



REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 1995	3. REPORT TYPE AND DATES COVERED	
4. TITLE AND SUBTITLE Nursing Case Management: What Difference Does It Make? A Replication Study			5. FUNDING NUMBERS	
6. AUTHOR(S) Marelene Renee Pietrocchi, RN, BSN				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AFIT Students Attending: Louisiana State University New Orleans			8. PERFORMING ORGANIZATION REPORT NUMBER AFIT/CI/CIA 95-019	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) DEPARTMENT OF THE AIR FORCE AFIT/CI 2950 P STREET, BDLG 125 WRIGHT-PATTERSON AFB OH 45433-7765			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for Public Release IAW AFR 190-1 Distribution Unlimited BRIAN D. GAUTHIER, MSgt, USAF Chief Administration			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)				
 				
14. SUBJECT TERMS			15. NUMBER OF PAGES 28	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT	

NURSING CASE MANAGEMENT: WHAT DIFFERENCE DOES IT MAKE?

A REPLICATION STUDY

by

MARLENE RENE PIETROCOLA, RN, BSN

THESIS

Presented to the Graduate Faculty
in Partial Fulfillment
of the Requirement
for the Degree of

MASTER OF NURSING

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Availability Codes	
Dist.	Avail and/or Special
A-1	

ACKNOWLEDGEMENTS

I am grateful to a number of people who provided support and assistance during the preparation of this study. The members of my thesis committee, Dr. Patricia G. Beare and Dr. Marie DiVincenti, provided valuable guidance and challenged my thinking during the research process. I would like to thank the Medical University of South Carolina, Charleston for opening their records to me and supporting this valuable learning experience. I would especially like to thank Mary Beth Crummer, MSN, RN, Adult Cardiovascular Case Manager, for her priceless assistance. Her support and experience made this project enjoyable. Finally, I would like to thank my family. Without their support and encouragement, this project would not have been possible.

M.R.P.

ABSTRACT

Some researchers have argued that effectively implemented nursing case management can provide quality patient care and reduce unnecessary expenditure of human and material resources. The purpose of this study was to replicate a 1988 study to examine the impact of nursing case management on cost and length of stay for DRGs 107 (coronary artery bypass graft) and 106 (coronary artery bypass graft with angiography). The study reviewed trends in cost and length of stay over a four year period from 1988, when nursing case management was initially implemented, to 1992 when the present study was undertaken. These trends were established by comparing data from the original study and from fiscal year 1992.

This descriptive study used a convenience sample (n=286) obtained from a population at a 600 bed medical center in the southeastern United States. The sample consisted of DRG 107 and DRG 106 patients, between the ages of 25 and 85. The sample of patients' medical records for DRG 107 was 148; for DRG 106 it was 138. Data were analyzed based on distribution of means.

Analysis of the data collected indicated that there had been a significant statistical increase in both cost and length of stay over the four year period.

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May 1995

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CHAPTER I

INTRODUCTION

CHAPTER I

Introduction

Case management has been defined as "a systematic approach to identifying high-risk/high-cost patients, assessing potential opportunities to coordinate their care, assessing and choosing treatment options, developing treatment plans to improve quality and efficacy, controlling costs, and managing a patient's total care to ensure optimum outcome" (Desimone, 1988, p. 22-23). Nursing Case Management (NCM) has been described by various authors as a care delivery model with great potential for maximizing the quality of patient outcomes (Del Tongo-Armanasco, Olivas, & Harter, 1989; McKenzie, Torkelson, & Holt, 1989). Zander (1990) described the cost benefits of NCM as twofold: a decrease in length of stay (at least one day per case type) and a decrease in resource utilization per case. Case management has been successful in reducing cost and length of stay for a variety of chronically ill and medically fragile populations (Cohen, 1991; Ethridge & Lamb, 1989; Knollmueller, 1990; Zander, 1988). Bertrand (1989) conducted a study at MUSC three, six and nine months before and three, six and nine months after implementation of NCM. In this original study, patient length of stay did not decrease and costs associated with Diagnostic Related Groups (DRGs) 107 and 106 increased. NCM was implemented by the Medical University of South Carolina's (MUSC) Nursing Department in November 1988 as an alternative to traditional patient care delivery.

