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The University of Arizona, 1990

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Critical Paths: An Evaluation of Patient Outcomes

by

Sharon Ann Knutson

A Thesis Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

In the Graduate College

THE UNIVERSITY OF ARIZONA

1 9 9 0

STATEMENT BY THE AUTHOR

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APPROVAL BY THESIS DIRECTOR

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ABSTRACT

Managed care has been proposed as a system for decreasing the cost and improving the quality of care to hospitalized patients. Critical paths, which time and sequence nursing and medical interventions, are an integral part of managed care. The purpose of this study was to describe the relationships between use of the critical paths and selected patient outcomes: length of hospital stay, mobility, pain medication regimen, and bowel regimen. A retrospective record review of hospital care for adults, having total hip replacements ($n = 30$), and total knee replacements ($n = 30$) suggested that the critical paths were used more intensively with patients having knee replacements. Although significant relationships between the intensity of use of the critical paths and patient outcomes were not found in this study, some of the findings were in the predicted direction.

CHAPTER I

INTRODUCTION

With the advent of the national prospective payment system for the delivery of health care, hospitals, nurses, and physicians have become increasingly concerned about the costs of health care. Length of hospital stay, in particular, has been the focus of considerable interest. Shaffer (1984) described several issues related to the prospective payment system and stated that the most important challenge for top hospital management is to encourage interdepartmental and multidisciplinary communication, and to identify potential areas for cost saving and increased efficiency. "Communication systems are required for effectively fulfilling this responsibility of organizing the effort of the nursing staff, medical staff, and numerous other departments. Indeed, the nurse is the coordinator of care" (Shaffer, 1984, p. 83).

Two systems have been proposed with the nurse as the coordinator of care, communicating between the departments of the hospitals. The first is a delivery system nurse case management, and the second system is managed care. There are two dominant models of nurse case management. In one, a hospital-community model, the nurse assesses the patient and family, establishes nursing diagnoses, develops the care plan, activates interventions, coordinates care and

collaborates with the interdisciplinary team, and evaluates outcomes (Ethridge & Lamb, 1989), (Appendix A). "The goal is to keep the patient out of the hospital or lessen the severity of illness and shorten the length of stay" (Chapman, 1990, p. 14). The nurse case manager works with the patient throughout the hospital stay, after discharge, and during subsequent hospitalizations. The patients usually seen by the nurse case managers are those at highest risk for developing complications and those having difficulty managing their health care needs over time. Often, these are the individuals with repeated hospital admissions who incur substantial health care costs.

The second model of nurse case management is a hospital-only model where "case management provides continuity of provider by linking people across clinical settings" (Zander, 1990, p. 1). The case manager follows the patient throughout the hospital stay and establishes the plan of care in collaboration with the health care team. This model incorporates a managed care component in the form of critical paths. In critical paths, all major interventions are timed and sequenced for nurses, physicians, and other departments providing care to the patient.

Managed care facilitates communication with the nurse as the coordinator of care, and is capable of being applied

to all patients in the health care system. Managed care refers to health care delivery and reimbursement arrangements in which the insured health services are actively managed through monitoring both the use and the cost of the services (Coile, 1990). Usually described in relation to Health Maintenance Organizations (HMOs), hospitals are redefining managed care as unit based care organized to achieve specific patient outcomes within a fiscally responsible length of hospital stay while using resources appropriate to the specific case type and the individual patient (Bower, 1988), (Appendix A).

One tool for managed care used by hospitals involves the use of critical paths, collaborative guidelines which outline the time and sequence of the major interventions of nurses, physicians, and other key departments necessary for a particular case-type (Zander, 1989), (Appendix A).

Critical paths

acknowledge all key events that must occur within the limitation of time. Although they are descriptors and patterns of care rather than standing orders or protocols, they do provide a reality base from which to predict certain services and by which to evaluate variances from a norm (Zander, 1988, p. 1).

In contrast to standards of care which describe how an intervention is to be done, critical paths describe when an

intervention is to take place. Critical paths can incorporate the standards of care into the overall picture of timing and sequence of interventions necessary to achieve the desired patient outcomes.

If a patient's hospital care deviates from the outline of the critical path, it is called a variance. There are three types of variances: system, clinician, or patient. Nurses are supposed to evaluate why a variance has occurred. For example, a patient may not begin physical therapy the third postoperative day as expected. The reason for this variance is assessed. For example, the patient's hemoglobin was less than 8 mg/dl; the patient was pale and listless with a decreased blood pressure and an increased pulse. The nurse would then develop a plan of care addressing this patient variance. The nurse would intervene within the interdisciplinary plan of care by transfusing the patient with two units of blood ordered by the physician; encouraging oral intake of fluids and foods high in protein, iron and vitamins; and encouraging exercises in bed or chair as tolerated by the patient. Timely correction of the variance and appropriate individualization of the critical path and care plan for the patient would allow for continued timing of interventions per the critical path. Variance was not measured in this study.

Problem

Patients, nurses, and physicians enter the hospital with preconceived expectations regarding the environment, quality and quantity of care, utilization of time, and outcomes of care. When these expectations are not met, dissatisfaction and frustration sometimes become evident.

Upon listening to many complaints from nurses, physicians, and patients, the nursing staff on one orthopedic unit in a Southwest hospital identified the problem as a lack of communication regarding the expectations among nurses, nurses and physicians, and between nurses and patients. This led to a lack of consistency with the care, and a lack of recognition of the overall pattern of care given to patients within case-types. Within the last few years, the increased use of float pool nurses and the loss of experienced nurses due to retirement or turnover resulted in the loss of specialized care, and communication of that knowledge. The newly hired nurses began anew to build the knowledge base that would continue the quality of care the nurses, physicians, and patients expected. The communication between the nurses currently employed did not address the consistency expected in the care given, and the overall pattern of care required.

After reviewing what other hospitals had used for improving communication, the New England Medical Center's

(NEMC) managed care system was adapted and critical paths were proposed as a plan for communicating the expectations of consistency in care and pattern recognition in case types (Appendix B and C).

Critical paths identify predictable and critical incidents which must occur at certain times to achieve an appropriate length of stay within the hospital (Fuszard, Bowman, Howell, Malinowski, Morrison, & Wahlstedt, 1988). Critical paths were first instituted in NEMC in 1986. Five goals were envisioned:

- 1) early patient discharge or discharge within an appropriate length of stay; 2) 'expected' or 'standardized' clinical outcomes; 3) promotion of collaborative practice, coordinated care, and continuity of care; 4) use of appropriate or reduced resources; and 5) promotion of nurses' professional development and satisfaction (McKenzie, Torkelson, & Holt, 1989, p. 30).

The critical path is a detailed set of desired patient outcomes expected throughout the hospitalization and the clinical processes required to obtain these outcomes (McKenzie, et al., 1989).

