITERATURE CITED

Abrahams, R., Capitman, J., Leutz, W., and Macko, P. (1989) Variations in care planning practice in the social/HMO: An exploratory study. The Gerontologist, 29(6), 725-736.

American Hospital Association. (1983). Managing under medicare prospective pricing. Chicago, IL.

American Nurses Association. (1991). Nursing's agenda for health care reform. Applebaum, R. (1988). Recruitment and characteristics of channeling clients. Health Services Research, 23(1), 51-66.

Bocchino, C. (1990). An interview with Senator David H. Pryor. Nursing Economics, 8(1), 6-12.

Brooten, D., Brown, L. P., Munroe, B. H., York, R., Cohen, S. S., Roncoli, M., & Hollingsworth, A. (1988). Early discharge and specialist transitional care. Image: Journal of nursing Scholarship, 20(2), 64-68.

Carcagno, G. J., & Kemper, P. (1988). An overview of the channeling demonstration and its evaluation. Health Services Research, 23(1), 1-21.

Casalou, R. F. (1991). Total quality management in health care. Hospital and Health Services Administration, 36(1), 134-146.

Chapman, E. (1990). Nurse case management and hospital length of stay. Unpublished master's thesis, University of Arizona, Tucson, AZ.

Cummings, J., Hughes, S., Weaver, F., Manheim, L., Conrad, K., Nash, K., Braun, B., & Adelman, J. (1990). Cost-effectiveness of Veterans Administration hospital-based home care. Archives of Internal Medicine, 150, 1274-1280.

Davidson, G., Penrod, J., Kane, R., Moscovice, I., & Rich, E. (1991). Modeling the costs of case management in long-term care. Health Care Financing Review, 13(1), 73-81.

Desimone, B. (1988). The case for case management. Continuing Care, July, 22-23.

Eggert, G., Zimmer, J., Hall, W. J., & Friedman, B. (1991). Case management: A randomized controlled study comparing a neighborhood team and a centralized individual model. Health Services Research, 26(4), 471-507.

Etheredge, M. L. (1989). Collaborative care: Nurse case management. Chicago,IL: American Hospital Publishing.

Ethridge, P. (1991). A nursing HMO: Carondelet St. Mary's Experience. Nursing Management, 22(7), 22-27.

Ethridge, P., & Lamb, G. (1989). Professional NCM improves quality, access, and cost. Nursing Management, 20,(3), 30-35.

Falk, C. (1991). AHA News, Vol. 27: 39.

Greenberg, J., Leutz, W., Greenlick, M., Malone, J., Ervin, S., & Kodner, D. (1988). The social HMO demonstration: Early experience. Health Affairs, Summer, 66-78.

Abrahams, R., Capitman, J., Leutz, W., & Macko, P. (1989). Variations in care planning practice in the social/HMO: An exploratory study. The Gerontologist, 29(6), 725-736.

Kane, R. (1988). The noblest experiment of them all: Learning from the national channeling evaluation. Health Services Research, 23(1), 189-197.

Kemper, P. (1988). The evaluation of the national long term care demonstration: Overview of the findings. Health Services Research, 23(1), 161-173.

Kemper, P. (1990). Case management agency systems of administering long-term care: Evidence from the channeling demonstration. The Gerontologist, 30(6), 817-824.

Knollmueller, R. (1989). Case management: What's in a name? Nursing Management, 20(10), 38-41.

Kongstvedt, Peter, (1989). The Managed Health Care Handbook. Gaithersburg, MD: Aspen

Lamb, G. (1988). Innovation: 1988 organizational innovational awards. The Health Care Forum, 1.

Loomis, J. (1988). Case management in health care. Health and Social Work, 13(3), 219-225.

McCombs, J., Kasper, J., & Riley, G. (1990). Do HMOs reduce health care costs? Health Services Research, 25(4), 593-613.

Merrill, J. (1985). Defining case management. Business and Health, 2, 5-9.

Michaels, C. (1991). Aspen's Advisor for Executive Nurses, Vol 6: 11. August.

Newcomer, R., Harrington, C., & Friedlob, A. (1990). Social health maintenance organizations: Assessing their initial experience. Health Services Research, 25(3), 425-448.

Newman, M., Lamb, G., & Michaels, C. (1991). Nurse case management: The coming together of theory and practice. Nursing and Health Care, 12(8), 404-408.

Phillips, B., Kemper, P., & Applebaum, R. (1988). Case management under channeling. Health Services Research, 23(1), 67-81.

Porter, B., & Sloan, R. (1986). Philosophy and science of caring in Nursing theorists and their work. St. Louis: C.V. Mosby.

Prescott, P., & Sorensen, J. (1978). Cost-effectiveness analysis: An approach to evaluating nursing programs. Nursing Administration Quarterly, 17-40.

Rezler, A., & Stevens, B. (1978). The nurse evaluator in education and service. New York: McGraw Hill.

Roper, W., Winkenwereder, W., Hackbarth, G., & Krackuer, H. (1988). Effectiveness in health care: An initiative to evaluate and improve medical practice. The New England Journal of Medicine, 319(18), 1197-1202.

Sandella, D. (1990). Cost vs. quality. Nursing Administration Quarterly, 14(3), 31-40.

Thornton, C., Dunstan, S. M., & Kemper, P. (1988). The effect of channeling on health and long-term care costs. Health Services Research, 23(1), 129-144.

Watson, J. (1985). Nursing: Human science and human care. Norwalk, CT: Appleton-Century-Crofts.

Watson, J. (1988). Nursing science and human care. New York: National League of Nursing.

Watson, J. (1979). Nursing: The philosophy and science of caring. Boston: Little, Brown.

Weissert, W. (1988). The national channeling demonstration: What we knew, know now, and still need to know. Health Services Research, 23(1), 175-187.