NCM's effective implementation requires time and careful planning. Evaluation and feedback are important methods for measuring the processes and outcomes of NCM. According to Porter-O'Grady (1993), substantive outcomes cannot be expected from systems redesign, which involve a wide variety of personnel, for at least 5 years. When a complete reorganization of work and culture is implemented in a system, the passage of a minimum of 3 to 5 years are required before critical

evaluations can be reliable. Frequent evaluations must occur to measure the success of the NCM model and determine whether any modifications are required (Biller, 1992). Critically evaluating information gathered before full implementation may result in an invalid evaluation.

Statement of Problem

According to Cohen (1991), NCM provides cost-effectiveness and quality care through the linking of structure, process and outcome standards. Effectively implemented, NCM can help healthcare professionals provide high-quality patient care in an appropriate length of stay, while monitoring the expenditure of human and material resources.

Bertrand's, 1989 study of MUSC's NCM provided data that was inconsistent with the claims in the published literature. Several reasons may account for these inconsistencies. Bertrand's evaluation of NCM was conducted only nine months after it was implemented and full integration of NCM was not in place throughout the center.

Literature and studies published after the original study support the idea that full implementation of NCM must occur prior to evaluation if the evaluation is to be reliable. At the time of Bertrand's study, NCM was in its infancy with little research to support its value. Today, nursing literature is replete with information on the NCM model. Even though studies have been done supporting NCM, a study of the impact of fully implemented NCM on cost and length of stay for DRGs 107 and 106, has not been reported.

Statement of Purpose

The purpose of this study was to replicate Bertrand's 1989 study which evaluated length of stay and cost associated with DRGs 107 and 106 after the

implementation of NCM. This study replicated the Bertrand study four years later, to determine the validity of its results.

Research Question

Is there a reduction in cost and length of stay for patients with DRGs 107 and 106 four years after NCM was originally evaluated in 1988?

Sub Questions

1. What are the significant differences between the total costs associated with DRGs 107 and 106?
2. Are there significant differences between the length of stay associated with DRGs 107 and 106 in 1988 and four years after implementation of NCM?
3. Do these statistical findings support original study findings?

Hypothesis

Four years after implementing NCM, length of stay and costs associated with DRGs 107 and 106 have decreased from those reported in the original study (Bertrand, 1989) done at MUSC.

Theoretical/Conceptual Framework

The conceptual framework for this replication reflects the conceptual framework of the original study (Bertrand, 1989). This framework was devised from an integration of the Classical Management Theory and the model developed by Zander (1988) for the NCM System. This theory and model both focus on outcomes that reflect the cost effectiveness of the end product (patient outcomes), by matching the appropriate person and resources with the patient's needs.

Classical Management Theory was developed early in the twentieth century by Frederick Taylor (Griffin, 1984) in response to new demands placed upon limited resources. This theory divided the workplace into five phases:

Phase 1. The workplace situation can be divided into three elements: a job to be done, a pool of workers, and a manager.

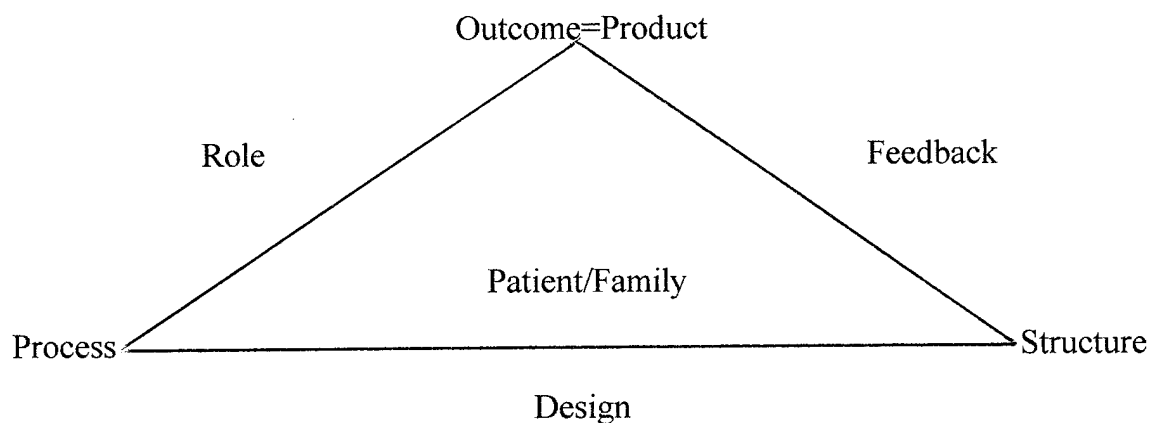
Phase 2. Task analysis is done by managers to determine what skills are needed for each task, and how many workers need to be assigned to the task.