In the spring of 1989, the case manager on the orthopedic unit under study proposed the use of critical paths. Nurses on the unit began to review charts to

establish generic critical paths for the four diagnoses of total hip replacement, total knee replacement, endoprosthesis of the hip, and hip pinning. These diagnoses were chosen for the development of critical paths because the highest volume of patients admitted in a given time period had these diagnoses. In the fall of 1989, the four generic critical paths were discussed with each orthopedic surgeon and revised to include specific physician practices and expectations. The critical paths were written to be physician-specific because each of the 18 orthopedic physicians who admit patients to the study unit had his own criteria and techniques designed to meet the insurance guidelines and medical practice guidelines. By incorporating each physician's preferred practice into the critical path, collaboration and communication between each physician and nurse can be enhanced. In addition to incorporating medical practice, the critical paths included physical therapy, occupational therapy, and social services.

All nurses on the unit were then taught about the use of critical paths. Beginning in November 1989, each patient admitted with the four selected diagnoses had a critical path placed on the care plan. Only the patients having total hip or total knee replacements were chosen as subjects for this study because of the high incidence, and the lack

of multiple complications common to the traumatic accidents which often precede endoprosthesis and hip pinning.

In summary, upon recognizing the problem as a lack of communication that did not address the consistency of care expected, nor the recognition of the pattern of care required, the nurses on the orthopedic unit adopted the use of critical paths. The critical path was seen as a tool for interdisciplinary care, a tool to integrate nursing assessment and diagnosis, and as a tool to communicate the pattern of care necessary to meet the desired patient outcomes in a consistent manner, and in an appropriate time frame for a particular case-type. As an end result, critical paths were expected to increase the quality and consistency of care delivered, and decrease the cost of health care as reflected in length of stay.

Purpose

The purpose of this study was to describe patient outcomes associated with the use of critical paths on one orthopedic unit in a Southwest hospital. Patients admitted for total hip or total knee replacements between November 1989 and June 1990 were the subjects for the study.

The patient outcomes under study were length of hospital stay, mobility, pain medication regimen, and bowel regimen (Appendix A). These patient outcomes were chosen for study because increased mobility, pain control, and

prevention of constipation are three of the major outcomes for orthopedic patients. Immobility may have severe consequences on multiple body systems (Lentz, 1981; Rubin, 1988), while pain decreases mobility (Nelson, Taylor, Adams, & Parker, 1990), and constipation leads to increased length of stay and cost as well as decreased mobility and patient satisfaction (Ross, 1990). Preventive interventions for these patient outcomes are outlined within the time frame of each postoperative day within the critical path, and the outcomes are measurable in relation to the use of the critical path (Appendix B and C).

The intensity of use of the critical paths, or the number of columns marked on the critical path by the nurses, was the independent variable. Although the nurses on the orthopedic unit were familiar with the use of critical paths, variability in implementation was likely.

Research Questions

1) What is the relationship between the intensity of use of critical paths and the length of hospital stay for patients having total hip or total knee replacements?

2) What is the relationship between the intensity of use of critical paths and the mobility at discharge for patients having total hip or total knee replacements?

3) What is the relationship between the intensity of use of critical paths and the number of postoperative days

intramuscular injections are administered for patients having total hip or total knee replacements?

4) What is the relationship between the intensity of use of critical paths and the number of postoperative days before achievement of bowel elimination for patients having total hip or total knee replacements?

Significance

Critical paths as a tool for managed care may be significant for health care delivery, nursing knowledge, and nursing practice. The health care system is experiencing a need to control costs and achieve high quality patient outcomes, as proposed by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Nationwide, 20% of the existing hospitals are predicted to close due to an inability to maintain occupancy, control expenses, and operate efficiently (Wilson, 1988).

To provide the most efficient packages of services for specific populations at the most reasonable costs (Moccia, 1989), systems of managed care have evolved. If managed care in the form of critical paths can be shown to improve patient outcomes for selected groups of patients, such as those having hip or knee replacements, the ability of hospitals and their subunits to meet organizational objectives will be stronger. This study proposed to demonstrate how patterns of care using a management tool

such as critical paths, which nurses can easily use, was related to both the cost, as measured by length of stay, and the quality of patient care. Nursing knowledge can be expanded by identifying how a specific critical path relates to patient outcomes.

Nursing practice may be improved by specifying nursing actions that affect patient outcomes and by improving communication among nurses and between nurses and physicians. Specifying and communicating nursing actions can be expected to lead to greater continuity of care, and improved quality of patient outcomes related to bowel regimen, medication regimen, length of stay, and mobility.

Summary

The prospective payment system, as well as the quality of care expectations of physicians, nurses, and patients, requires a system of managed care to provide high quality care with the greatest effectiveness. Critical paths have been proposed as one management tool to meet these expectations. To evaluate how the use of critical paths were related to patient outcomes, patients admitted under the diagnosis of total hip or total knee replacement were described and outcomes were correlated with the intensity of use of critical paths.

If patient outcomes are related to the use of critical paths, this component of a managed care system could provide

hospitals with a tool for integrating medical and nursing care around the diagnostic related groups of the prospective payment system. Furthermore, critical paths may assist nurses and other health care professionals to identify the interventions necessary for the expected patient outcomes, cost savings to the hospital, the insurance system, and patients by alleviating unnecessary patient charges and decreasing patient time within the health care system.

CHAPTER II

REVIEW OF THE LITERATURE AND CONCEPTUAL ORIENTATION

Literature on managed care and the use of critical paths in hospitals is reviewed in this chapter. Additionally, the conceptual orientation and the operationalization of the concepts studied are presented.

Literature Review

Managed care has been described and defined in many different contexts. Generally the focus is on controlling, monitoring, reviewing, and directing health care to promote high quality, outcome oriented, fiscally responsible care for specific populations (Bower, 1988; Moccia, 1989; St. Armand, 1988). Health Maintenance Organizations (HMOs) have utilized managed care through monitoring both the use and the cost of the services (Coile, 1990). Hospitals have redefined managed care as unit based care organized to achieve specific patient outcomes within a fiscally responsible length of hospital stay while using resources appropriate to the specific case type and the individual patient (Bower, 1988).

Critical Paths

One method for managed care, critical paths, was first proposed by staff at the New England Medical Center (NEMC) in Boston, MA. By definition, "critical paths are the

collaborative guidelines which time and sequence the major interventions of nurses, physicians, and other key departments for a particular case-type or condition" (Zander, 1989, p. 1). NEMC instituted a case management plan and its critical path to "map, track, evaluate, and adjust the patient's course and achievement of outcomes" (Zander, 1988, p. 23). NEMC defined its nurse case management as assessment of problem and goal identification, use of the critical path every day, consultation regularly with the disciplines involved, and monitoring of patient's progress (Zander, 1988). Results of the use of critical paths were presented as case studies, involving an undisclosed number of ischemic stroke patients, adult leukemia patients, and one abdominal aortic aneurysm repair patient. In the first case study, length of stay was decreased by 29%; in the second, length of stay was decreased from at least 42 days to 32 days, infection rates decreased, and higher patient satisfaction was reported. In the third, Zander (1989) stated, "quality outcomes were met although the patient stayed two days longer because of major complications. In the past, similar patients would have possibly experienced longer, more fragmented care and far more insecurity in the hospital" (p. 24).