Phase 3. The manager decides how the tasks are to be performed and enumerates the skills needed to carry out these tasks.

Phase 4. Tasks are matched with specific workers who have the skills required for each task.

Phase 5. The manager must continue to supervise the work of the workers and serve as primary planner for the work group (Griffin, 1984).

The model for the practice of NCM was developed from the practice of Primary Nursing. In the NCM model, nursing is linked to the dynamic relationship of design, role and feedback (Figure 1) (Zander, 1988a).



Case Management Model

Figure 1

Design includes the structural components, such as labor and equipment, that support the actual production process. Role is the set of behaviors that are expected to transform the production process into the actual product. Feedback is

the essential link between the outcomes of a system and the revisions and adaptations that the system must make to better its work (Zander, 1988a).

In the NCM model, design entails the case management plans (CMP), critical pathways (CP), and timelines. CMP's are both descriptive and prescriptive in nature. The goals and expected outcomes are determined for specific patient groups by establishing care plans implemented by physicians and nurses. The CMP is developed by analyzing high volume specific patient populations for common problems (e.g., coronary artery bypass graft (CABG) patients). After the problems are identified, goals, discharge outcomes, average length of stay (LOS) and resource consumption are planned using Health Care Finance Administration (HCFA) guidelines. Critical Pathways (CP) are a condensed version of the CMP. This tool shows the exact timing of all key events that must occur in order to achieve the standard outcomes within the LOS specific for the DRG. The CP is used with the patient throughout the entire hospital stay. Variations in each patient's path, their causes, and the actions taken to correct the deviance are recorded by the nursing case manager. Timelines are the part of the CP that provide a "map" of care for patients during their length of stay (Zander, 1988a).

Role is the set of behaviors that are expected to transform the production process into the actual product. Fundamental to NCM is the belief that the case management role is best filled by the clinician who is in a direct care relationship with the patient and the family, and who is responsible for developing patient care outcomes and revising standards after assessing the patient's specific needs. The case manager is accountable for meeting those outcomes within an appropriate length of stay, utilizing resources effectively and staying within the preestablished standards (Zander, 1988a).

Feedback is the essential link between the outcomes of a system and the revisions and adaptations it must make to better do its work. Feedback is used to audit the patient's progress toward established goals. Outcomes are reviewed to determine whether or not anticipated goals were achieved (Zander, 1988a).

The CMP is an overall prescriptive and evaluative tool for nursing care. The CP is the case manager's tool for monitoring the patient's progress toward the expected outcomes on a daily basis. The case manager is the pivotal person who plans, manages, and evaluates the total care of the patient in relation to the CMP. Daily evaluation of care is accomplished through feedback to and from the nurse case manager.

The fusion of the Classical Management Theory with the conceptual model for NCM allows the case manager to review the work to be done and the specific tasks involved to design case management plans and critical pathways. Phases 2 and 3 of the Classical Management Theory examine the required skills for each task so that optimal patient outcomes are achieved in a timely and cost effective manner. Phase 4 matches the work required to meet the needs of the patient. Finally, the case manager cooperates with the work team to elicit feedback on patient care. This serves to determine whether or not actual outcomes fulfill previously agreed upon expectations outlined in the case management plan and the critical pathway for the specific DRG.

Definition of Terms

Theoretical and operational definitions relevant to this study were extracted from the original study (Bertrand, 1989) and remain unchanged. The following conceptual and operational definitions are included.

Nursing Case Management

Theoretical

A model and set of technologies for the strategic management of cost and quality outcomes in patient care as given by health care providers throughout an entire episode of illness (Zander, 1985).

Operational

A patient care delivery model that focuses on the achievement of outcomes within effective time frames and appropriate use of resources. Case management encompasses an entire episode of illness and crosses all settings in which the patient receives care. It also provides for collaborative practice among all care givers. The group uses a Case Management Plan (CMP) and Critical Pathway (CP) to map, track, evaluate and adjust the patient's course of illness and achievement of outcomes (Zander, 1987).