Several other hospitals have reported their experience with critical paths, including Hillcrest Medical Center,

Logan Regional Hospital, Tucson Medical Center, and Rose Medical Center. The Hillcrest Medical Center, in Tulsa, OK, defined nurse case management as "a set of logical steps and a process of interaction with service networks which assures that a patient receives needed services in a supportive, efficient, and cost-effective manner" (McKenzie, et al, 1989, p. 30), and defined critical path as " a detailed set of desirable patient outcomes expected throughout the episode of illness and the clinical processes required to successfully obtain these outcomes" (McKenzie, et al, 1989, p. 30). They reported results on 84 out of 190 cases of the DRG 106, Coronary Artery Bypass Graft with Catheterization (McKenzie et al., 1989). When comparing the cases managed with the use of critical paths and nurse case management to those not managed by either, costs for the managed (\$29,230) were less than the unmanaged (\$31,663); length of stay was less (11.7 days compared to 12.8 days); the average age was similar (63.3 years compared to 63.5 years); patient satisfaction was enhanced in the managed cases; and the nurse case managers reported higher nurse satisfaction (McKenzie et al., 1989).

Logan Regional Hospital, in Logan, UT (Bair, Griswold, & Head, 1989), described a case management system in which the nurse wrote out a plan of care using the Diagnostic Related Groups of the prospective payment system as a

service line with the various needs and financial components. The components and needs were the acute care services required, length of hospital stay, and anticipated charges, desired treatment, and educational outcomes for each day of hospitalization. Medical discharge criteria and appropriate hospital or community resources appropriate were also included. The nurse then monitored this plan, or critical path, daily. The authors reported a 40% reduction in the difference between costs incurred and costs reimbursed on 10 targeted diagnostic related groups. In addition, they believed that quality did not decrease.

Tucson Medical Center (TMC), in Tucson, AZ has implemented critical paths (Del Togno-Armanasco, Olivas, & Harter, 1989; Olivas, Del Togno-Armanasco, Erickson, & Harter, 1989). The TMC system involves a case management system using a multidisciplinary care delivery process to control the quality of care and the costs of that care with standardized use of resources, length of hospital stay, and identified patient care, caregiver and system outcomes (Olivas et al., 1989). To date, no outcome data have been published.

Rose Medical Center (RMC), in Denver, CO has also implemented critical paths (Dunston, 1990). The RMC system involves case managers who coordinate care for high-risk patients and assess the progress of patients in context of

the individualized critical path. The critical paths described by RMC are the result of the collaborative practice between patients, nurses, and physicians. Empirical results were not reported by RMC.

These authors demonstrated the importance of studying length of hospital stay, described the impact of critical paths on length of stay, and described thoroughly what a critical path is, and how to institute it into the hospital environment. However, in each of these settings, empirical results of the use of critical paths are extremely limited. None of the available literature on critical paths has described either the statistical or clinical significance of the results, (i.e., how significant is a difference of \$1000 or one day?), nor the validity of the critical path or of the measurements of outcomes. Other variables shown to have an effect on length of stay, such as discharge planning, discharge destination, and age (Marchette & Holloman, 1986), have not been considered.

Conceptual Orientation

Managed care, critical paths, and patient outcomes are defined and described in this section. The conceptual orientation is shown in Figure 1. Additionally, the operationalizations of critical path, length of stay, mobility, pain medication regimen, and bowel regimen are presented.

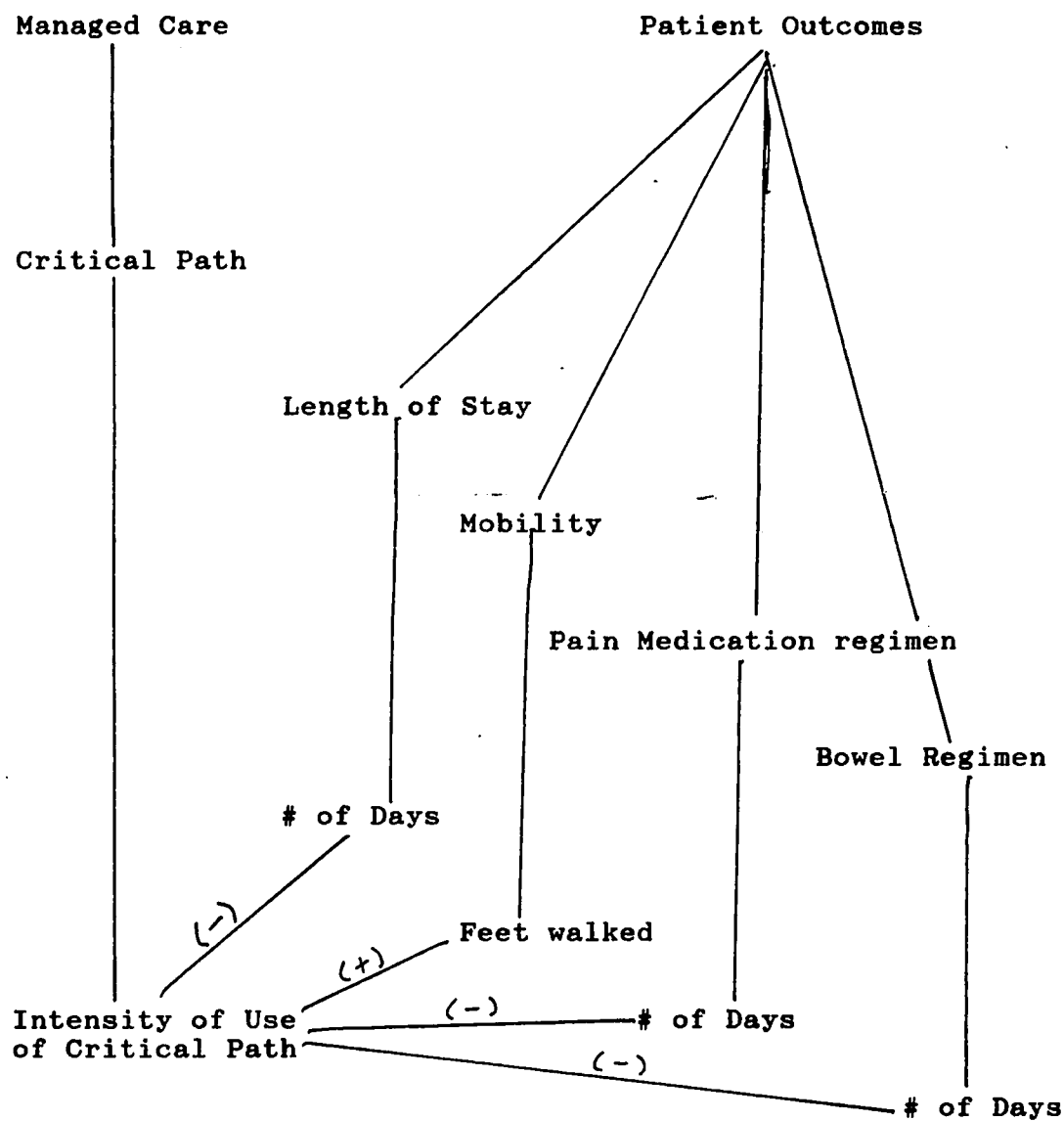


Figure 1. Diagram of conceptual orientation of relationship between managed care and patient outcomes

Managed Care

Managed care has been defined as unit based care organized to achieve specific patient outcomes within a fiscally responsible length of hospital stay while using resources appropriate to the specific case type and the individual patient (Bower, 1988). One tool for managing care is the critical path, defined as collaborative guidelines outlining the time and sequence of the major interventions of nurses, physicians, and other key departments necessary for a particular case-type (Zander, 1989). Managed care has been related to decreased length of stay (Bower, 1988; Coile, 1990; Moccia, 1989; St. Armand, 1988). Critical paths have been related to length of stay, decreased infection rates, increased patient satisfaction, and higher quality outcomes (McKenzie et al., 1989; Zander, 1989; Zander, 1988). Intensity of use of the critical paths will be measured as the percentage of the critical path marked as having been performed by the nurse.

Patient Outcomes

The focus of this study was on the critical path as a tool for managed care, and the relationship between the use of critical paths with patient outcomes. The patient outcomes are length of hospital stay, mobility, pain medication regimen, and bowel regimen.

Length of Stay

Length of hospital stay is defined as the length of time a patient is in the hospital (Howard, Wolff, Perry, New, & Stelton, 1989). "Length of stay and resource allocation [have become] a shorthand version for costs" (Zander, 1988, p. 508), therefore length of hospital stay has become the variable to measure in order to understand cost. In a retrospective chart review, length of hospital stay and previous admission "were the only independent predictors of hospital charge variance" (Howard, et al., 1989, p. 39). Variables significantly related to length of hospital stay include discharge planning, age, discharge destination, preoperative ambulation level, and case management (Cheng, Lau, Hui, Chow, Pun, Ng, & Leong, 1989; Ethridge, 1988; Marchette & Holloman, 1986). Because length of hospital stay is expected to decrease with the use of a critical path (McKenzie et al., 1989; Zander, 1989), one might hypothesize that increased use of the critical path will be negatively related to length of hospital stay (Figure 1). Length of hospital stay was measured by the number of overnights the patient was in the hospital.

Mobility

The three outcomes of mobility, pain medication regimen, and bowel regimen were chosen in relation to the critical paths of total hip and total knee replacements

because these are three of the major outcomes for orthopedic patients. Mobility is defined as the ability to move, usually the ability to ambulate or to transfer from bed to chair and back to bed (Stearns & Brunner, 1987). Mobility is of significance as a patient outcome due to the severity of complications directly related to immobility such as hypovolemia, hypoproteinemia, thrombophlebitis, decreased ventilation, decreased cardiac output, demineralization of the bones, decreased muscle mass, decreased immune system response, constipation, and skin breakdown (Lentz, 1981; Rubin, 1988). As a result, early mobilization is an important factor in the care of the orthopedic patients. The critical path addresses this by outlining the expectations for mobility. For example, on the first postoperative day, the patient is transferred to a chair, with three to four people assisting. On the second postoperative day, the patient begins walking in therapy, and each day progresses to increased independence with the walker. If this expected pattern of care for mobility is outlined day by day on the critical path, and the nurses and patient follow the critical path for increasing mobility, then it would logically follow that mobility would be positively related to increased use of the critical path (Figure 1). Mobility was measured by the number of feet walked the day of discharge.

Pain Medication Regimen

Pain management is essential to increase the patient's ability to tolerate movement and the physical therapy exercises (Nelson et al., 1990). In addition, pain management must progress from intramuscular to oral medications in order to prepare the patient for discharge and independent living at home. The critical path defines the pain medication regimen as the use of parenteral pain medications (intramuscularly or intravenously) for the day of surgery and the first two postoperative days, then changing to oral medications completely by the third postoperative day. This pain medication regimen is based upon physician knowledge and experience with pain control in these patient populations, and the pharmacy standards for the use of narcotics. If this expected pattern of care for pain management is followed according to the critical path, then intramuscular injections would be discontinued on the third day, and continued use of intramuscular injections would be negatively related to the use of the critical path (Figure 1). Use of intramuscular injections was measured by the number of days the patient received injections postoperatively.

Bowel Regimen

Constipation is a frequent discomfort experienced by patients undergoing orthopedic surgeries and is a common

side effect of using narcotics for pain control (Ross, 1990). The critical path defines bowel regimen for preventing constipation as follows: Colace (Docusate Sodium) or the patient's choice of laxative beginning on the first postoperative day, if the patient is tolerating food, with the goal of having a bowel movement by the third day. If this expected pattern of care for bowel regimen is followed according to the critical path, then the first bowel movement would occur within three days of surgery (Carpenito, 1989, McCaffery & Deeb, 1989), and would be positively related to the use of the critical path (Figure 1). This was measured by the number of days preceding the first bowel movement occurred.

Operationalization of the Conceptual Orientation

The intensity of use of the critical path was indexed as a variable since the investigator's experience with the use of the critical paths suggested that although all the nurses were familiar with the critical paths, some nurses used the paths more consistently than others. Assuming that when the nurses used the critical path, they recorded it accurately, the intensity of use was indexed using a percentage, i.e., the number of columns marked was divided by the possible number of columns in the path.

The goals of the critical path have been met when the patient has experienced a hospitalization that meets the

activities outlined by the critical path. For example, on the first day after surgery the patient is expected to transfer from the bed to the chair with three or four nurses maximally assisting; prevention of constipation is begun, and intramuscular pain medications are administered. On the second day after surgery, physical therapy is begun, prevention of constipation continues, and oral pain medications are begun. To achieve the expected length of hospital stay, a total of less than 12 days, patient care progresses along the trajectory established by the critical path.

Length of stay was measured by the total number of nights the subject was in the hospital. Mobility was measured by the number of feet walked the day of discharge. Use of pain medication was measured by the number of days following surgery the subject received the last intramuscular injection. Use of bowel regimen was measured by whether or not the subject had the first bowel movement by the third day following surgery.

Summary

Upon reviewing the literature, critical paths have been suggested to produce a desired change in patient outcomes measured in length of stay by communicating the "time and sequence [of] major interventions of nurses, physicians, and other key departments for a particular case-type" (Zander,

1989, p. 1). However, the existing literature consists primarily of anecdotal notes and case-studies. Patient care outcomes integral to the critical path were seldom documented empirically.

CHAPTER III

METHODOLOGY

The research design, sample, setting, human subjects protection, and data collection protocol are described in this chapter. Additionally, the data analysis plan is presented.

Research Design

A retrospective descriptive design was used to evaluate the relationship between the intensity of the use of a critical path and four patient outcomes which included length of hospital stay, mobility, use of intramuscular injections, and bowel movements. Data were obtained through a retrospective chart review after the patient was discharged from the hospital.

Sample

The sample consisted of 30 adults admitted to the hospital for a total hip replacement and 30 adults admitted for a total knee replacement. The target population was adults age 18 and over who were admitted to and discharged from one orthopedic unit, although the stay might have included some time on another unit due to complications. Patients omitted from the study included those being cared for under the insurance group Family Health Plan due to the use of a different managed care model by that particular group. All patients meeting the study criteria, and

admitted to the hospital between November 1989 and June 1990, were chosen to be included in the study. This period of time was chosen in order to study the use of the critical path from the beginning of its use until the time of decreased admissions in the summer.