DRG 107

Theoretical

A DRG that is specific to a patient having a coronary artery bypass graft (CABG) that includes any number of vessel replacement grafts (Health Systems International, 1986).

Operational

Patients who have had a coronary artery bypass graft (CABG) with no evidence of chronic illness complications preoperatively and who have not had a cardiac catheterization during the current hospitalization.

DRG 106

Theoretical

A DRG that is specific to a patient having a CABG which may include any number of vessel replacement grafts and angiography during the current admission (Health System International, 1986).

Operational

Patients who have had a coronary artery bypass graft (CABG) with no evidence of chronic illness complications preoperatively and who have had a cardiac catheterization during the current hospitalization.

Length of Stay

Theoretical

The total number of hospital days from admission through discharge for a patient having a CABG, usually 11 days (Health System International, 1986).

Operational

The total number of hospital days from admission through discharge found for patients who have had a CABG at MUSC.

Cost

Theoretical

The average number of resources consumed for the average patient within a particular DRG (Health Systems International, 1986).

Operational

The total dollar amount associated with resource consumption by patients who have had a CABG during a particular length of stay at MUSC.

Coronary Artery Bypass Graft

Theoretical

A surgical procedure to the heart in which a blood vessel is grafted onto one of the coronary arteries and connected to the ascending aorta by passing a narrowing or blockage in a coronary artery (Mosby's Medical and Nursing Dictionary, 1983).

Operational

A surgical procedure, to the heart of a patient, in which a blood vessel is grafted onto one of the coronary arteries and connected to the ascending aorta by passing a narrowing or blockage in a coronary artery.

Assumptions

The assumptions were as follows:

1. Nursing Case Management has been fully integrated into the culture of the nursing department at MUSC.
2. The operational definition of NCM remained consistent.
3. DRG categories are used as the basis for reimbursement.
4. The charts reviewed reflected accurate data regarding lengths of stay and cost for DRGs 107 and 106.
5. Medical Records reviewed were available at time of data collection.
6. Access to the data extended throughout study.

Significance of Study

Zander (1990) described the cost benefits of NCM as twofold: decrease in length of stay (at least one day per case type) and decrease in resource utilization per case. Findings from the original study (Bertrand, 1988) were inconsistent with outcomes reported by Zander in her experience with NCM. There was no notable

decrease in length of stay, and the cost variable showed a statistically significant increase after the implementation of NCM.

Sound progress in systems changes is measured in years, not days or months. Substantive outcomes cannot be expected from systems redesign and work refocus that involve a wide variety of people for at least 5 years (Porter-O'Grady, 1993). The original study (Bertrand, 1989) noted that time between the implementation of NCM and the initiation of the study may have been inadequate. Without full integration, one would not expect to see significant changes in length of stay and resource consumption. Frequent evaluations are necessary to measure the success of the model and to determine whether or not any modifications are required (Biller, 1992). Evaluation of a redesigned system must be ongoing and conducted at multiple points throughout the project (Flarey, 1993). Reevaluating the same variables, after allowing for a significant amount of time to elapse, should provide accurate outcome data on the effects of NCM on DRGs 107 and 106.

The development of a body of knowledge around nurse case management is essential to assure the expansion of this design and to justify reimbursement through current and evolving insurance mechanisms (Lamb, 1992). Conducting this replication study has contributed to the scientific knowledge base for NCM and provided information on the potential benefits of NCM.

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

Review of Literature

The original literature review included much of the information available on NCM in 1988. Since 1988, information on NCM and its implementation has increased dramatically. The original review of literature and additional studies that have been published since 1989 are included below to support the research purpose.

The reimbursement system for hospitals is based on a prospective payment system. Based on DRGs legislated by the Omnibus Reconciliation Act of 1982, patients are classified into 23 major diagnostic categories based on the homogeneity of resource consumption. DRGs are used to classify patients according to the following major variables: use of the operating room, discharge diagnosis, age, existence of complications of significant co-morbidity, and length of stay (Kramer & Schmalenberg, 1987).