Critical paths were in use on the orthopedic unit for the diagnoses of total hip replacement, total knee replacement, endoprosthesis of the hip, and hip pinning. Only patients having a total hip or total knee replacement were selected for this study because the investigator's clinical experience suggested that these had the highest rate of occurrence, and the lack of multiple complications common to the traumatic accidents which often precede endoprosthesis and hip pinning.

Setting

The setting was a 378-bed community and teaching hospital, with an orthopedic unit of 42 beds, located in the southwestern United States. This orthopedic unit instituted critical paths as a pilot study, and the critical paths were voluntarily established and implemented by a group of nurses working on the unit. The unit uses a team approach to nursing with a staff mix including registered nurses with baccalaureate degrees, associate degrees, and diplomas, as well as licensed practical nurses and nursing assistants. A team consists of either a registered nurse and a nursing

assistant, a registered nurse and a licensed practical nurse, or a licensed practical nurse and a nursing assistant. The average ratio of patients to a team is seven to one on the day shift, eight to one on evenings, and 10 to one on nights. The unit has eight, 10 and 12 hour shifts.

Changes in practice resulting from quality assurance activities on the unit, or changes in policy and procedures could have an unknown impact upon the use of critical paths. Field observations suggested these possible changes did not occur during the time period data were collected.

Protection of Human Subjects

The proposal for this study was submitted to the Human Subjects Committee of The University of Arizona for approval prior to data collection (Appendix D). The Clinical Director for Nursing Research at St. Mary's Hospital and Health Center, Tucson, Arizona, reviewed the proposal for access to the medical records (Appendix E). All data were collected after the patients had been discharged, and patient care was not altered by the study. There were no known risks, benefits, or costs to the subjects.

Data Collection Protocol

The investigator reviewed the charts and recorded the data on the data collection form (Appendix F). All data collection occurred within the Medical Records Department.

Another nurse from the orthopedic unit served as a second independent rater to determine interrater reliability. Training sessions occurred until 90% agreement was obtained. Interrater reliability was estimated on every tenth chart. Ninety percent agreement or greater was accepted, with five out of the six charts obtaining 100% reliability. Otherwise, additional training sessions would have been conducted as needed (Burns & Grove, 1987).

The subject identification number, age, gender, ethnicity, and date of admission was obtained from the first page of the medical record, initially produced in the hospital admissions office. The date of surgery was obtained from the physician's dictated operative record. The date of discharge was obtained from the physician's dictated discharge summary. The number of feet walked upon discharge was obtained from the physical therapy notes. The date changed to oral pain medications was obtained from the pro re nato (as needed) medication sheet. The date of first bowel movement was obtained from the nurses' notes in the section for bowel movements.

The intensity of use of the critical paths was obtained from the number of columns marked on the critical path itself. The intensity of use of the critical path was measured by computing the intensity quotient; i.e., counting the number of actual columns marked by the nurses, dividing by the total number of columns possible (7), and multiplying by 100. Critical paths were obtained from the files in the office of the nurse case manager.

Data Analysis

The description of the sample included age, gender, ethnicity, physician, presence of current chronic illness, and presence of complications. Descriptive statistics were used to describe the demographic data. Means, standard deviations, the t-test, and Pearson product-moment correlation coefficients were used to describe continuous variables; frequencies, and percentages were used to describe categorical data. The level of significance was set at $p \leq 0.05$.

Summary

The relationships between the intensity of use of a critical path and the patient outcomes including length of hospital stay, mobility, medication regimen, and bowel regimen were studied using a retrospective descriptive design. The sample consisted of 30 patients hospitalized for a total hip replacement, and 30 patients for a total

knee replacement. All subjects were hospitalized between November 1989 to June 1990. Data were collected retrospectively by chart review after the subjects had been discharged from the hospital. Data were analyzed through the use of descriptive statistics and correlational techniques.

CHAPTER IV

PRESENTATION OF THE DATA

The results of the analysis of the data and discussion of the study's findings are included in Chapter Four. Descriptive statistics were used to describe the sample and the outcome variables. Correlation coefficients were used to answer the research questions. The statistical program used was the SPSS-X for the personal computer.

Description of the Sample

The sample consisted of 60 discharged patients: all patients with total hip replacements (n=30) and a random sample of patients with total knee replacements (n=30). All subjects were hospitalized between November 1989 and June 1990.

The subjects' ages ranged from 32 to 87 years, with a mean age of 69 years (s.d. = 12.61). As shown in Table 1, 20 (33.30 %) of the subjects were male, and 40 (66.70%) were female. Fifty-one (85.00%) were Caucasian, 7 (11.70%) were Hispanic, and 2 (3.30%) were Black.

Prior to hospitalization, 28 (46.70%) of the subjects had no preexisting medical condition, 28 (46.70%) had cardiac disease as a preexisting condition, 3 (5.00%) had diabetes mellitus, and 1

Table 1

Characteristics of the Sample (N=60)

Characteristic	Category	n	%
Sex	Male	20	33.30
	Female	40	66.70
	Total	60	
Ethnicity	Caucasian	51	85.00
	Hispanic	7	11.70
	Black	2	3.30
	Total	60	
Pre-existing Condition			
	None	28	46.70
	Cardiac	28	46.70
	Diabetes	3	5.00
	COPD*	1	1.70
	Total	60	
Complications	None	51	85.00
	Cardiac	7	11.70
	Pulmonary	1	1.70
	Thrombus	1	1.70
	Total	60	

*COPD = Chronic Obstructive Pulmonary Disease

(1.70%) had chronic obstructive pulmonary disease. During the hospitalization, 51 (85.00%) of the subjects did not experience any complications, 7 (11.70%) experienced cardiac difficulties, 1 (1.70%) experienced pulmonary complications, and 1 (1.70%) experienced the complication of a thrombus.

Critical Path

The intensity of use of the critical path was measured by computing the intensity quotient. A range from 0 to 100 was obtained, with a mean of 54.80 (s.d. = 33.60).

The Student's t-test for independent groups was used to determine if any differences existed between the subjects who had total hip replacements and those who had total knee replacements on outcome variables and use of critical path (Table 2). The only significant difference between the two groups was in the intensity of use of the critical path ($t = -.252$, $p = 0.015$). The critical paths were used to a greater extent with patients having a total knee replacement ($\bar{x} = 65.3$; s.d. = 27.9) compared to patients having a total hip replacement ($\bar{x} = 44.3$; s.d. = 36.0).

Table 2Differences in Outcome Variables Between Groups

Outcome Variable	Mean	s. d.	df	t	p
Length of Stay			58	.50	.62
Hips	9.1	3.9			
Knees	8.6	2.6			
Mobility			56	.09	.93
Hips	139.31	141.8			
Knees	136.5	85.8			
Pain Medication Regimen			58	.00	1.00
Hips	3.2	1.8			
Knees	3.2	2.5			
Bowel Regimen			53	-1.26	.21
Hips	3.5	1.5			
Knees	4.0	1.7			

Description of Outcome Variables

Length of Stay

The length of hospital stay was obtained by counting the number of nights the subject was in the hospital, consistent with the billing method used by the hospital. As shown in Table 3, the length of stay ranged from two to 23 days, with a mean of 8.90 days (s.d. = 3.30). This mean is less than the maximum recommended length of stay of 11.9 days of the critical path and the prospective payment insurance system.