Prospective payment is designed to provide positive incentives to hospitals to cut costs. If a patient is discharged quickly and with minimal resource consumption, the hospital profits. Conversely, patients who stay for long periods and who utilize many resources cause the hospital to absorb the cost that is not reimbursed by the Medicare DRG classification. The federal government expects the impact of DRGs to decrease unnecessary utilization of tests and services per patient, thus reducing overall costs (Kramer & Schmalenberg, 1987).

Kramer and Schmalenberg (1987) studied the changes in the size and functioning of hospitals after the implementation of the prospective payment system. This included changes in the number of beds available for patients,

patients' perspectives on their care, the acuity level of the patients being discharged, and nurses' evaluation of the care they provided. Data collection was done by means of interviews with 1,694 nurses in 16 magnet hospitals.

Kramer and Schmalenberg (1987) noted that, despite a decrease in hospital occupancy rate, the number of patients admitted actually increased after implementation of NCM. In some cases, nurses reported having three different patients occupy the same bed in a 24-hour period. The decrease in occupancy rate was a direct result of decreased lengths of stay for patients. Additionally, the nurses stated that patients had a higher level of acuity and patients were being discharged with increased needs for follow-up care. Nurses reported dissatisfaction with the quality of care that they were providing to patients. The nurses reported that they no longer had time to plan and provide patient care to the degree that they had in the past. Also, the nurses no longer were able to provide teaching necessary to promote the recovery of the patient. Ironically, in 12 of the 16 hospitals studied, patient responses to patient satisfaction questionnaires indicated the same or higher levels of satisfaction with care provided, as compared with previous hospitalizations.

The Kramer and Schmalenberg (1987) study demonstrated changes in the numbers of patients being admitted to hospitals and the increase in the acuity of discharged patients. It also gave encouraging information about patient satisfaction in relation to the new trends in the hospital environment. On the other hand, the study verified nurses' dissatisfaction with the quality of care they were able to provide.

These profound changes in reimbursement practices have created a much-needed catalyst for an equally profound restructuring of traditional care delivery systems and practice patterns at every level of acute care institutions. NCM, a set

of technologies for the strategic management of cost and quality outcomes for the clinicians who give the care throughout an entire episode of illness, meets this restructuring need(Zander, 1988a).

NCM was designed to meet the changing needs of the patient, nurse and hospital. Grau's (1984) exploratory study provided a historical perspective on case management. In addition, it provided an exploration of the similarities and differences of implementating case management by nurses, social workers and paraprofessionals in a geriatric setting. Grau found these three groups implemented case management differently from each other. Nursing was consistently the only discipline that made case management decisions and, at the same time, provided and/or coordinated both health and social services. This study reported biases due to the way the subjects were selected (convenience sample). It's conclusions were applicable to the environment in which the study took place. Even with these limitations, case management was consistently chosen as a tool for planning care for the complex, interrelated needs of geriatric patients.

Nursing has taken the case management concept and applied it to today's changing health care environment. Zander (1988a), from the New England Medical Center in Boston, was instrumental in the development and implementation of the NCM. She notes that "critical pathways are the most useful documents (to date) developed for case management because they show the exact timing of all key incidents that must occur for a patient to achieve the standard outcomes within the DRG-specific length of stay" (Zander, 1988a, p. 36).

Zander (1988b) studied three groups of patients who were case managed. She presented the results of using NCM on patients with ischemic strokes, patients with newly diagnosed leukemia and patients with abdominal aneurysms who had complications.

Group one included ischemic stroke patients. Six months after the implementation of case management, a 29% drop in the average length of stay and a 47% drop in the average number of intensive care unit days were noted for patients with ischemic stroke disease. Group two included newly diagnosed leukemia patients who were started on a course of chemotherapy. After the implementation of NCM, length of stays decreased from a high of 56 days down to approximately 32 days. The decrease was attributed to cooperative planning among the health care team. The team agreed that much of the work that had been done previously in the hospital could now take place in an outpatient setting. Group three included patients with repair of abdominal aortic aneurysms who had suffered post operative complications. Even with complications, the length of stay only increased an average of three days as compared to patients without complications. Had this patient not been case managed, this patient possibly would have experienced longer, more fragmented care (Zander, 1988b).