Mobility

As shown in Table 3, the distance walked ranged from 0 to 750 feet, with a mean of 137.80 feet (s.d. = 115.30). One person never walked before being discharged; in this case, the patient was discharged to a nursing home. Forty-one (68.30%) of the subjects met the criterion for discharge as identified in the critical path, walking at least 100 feet. Seventeen subjects (28.30%) did not meet this criterion. Two (3.33%) did not have any data recorded on the distance walked before discharge.

Pain Medication Regimen

The critical path specified the second day postoperatively for beginning oral pain medications, and the third day for continuing solely on oral pain

medications. As shown in Table 3, the number of days on intramuscular injections before continuing solely on oral pain medications ranged from 0 to 9 days, with a mean of 3.20 days (s.d. = 2.20). Thirty-seven (61.70%) of the subjects met the two-day criterion, while 23 (38.30%) did not.

Bowel Regimen

The critical path specified a bowel regimen that began when the patient could take food and drink by mouth, with the intent that a bowel movement would occur within the first three days postoperatively. As shown in Table 3, the mean length of time before having a bowel movement was 3.7 days (s.d. = 1.60), with a range of one to nine days.

Twenty-five subjects (41.70%) met the criterion for having the first bowel movement on or by the third day postoperatively; 30 (50%) did not meet this criterion. For five (8.30%) of the subjects, there were no data available in the chart.

Findings Based on the Research Questions

The first research question asked, "What is the relationship between the intensity of use of critical paths and the length of hospital stay for patients having total hip or total knee replacements?" Because there was a difference in use of the critical path

Table 3

Description of Outcome Variables

Outcome Variable	N	mean	s. d.	range
Length of stay (days)	60	8.8	3.3	2-23
Mobility (feet)	58	137.8	115.3	0-750
Medication Regimen (days)	60	3.2	2.2	0-9
Bowel Regimen (days)	55	3.7	1.6	1-9

between subjects having total hip replacements and those having total knee replacements, separate correlations were computed. For the subjects having total hip replacements, $r = -0.28$ ($p = 0.08$); for the subjects having total knee replacements, $r = -0.04$ ($p = 0.42$), (Table 4). There were no statistically significant relationships in either group. However, the correlation was in the predicted direction for subjects having total hip replacements.

The second research question asked, "What is the relationship between the intensity of use of critical paths and the mobility at discharge for patients having

Table 4

Correlations of Outcome Variables with Intensity of Use
of Critical Path

<u>Outcome Variable</u>	<u>Pearson r</u>	<u>p*</u>
Length of stay		
Hips	-.28	.08
Knees	-.04	.42
Mobility		
Hips	.05	.40
Knees	.22	.09
Medication Regimen		
Hips	-.24	.12
Knees	-.13	.20
Bowel Regimen		
Hips	-.25	.10
Knees	-.16	.20

*p \leq 0.05

total hip or total knee replacements?" For subjects having total hip replacement, $r = 0.05$ ($p = 0.40$), and for total knee replacements, $r = 0.22$ ($p = 0.09$), (Table 4). There was no statistically significant relationship in either group, although the correlation was in the predicted direction for subjects having total knee replacements.

The third research question asked, "What is the relationship between the intensity of use of critical paths and the number of postoperative days intramuscular injections were administered for patients having total hip or total knee replacements?" For the subjects having total hip replacement, $r = -0.24$ ($p = 0.12$), and for total knee replacements, $r = -0.13$ ($p = 0.20$), (Table 4). There was not a statistically significant relationship in either group. However, both relationships were negative as predicted.

The fourth research questions asked, "What is the relationship between the intensity of use of critical paths and the number of postoperative days before achievement of bowel elimination for patients having total hip or total knee replacements?" For subjects having total hip replacements, $r = -0.25$ ($p = 0.10$), and for total knee replacements, $r = -0.16$ ($p = 0.20$), (Table 4). There was no statistically significant

relationship in either group. Again, the relationships were negative, as predicted.

Additional Findings

One additional finding was a positive relationship between length of hospital stay and pain medication regimen for subjects having total hip replacements ($r = 0.47$, $p = .01$), and for subjects having total knee replacements $r = 0.56$ ($p = .01$). As use of intramuscular injections increased by the day, length of stay also increased.

Summary

The two groups, patients having total hip replacements and patients having total knee replacements, were compared for differences in patient outcomes and use of critical paths. The critical paths were used significantly more with total knee replacements than with total hip replacements. Relationships between the intensity of use of critical paths and the patient outcomes of length of stay, mobility, pain medication regimen, and bowel regimen were not documented in either the two groups, total hip and total knee replacements. However, some of the correlations were in the predicted direction.

CHAPTER V

INTERPRETATIONS AND IMPLICATIONS

The interpretation of the findings presented in chapter four are presented in this chapter. The limitations of the study are discussed, and the implications for nursing practice and nursing research are presented.

Interpretation of the Findings

Research Questions

Results related to the first research question, "What is the relationship between the intensity of use of critical paths and the length of hospital stay for patients having total hip or total knee replacements?" suggested there were no statistically significant relationships in the two groups: subjects having total hip replacements ($r = -0.28$, $p = 0.08$) or subjects having total knee replacements ($r = -0.04$, $p = 0.42$). Although there was a trend in the group having total hip replacements towards a low, negative relationship; that is, as use of the critical path increased, length of stay decreased. An r of 0.10 to 0.30 can be considered a weak relationship, with the trend supported by a probability less than or equal to .10 (Burns & Grove, 1987). This trend is supported by the results reported by McKenzie, et al. (1989), and Zander

(1989) who reported decreased length of stay associated with the use of critical paths.

One possible reason a significant relationship was not found could be due to a lack of sensitivity in measuring the intensity of use of the critical path. The nurses could have practiced in accordance with the critical path during patient care, without marking that use on the critical path. This would account for the critical path being followed without relating to the intensity of use of the critical path.

Also, the nurses may not have valued the critical paths as a tool for patient care, and as a consequence did not use them in patient care, but marked them to conform to expectations. This would have resulted in measurement error of intensity of use of the critical path. In addition, the small sample size may have decreased the likelihood of detecting a significant relationship between intensity of use and length of stay.

Results related to the second research question, "What is the relationship between the intensity of use of critical paths and the mobility at discharge for patients having total hip or total knee replacements?" suggested there were no significant relationships between intensity of use and mobility in either of the

two groups: subjects having total hip replacements ($r = +0.05$, $p = 0.40$) or subjects having total knee replacements ($r = +0.22$, $p = 0.09$). However, there was a trend in the group having total knee replacements towards a low, positive relationship; that is, as use of the critical path increased, mobility as number of feet walked also increased. This positive trend supports the hypothesized relationship between critical paths and mobility. Zander (1989) stated "quality outcomes were met" (p. 24) with the use of critical paths, lending support to this trend. Another measurement of mobility such as functional independence in transfers from bed to chair, or activity tolerance, may have shown a stronger relationship to use of the critical path.