Stetler (1987), Special Assistant for Research at the New England Medical Center, also did a study to examine the outcomes of NCM. As part of the process for piloting NCM, a brief questionnaire, using open and closed ended questions, was used to gather information to determine if NCM was meeting expected goals. Thirty-one nurses reported information on 111 of their patients, over a period of six weeks. A qualitative approach was used to evaluate the data collected.

The following information was derived from this study: (a) Expected outcomes of patient care were achieved 36% of the time, (b) early discharge or discharges within appropriate time frames were achieved 61% of the time, and (c) resource consumption was decreased for 17% of the cases.

In a study done by Loop and Lester (1983), the length of stay for patients having a coronary artery bypass graft was shortened by involving the entire team in

the coordination of outpatient services. The patient's discharge plan was begun prior to the patient's admission and included scheduled outpatient testing. The patient was admitted the morning of surgery, proceeded to the staging room and promptly went to the operating room. Loop and Lester found that by coordinating care with the other team members and doing outpatient testing, lengths of stay were reduced by two days and costs by 10%.

Ethridge and Lamb (1989) reported, after their examination of institution-wide statistics for specific populations of patients with respiratory disease, that cost savings associated with NCM were substantial. As a group, patients admitted with respiratory diseases constituted 10% of all patients admitted to Carondelet St. Mary's Hospital and Health Center. The largest subset of this group fall under DRG 88, Chronic Obstructive Pulmonary Disease. At one time, patients with DRG 88 accounted for the greatest financial loss to the hospital of all Medicare patients. Today, of all the DRG categories, DRG 88 has become the highest revenue generator for Carondelet St. Mary's Hospital and Health Center (Ethridge and Lamb, 1989). Since 1986, the year in which NCM was initiated, average length of stay for individuals with DRG 88 has decreased 8.1 days resulting in a savings of \$1,552 per case.

In a quasi-experimental study of caesarean section patients (N=128), Cohen (1991) found that case management decreased average length of stay by 19%. Hospitalization lasted an average of 4.86 vs. 6.02 days. This study was performed in a large acute-care institution. A non-random selection was employed for both the nursing provider and patient-subject population. Data were collected over a period of 4.5 months. The results showed an overall decrease in length of stay, an increase in patient turnover and a potential increase in patient revenues generated for the hospital. Nursing intensity, along with various nursing interventions and

clinical practice outcomes associated with NCM, was effective in reducing patient length of stay.

Shiell, Kenny and Farnworth (1993) found that nurse case managers succeeded in reducing hospital lengths of stay for elderly orthopedic patients. Better coordination of resources in hospital, planned early discharge and arrangement of physiotherapy in the patient's own home were instrumental in reducing these costs. The study included 138 elderly patients with fractured hips. By coordinating hospital resources needed to treat the elderly orthopedic patients, nurse case managers reduced the average length of stay from 10.2 days to 7.3 days for patients admitted from nursing homes and from 28.2 days to 21.5 days for patients admitted from private residences. The total value of the resources released by the program on an annual basis was \$245,000.

A review of the literature related to NCM and its relationship to DRGs did not reveal any studies reporting effects of NCM on DRGs 107 and 106. Cohen (1991), Ethridge and Lamb (1989) and Zander (1988b), describe studies that produced decreases in lengths of stay and cost to other DRGs (e.g., DRGs 110, 88 and 370-371).

CHAPTER III

METHOD

CHAPTER III

Design

Replicating Bertrand's original study (1989), the present study utilized a non-experimental research design. Polit and Hungler (1993) describe two broad classes of non-experimental research. One is referred to as descriptive research. The purpose of a descriptive study is to observe, describe and explore aspects of a situation as it naturally occurs. The purpose of this replication study was to evaluate the LOS and costs for DRGs 107 and 106 four years after the original study was conducted in 1988. Therefore, this non-experimental design was appropriate.

Setting of the Study

The study was conducted in the same 600 bed medical center located in the southeastern United States as the original study (Bertrand, 1989). Patients having coronary artery bypass graft (CABG) surgery are cared for in the Heart Center, where NCM has been fully implemented.

Population and Sample

Patients for this study included all patients admitted for CABG surgery with or without angiography between September 1, 1992 and September 1, 1993. This is consistent with the original study (Bertrand, 1989), which was conducted between September 1, 1987 and September 1, 1988. In addition, the same inclusion criteria were used. The inclusion criteria for this sample of patients included (a) male and female, (b) a minimum age of 25, (c) all races and socioeconomic strata and (d) those patients who had received a CABG with or without angiography during their current hospital stay.