Results related to the third research question, "What is the relationship between the intensity of use of critical paths and the number of postoperative days intramuscular injections are administered for patients having total hip or total knee replacements?" again suggested there were no significant relationships between intensity of use and pain medication regimen in either of the two groups: subjects having total hip replacements ($r = -0.24$, $p = 0.12$) or subjects having total knee replacements ($r = -0.13$, $p = 0.20$). The

lack of support for a relationship may be due to the lack of sensitivity in measuring the intensity of use of the critical path, and the lack of an adequate sample size to detect a significant relationship. Another method of measuring the medication regimen may have been more effective. For example, a questionnaire describing the intensity of pain with the use of pain medication, whether intramuscular or oral, could be used.

Results related to the fourth research question, "What is the relationship between the intensity of use of critical paths and the number of postoperative days before achievement of bowel elimination for patients having total hip or total knee replacements?" suggested there were no significant relationships between intensity of use and bowel regimen in either of the two groups: subjects having total hip replacements ($r = -0.25$, $p = 0.10$) or subjects having total knee replacements ($r = -0.16$, $p = 0.20$). However, a weak relationship existed with subjects having total hip replacements. As use of the critical path increased, bowel elimination occurred earlier; that is, usually by the third postoperative day. This negative trend supports the hypothesized relationship and the quality outcomes described by Zander (1989).

Additional Findings

The positive relationship between length of stay and the medication regimen for subjects having total hip replacements ($r = 0.47$, $p = .01$), and for subjects having total knee replacements $r = 0.56$ ($p = .01$) necessitates further study to determine if these are spurious correlations or confounded correlations. For example, the degree of illness or the amount of tissue manipulation during surgery may increase pain but may also increase length of stay. One possible research question is: "How does the patient's perception of pain and the control of pain interact with his/her ability to recover from surgery?"

Limitations of the Study

Two major limitations were identified in this study: generalizability and possible measurement error in the use of critical paths. Generalizability of the results of the study is limited due to the collection of data in one hospital. A larger sample, a random sample, and different patient population groups would increase representativeness (Burns & Grove, 1987). The use of critical paths needs to be measured in different hospital settings.

Measurement error in the use of the critical path was also a possibility because the nurses may not have

documented their use of the critical path correctly although they may have used the critical path during patient care. If this occurred, the intensity of use of the critical path would be higher than the data analysis showed, and the relationships with length of hospital stay, mobility, medication regimen, and bowel regimen may be stronger than indicated in the results of this study.

Implications for Practice

The directions of the relationships between intensity of use of the critical paths and length of stay, mobility, and bowel regimen were supported by the trends in the data, although significant relationships were not found. Three recommendations for practice are, assessment of variance with use of critical path, use of a nurse case manager with critical path, and continued education of nurses about critical paths.

If documentation of the critical path was expected with assessment of variance, these trends could become measurable as significant relationships. For example, the nurse's note might read "Care according to critical path with no variances noted", or "Care according to critical path; one variance noted: patient did not attend physical therapy" followed by the assessment and plan to correct the variance. This type of charting

would strengthen the use of the critical path, and the measurement of that use. This type of charting would also support the use of critical paths as accepted by JCAHO, as a substitute for nursing care plans for the uncomplicated admissions, and would individualize the critical paths to each patient. Otherwise, if a patient varies from the critical path, the nurses may abandon the critical path and the interventions it outlines, some or all of which may still apply. This would weaken the critical path as a tool for managed care.

The use of nurse case management with the critical path may also strengthen its value and relationship with patient outcomes. Nurse case management may provide consistent assessment, documentation, and reinforcement with use of the critical paths.

Further education of nurses about managed care and the use of critical paths as a tool may strengthen the nurse's ability to effect patient outcomes and possibly lead to identifiable relationships between critical paths and patient outcomes such as length of stay, mobility, pain medication regimen, bowel regimen.

Implications for Research

Critical paths are being adopted for many diagnostic categories in many hospitals in the United

States. Very little research has been completed that identifies the impact of critical paths on quality and cost of health care. This study failed to show any significant relationships between the use of critical paths and patient outcomes. However, it may be possible that critical paths used within different systems of nursing care, such as primary nursing or nurse case management, may show significant relationships to patient outcomes.

Another form of measurement of use of critical paths may be more reliable. For example, one might use a questionnaire filled out by the nurses on how the critical path was used during shift report or other documentation of care given and variance correction might be used.

Generalizability may be strengthened through randomized and controlled clinical trials, with multiple replications with different patient groups within different hospitals. These studies would need to control for use of the critical path, and characteristics of the patient population shown to affect outcomes, such as discharge planning, age, discharge destination, preoperative ambulation level, and case management (Cheng, et al., 1989; Ethridge, 1988; Marchette & Holloman, 1986).

Summary

The findings from this study did not support the predicted relationships between intensity of use of critical paths and patient outcomes. Limitations included the measurement of the use of the critical path, and the collection of data within one hospital. Recommendations for practice include further education of nurses, continued reinforcement of use of critical paths with increased documentation of corrected variance, and use of critical paths with consistent evaluation by nurse case managers. Recommendations for research include increasing sensitivity of measurement of use of critical paths, and data collection in a variety of hospital systems.

APPENDIX A

CONCEPTUAL DEFINITION OF TERMS

Managed Care: Unit based care organized to achieve specific patient outcomes within a fiscally responsible length of hospital stay while using resources appropriate to the specific case type and the individual patient (Bower, 1988).

Case Management: Delivery system of care in which the nurse assesses the patient and family, develops the nursing care plan, activates the interventions, coordinates and collaborates with the interdisciplinary team and evaluates outcomes (Ethridge & Lamb, 1989).

Critical Path: Collaborative guidelines which outline the time and sequence of the major interventions of nurses, physicians, and other key departments necessary for a particular case-type (Zander, 1989).

Length of Hospital Stay: The length of time a patient is in the hospital (Chapman, 1990).

Mobility: Ability to move, to ambulate or transfer from bed to chair and back to bed (Stearns & Brunner, 1987).

Pain Medication Regimen: Use of parenteral pain medications (intramuscularly or intravenously) for the day of surgery and the first two days postoperatively; then changing to oral medication completely by the third postoperative day (St. Mary's Critical pathways for Total Hip and Knee Replacements, 1989).

Bowel Regimen: Colace (Docusate Sodium) or the patient's choice of laxative beginning on the first postoperative day, if patient is tolerating food, (St. Mary's Critical pathways for Total Hip and Knee Replacements, 1989).