Instrument

A Data Collection Sheet for Review of Records instrument was developed specifically for the original study (Bertrand, 1989). This instrument was a data collection spread sheet used for manual recording of data. With advances in technology, this instrument was not necessary for this study. Data was compiled in the same format with the aid of the hospital data base and computer.

The data collection tool allowed for the same patient confidentiality as the original instrument. All record entries were logged by entering of a confidential coded number for each patient record reviewed. The coded number used by the investigator coincided with data extracted during the four year period from September 1, 1992 and September 1, 1993. In addition to the coded number, this form included each patient's age, sex, race, admission and discharge dates and total costs incurred.

In order to avoid problems associated with intra-rater reliability, data was collected during a one week period. The collected data was loaded into a computer by a statistician for statistical analysis.

Procedure

Data was collected by retrospective review of the clinical and financial records on all patients that meet sample criteria for DRGs 107 and 106. In order to obtain this information, it was necessary to contact the MUSC and request entry into their facility and data base. The nurse case manager for the Cardiovascular Department served as a contact at MUSC as this study was being processed through their internal review board.

After approval by the MUSC review board, data collection began. Data were retrieved from the MUSC database, printed, sent to this researcher and reviewed

for accuracy and consistency. After this thorough review, the data were uploaded by a statistician for statistical analysis.

Method of Data Analysis

Distribution of means was calculated by a statistical computer software package. A statistician of the Biometry Department at Louisiana State University Medical Center was used to load data for analysis.

Demographic information about the sample was collected during the review. The mean number of patients by race, sex and age was obtained to describe the sample. The mean for demographics related to each DRG was computed, to include number of patients, average age, length of stay and cost. This information was then compared with data obtained from the original study. Descriptive statistics were used to compare the means from the original study's cost and length of stay data with those of this replicated study and to determine if there were any significant statistical differences. An alpha level of .05 was set to determine statistical significance.

Human Rights Protection

Permission to conduct the study was obtained from the Institutional Review Board at Louisiana State University Medical Center and the MUSC, where the study took place. Permission was granted prior to the gathering of data.

CHAPTER IV

RESULTS

CHAPTER IV

Analysis of Data

The purpose of this study was to replicate Bertrand's 1989 study by evaluating the length of stay and costs for DRGs 107 and 106 after implementation of NCM. The original study was designed to evaluate length of stay and cost associated with DRGs 107 and 106 before and after implementation of NCM. This study observed cost and LOS for DRGs 107 and 106 in the same facility (MUSC) four years later, from 1992-1993.

Characteristics of the Sample

The sample consisted of 286 clinical and financial records of patients from a 600 bed medical center in the southeastern United States. The sample included patients who had undergone a coronary artery bypass graft (DRG 107 or 106) in that facility. The inclusion criteria for this sample included (a) male and female, (b) a minimum age of age of 25, and (c) all races and socioeconomic strata. The records reviewed were from September 1992 through September 1993. Data was compiled on a summary sheet for consolidation.

As in the original study, demographic information about the sample was collected during the review. Table 1 describes the number of patients with DRGs 107 and 106 in the sample, the average age, length of stay and cost for both DRGs. Of the 286 patients, 51.7% had a coronary artery bypass without angiography (DRG 107) and 48.3% had angiography in conjunction with the surgery (DRG 106). The average age of the entire sample was 61.1 years and the mean length of stay was 10.11 days. The average cost for the hospitalization for both DRGs was \$27,725.

Table 1
Average Age, LOS and Cost for DRGs 107 and 106

	DRG 107	DRG 106	TOTAL
Patients	148	138	286
Average Age	61.1	60.5	61.1
Average LOS	8.8	11.4	10.12
Average Cost	\$24,593	\$30,858	\$27,725

Table 2 describes the sample based on each specific DRG for variables of race, sex, and the unit where care was rendered. The majority of patients (79.3%) were white males. Of the entire population, 93.7% were cared for in the Heart Center during their hospitalization. The remaining 6.3% were cared for in one of two intensive care units that shared the same staff. These were designated overflow units should the Heart Center be filled to capacity. Both units were under the direction of Nursing Case Management.