APPENDIX B
CRITICAL PATH FOR TOTAL HIP

DRG: _____ HCFA LOS: _____ EXP LOS: _____		CSM - ORTHOPAEDIC UNIT					
MD: _____ PRIMARY RN: _____		TOTAL HIP/CRITICAL PATH					
DAY/DATE	PRE-OP	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6-10
CONSULTS	INTEREST ANESTHESIA	SURGERY R.T.		IPT EVAL: GAIT ITRNG: EXERCISE PROGRAM	SOCIAL SERVICE	DOT EVAL FOR ADL's, HIP PRECAUTIONS & EQUIPMENT NEEDS	
TESTS	UA, SEDRATE IPT/PTT, CBC, TXM, KOA 20, EKG, CXR	HIP XRAY H&H			ASSESS FOR CONT H&H		
ACTIVITY	AS TOLERATED	IRON/ABCs 02 ANKLE PUMPS BEDREST, TURN Q2 W/2 ASSIST	MAX 3-4 ASST PIVOT/ LIFT TO BSC/MC INHS WALKER HIP PRECAUTIONS	12-3 MAX ASST PIVOT 12-3 MOD ASST PIVOT 1W/WALKER TO BSC/MC TO MC; ENC ^ INDEP IPT BID PMS TO FMS AS TOL EXERCISES: QUADS, GLUTES,	IRON/ABCs 04	AMBULATION TO FMS AS TOL	
NURSING INTERVENTIONS	ADMIT TO HOSPITAL ASSESSMENT OBTAIN CONSENT BETADINE SCRUBS X3 <i>Egg on wall</i>	TEDs OR BCDs SKIN CARE Q8 ABDUCTION PILLON ASSESSMENT Q4 ICE Q2 HRS INC SPIRO/CDB Q2 ILO Q8 HEMOVAC MANAGEMENT Q4 & PRN IVS Q4 X48 HRS POST-OP ICBM CHECKS Q2 X48 IDRBG CHECK Q2 ICATH IF NO VD IN 18-10 HRS POST-OP			DC TEDs OR BCDs ABDUCTION PILLON WHEN IN BED ASSESSMENT Q8 ICE p PT & PRN INC SPIRO/CDB Q4 & PRN IDC ILO IDC HEMOVAC IVS Q8 ICBM CHECKS Q8 & PRN IDRBG CHECK Q4 ASSESS FOR TRANSFUSION REACTION IF TRANSFUSED BEGIN BLADDER TRNG IDC FOLEY CATHETER IDC MAINTENANCE IV & IV ANTIBIOTICS ASSESS FOR DEPRESSION/ SITUATIONAL/DEVELOPMENT CRISIS RELATED TO EXTENDED HOSPITALIZATION		
MEDICATIONS	AS AT HOME OR AS IPRESCRIBED IV ANTIBIOTICS AS PRESCRIBED ISOB	ASSESS IV SITE Q1 HR MAINTENANCE IV FLUIDS IV ANTIBIOTICS AS PRESCRIBED ID2 NGHT TITRATED TO 90% O2 SAT AS PRESCRIBED IV/IN PAIN MEDS AS PRESCRIBED ANTHETICS AS ORD BEGIN BOWEL REGIMEN COLACE 100 MG BID PRUNE JC @ ME		BEGIN PO PAIN MEDS PO PAIN MEDS	DC DRESSING ASSESS FOR DC OF IV FLOS & ANTIBIOTICS PO ANTIBIOTICS AS PRESCRIBED ASSESS FOR DC OF O2		
DIET	AS AT HOME	NO ADV AS TOL - ENCOURAGE FLUIDS & FIBER		NO BM DULCOLAX IF NO BM FOLLOW W/ FLEETS IF NO BM			
DISCHARGE PLANNING	ASSESS SITUATION HOME & MAKE APPROP REFERRALS			PT, ACCESS FOR POSS ECF, CONTACT SOCIAL SERVICES INSTRUCT ON: RATIONAL OF FEESOL TRANSFUSION & S/S OF REACT OF FE+/ BLOOD BOWEL REGIMEN	ASSESS FOR WALKER/ CRUTCHES OR TOILET SEAT EXTENDER FOR DISCHARGE REINFORCE P.T.s INSTRUCTIONS	OBTAIN DC ORDE IDC MEDS & F/U APPOINTMENTS	
NURSING INTERVENTIONS/TEACHING	PROVIDE VIDEO, ORIENT TO ROOM, INSTRUCTIONS BETADINE SCRUBS, POST-OP EXPECT., ICLB, TURNING, EXERCISES, ROM ABCs & EXP. LOS. PROVIDE OPPORTUNITY TO EXPRESS FEELINGS, THOUGHTS & CONCERNS	REVIEW PRE-OP TCHG; ICLB, TURNING, ROM REORIENT TO ROOM INSTRUCT ON: IV, ANTIBIOTICS, PAIN MEDS, VOIDING PROC, BODY MECH, USE OF TRAPEZE				INSTRUCT ON S/ OF INFECTION, WOUND/SKIN CAR PROVIDE WRITTEN DISCHA INSTRUCTIONS	
		ASSESS PREVIOUS DAYS TEACHING & EVAL FOR EFFECTIVENESS/AREAS FOR CONT TEACHING					

ADDRESSOGRAPH

APPENDIX C
CRITICAL PATH FOR TOTAL KNEE

APPENDIX D
HUMAN SUBJECTS APPROVAL

Human Subject Committee



1690 N. Warren (Bldg. 526B)
Tucson, Arizona 85724
(602) 626-6721 or 626-7575

July 18, 1990

Sharon Ann Knutson, R.N.
c/c Rose M. Gerber, R.N., Ph.D.
College of Nursing
University of Arizona

RE: CLINICAL PATHS: AN EVALUATION OF PATIENT OUTCOME

Dear Ms. Knutson:

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

Consult your department chairman for approval, the requirement of a subjects' consent form and any other departmental guidelines.

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

Sincerely yours,

A handwritten signature in cursive script, appearing to read "W. F. Denny".

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

WFD:rs

cc: Departmental/College Review Committee

APPENDIX E
LETTER TO AGENCY

7741 N. Nicole Pl.
Tucson, AZ 85741
June 10, 1990

Gerri Lamb, RN, PhD
Clinical Director for Nursing Research
St. Mary's Hospital and Health Center
1601 W. St. Mary's Rd.
Tucson, AZ 85745

Dear Dr. Lamb:

In order to complete the requirements for a Master of Science Degree in Nursing from the University of Arizona, I would like to collect the data for my thesis from medical records at your institution.

The title of my thesis is "Critical Paths: An Evaluation of Patient Outcomes" and data will be collected on all patients who had total hip replacements within the time frame of February 1990 to May 1990.

With your permission, I would like to begin collecting data August 1990 through September 1990 within the Medical Records Department.

Enclosed is the application, and a copy of the Human Subjects Approval from the University of Arizona.

Thank you for any consideration given the request. If you have any questions I may be reached at 744-0855.

Sincerely,

Sharon A. Knutson, RN
Graduate Student
University of Arizona
College of Nursing

APPENDIX F
DATA COLLECTION FORM

Subject identification number:

Age, in years:

Sex: ☐ male
☐ female

Ethnicity: ☐ Anglo
☐ Hispanic
☐ Native American
☐ Other

Current chronic illness: ☐ diabetes
☐ cardiac
☐ COPD

Complications: ☐ pulmonary
☐ cardiac
☐ thrombus

Date of admission:

Date of surgery:

Date of discharge:

Type of surgery: ☐ Total Hip ☐ Total Knee

Time of Use:

Date of first bowel movement: _____ # of days: _____
critical path met: ☐ no
☐ yes

Date changed to oral pain medications: _____ # of days: _____
critical path met: ☐ no
☐ yes

of feet walked upon discharge: _____
date walked 100': _____
critical path met: ☐ no
☐ yes

Intensity of use of Critical path: _____ number of
columns marked,
divided by 7 = _____

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