Table 2

Frequency of Patients with DRGs 107 and 106 Based on Race, Sex and Unit

	DRG 107	DRG 106	TOTAL	PERCENT
RACE				
White	132	120	252	88.1
Other	16	18	34	11.9
SEX				
Male	115	87	202	70.6
Female	33	51	84	29.4
UNIT				
Heart Center	139	129	268	93.7
Other	9	9	18	6.3

Findings Related to Study Questions

Is there a reduction in cost and length of stay for patients with DRGs 107 and 106 four years after implementing NCM? Results from this study suggest that no such reduction occurs. These results are consistent with the original study (Bertrand, 1989) conducted in the same facility from 1987-1988.

What are the significant differences between the total costs associated with DRGs 107 and 106? Table 1 presents the data in regard to subquestion 1 of this study, that is, what are the significant differences between the total costs associated with DRGs 107 and 106? It was necessary to adjust the costs associated with these two DRGs for increase in cost of healthcare for this region over the past four years. In order to adjust for inflation of healthcare costs for the past four years, an 8% adjustment was made to all cost figures.

The average cost for DRG 107 for this study was \$24, 593. The average cost for DRG 106 was \$30, 858. The total cost for both procedures was \$27,725. In the original study conducted four years ago, the average cost for both DRGs was \$19,912. All of these figures are significantly higher, $p=.05$, than the original study conducted four years ago.

Are there significant differences between the length of stay associated with DRGs 107 and 106 in 1988 and four years after implementation of NCM? Table 1 presents the data in regard to subquestion 2 of this study. The average LOS for DRG 107 was 8.89 days and the average LOS for DRG 106 was 11.43 days. The combined total for both DRGs was 10.12 days. The average total LOS for the original study was 10.7 which presents a significant increase, $p=.05$, for this variable from the original study.

Do the statistical findings support original study findings? The original study supported the findings that there was no significant decrease in length of stay and that the cost variable increased after the implementation of NCM. The results of this study support the original researcher's findings.. Statistical computations present a significant increase in the cost and LOS variables for this study.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Chapter V

Conclusions and Recommendations

This study was designed to replicate Bertrand's, 1989 study by evaluating the LOS and cost for DRGs 107 and 106 four years after the implementation of NCM at a southeastern medical center.

Discussion of Findings

NCM is a clinical delivery system for the strategic management of cost and quality outcomes. Within this system, nursing aims to meet the complex needs of patients in multiple hospital settings by using fewer resources than in previous years.

Zander (1990) describes the cost benefits of NCM as two-fold: decrease in length of stay and decrease in resource utilization per case. The major findings of the original study did not support Zander's experience with NCM. Bertrand found that there had been no significant decrease in length of stay after the implementation of NCM. In addition, the cost variable increased after the implementation of NCM. The findings of this study show that a significant increase in cost and length of stay had occurred since the original study conducted in 1988.

There may be several reasons for these inconsistencies. First, both studies failed to control for unknown variables that are influencing the variables of cost and LOS. This study was designed to describe what effect NCM has had on the two variables after four years. Because organizations are constantly changing, it is very likely that new technology or practices were introduced during this time, and this may affect the cost of the procedures. In the original study, the units described were the ICU and the medical/surgical unit. Today, patients with DRGs 107 and 106 are admitted to the Heart Center where they remain throughout their stay.

This change in practice may be responsible for the cost increase and change in LOS.

During the period of this study, a major task force was established by MUSC to identify areas of improvement for these two DRGs. An internal study at MUSC began in March 1993. Some of the goals of the work group were to increase communication between cardiology and surgery personnel, to provide next day surgery after cardiac catheterization, and to refine all protocols and practice standards. Though these changes may not be affecting the results of this study, they are good indicators of continuous change within the organization and demonstrate that operations are not static. Addressing these types of conditions was not within the realm of this study, but for future research, this should be strongly considered.

Recommendations for Further Study

As mentioned in the original study, this study should be replicated with other DRGs. This method of study will determine if the results from one DRG category can be generalized to other categories.

Many studies of this nature have been conducted for various disease groups and DRG categories. Excluding this study, most research of this nature justifies a decrease in cost and LOS when NCM is utilized. Recommendations for future studies would include describing what nursing interventions are responsible for this decrease. Future research should address what nursing interventions are affecting patient outcomes.

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