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UNIVERSITY OF SAN DIEGO

Hahn School of Nursing and Health Science

DOCTOR OF PHILOSOPHY

A RETROSPECTIVE EVALUATION OF THE PLANETREE PATIENT CENTERED MODEL OF CARE PROGRAM'S IMPACT ON INPATIENT QUALITY OUTCOMES

by

Susan Stone

A dissertation presented to the

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In partial fulfillment of the

Requirement for the degree

DOCTOR OF PHILOSPHY IN NURSING

July/2006

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Planetree

Abstract

This retrospective quasi experimental study evaluated the effectiveness of Planetree's patient-centered model of care. Donabedian's model linking structure and process to outcome was used to frame this study. The structure variable is the inpatient acute care hospital unit and the process variable consists of the Planetree patient-centered model of care. Outcomes are (1) patient satisfaction, (2) length of stay, (3) readmission, (4) cost per case, and (5) productive nursing hours per patient day.

All data for patient satisfaction, length of stay, readmission, cost per case and productive nurse hours per patient day were retrospective, no participant recruitment was needed. Data were obtained electronically by the primary investigator from multihospital system and individual entity organizational fiscal and clinical data bases following approval from the educational and organizational Institutional Review Boards.

When comparing the control unit to the treatment unit the questions to be addressed were: (1) what is the impact of the Planetree patient-centered model of care on patient satisfaction, (2) what is the impact of the Planetree patient-centered model of care on clinical outcomes (length of stay and readmission), and (3) what is the impact of the Planetree patient-centered model of care on the cost of providing care (cost per case and productive nursing hours per patient day).

The patient satisfaction composite mean score evaluation, length of stay evaluation and the cost per case evaluation demonstrate that the treatment unit is different from the control group (p=<.05 with Eta squared = >.01). This evidence validates that the Planetree patient-centered model of care had a positive impact on patient satisfaction, length of stay and cost per case.

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August 14, 2007

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Susan Stone

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CHAPTER 1

Introduction

Background and Significance

This study evaluated the effectiveness of the Planetree patient-centered model of care program. The Planetree patient-centered model of care promotes patient education, and patient and family involvement within the walls of a nurturing and homelike hospital where the mind, body and spirit are fostered. Two reports from the Institute of Medicine, "Crossing the Quality Chasm: A New Health System for the 21st Century" and "Improving the Quality of Long-Term Care", report increasing consumerism and ever increasing health care financial costs as factors that have propelled patient-centered care forward as an imperative for all health care consumers and providers (Committee on Quality Health Care in America, 2001; Wunderlich & Kohler, 2001). The advances in technology, knowledge and information access have propelled the delivery of health care into a new realm. While these advances have occurred, health care has not adequately improved the mechanisms for delivering care and in many cases the delivery of care has remained unchanged over the past several decades (Committee on Quality Health Care in America, 2001; Frampton, Gilpin, & Charmel, 2003; Gerteis, Edgman-Levitan, Daley, & Delbanco, 1993).

The Planetree patient-centered model of care was developed by a patient in the late 1970's to demystify, humanize and personalize the healthcare experience. The model includes human interaction, architectural & interior design, food and nutrition, patient and family education, family involvement, spirituality, human touch, healing arts,

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complementary/alternative therapy and healthy communities (Frampton, Gilpin, & Charmel, 2003).

Statement of the Problem

The current healthcare industry practices from a disease centered – practitioner centered model. This model has failed to meet the needs of healthcare consumers (Gerteis, Edgman-Levitan, Daley, & Delbanco, 1993). Communication problems occur as a result of health care providers focusing on diseases and their management, rather than people, their lives and their health problems. Greater understanding is needed within the healthcare industry regarding the impact patient-centered care models have on hospitalized patients. Descriptive articles have been published indicating hospital units practicing patient-centered care generally emphasize greater involvement of the patient, and personalizing care with a focus on patient education (Martin et al., 1998; Roter, 1987).

The Agency for Healthcare Research and Quality (AHRQ) is currently funding research focused on improving patient-centered care. Through the new AHRQ program entitled "Patient-Centered Care: Customizing Care to Meet Patient's Needs" care processes with greater patient empowerment, improved patient-provider interaction, quality and outcomes are being developed (Agency for, 2002). Concurrently, the Institute for Healthcare Improvement (IHI) in partnership with The Robert Wood Johnson Foundation (RWJF), launched "Transforming Care at the Bedside." Through this pilot project, improvements in patient-centeredness, safety and reliability, care team vitality and increased value are being tested and refined (Rutherford, Lee, & Greiner, 2004). Patient-centered care has now been included by the Institute of Medicine as one of the six

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aims of quality and the Centers for Medicare and Medicaid Services (CMS) have announced that beginning in 2008 full payment of hospital provided outpatient services will be contingent on publically reporting patient satisfaction (Committee on Quality Health Care in America, 2001; Centers for Medicare, 2006).

A full statement of the problem includes key points driven largely by consumer, health plan and legislative demand for immediate and ongoing health care reform. First, hospital financial and operational decision makers require proven relevant data to make organizational resource and budgetary decisions. Information demonstrating the cost and quality effectiveness of patient-centered care models is essential for nursing and health care managers.

Second, consumers, corporate buyers of employee health care benefits, regulators and legislators are now seeking information upon which to base provider selection. Data reporting for public display and interpretation is required to maintain full reimbursement from governmental insurers. Cost and quality data are consistently used when purchasers and providers negotiate.

In summary, research assessing the quality impact of hospital based patient-centered care programs is scarce. The current study supports the need to move the field of investigation regarding hospital based patient-centered care forward as a research imperative.

Statement of Purpose

The purpose of this study was to use existing data to assess the impact of Planetree's patient-centered model of care on quality outcomes. Because systematic study of the Planetree model of care at this level is in its beginning stages a need exists for such

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investigations. Knowledge about patient-centered programs is pertinent to nursing administration and healthcare business decision making. Previous research has demonstrated that the traditional health care process is not meeting the needs of patients and their families. Patients and their families have described a more patient-centered approach as key to meeting their needs. Character*i*stics of the desired model include: respect for patients, coordination of care, patient education, physical comfort, emotional support and involvement of family and friends. The Planetree model of care provides a framework and operational guidance on how to implement programs targeting these key areas. This study used descriptive statistics to describe the sample and inferential statistical techniques to analyze the impact of the Planetree care model on quality outcomes.

Significance to Nursing

This study has relevance to nursing science specific to nursing administration. Research based evaluation is necessary to assess, understand and expand patient-centered care and nursing science. This study supports the expanded field of nursing investigation at the organizational level by examining the impact of a defined patient model of care, Planetree patient-centered care, on the organizational nursing specific performance. Advancement of nursing science for the nursing management domain occurs through research at this level (Meleis, 1997/2007).

Findings from this study contribute to theory development for nursing administration. Nursing administration theory is considered in terms of the structure and organization of care and issues pertinent to nursing management. In 1989, Scalzi and Anderson described a meta-theory for nursing administration research. This hierarchical model

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contains levels of nursing services progressing from the individual nurse/patient to the context of the entire organization. Each level more highly integrates nursing with the health care system, therefore changing the relevant perspective and research variables. This study is an example of a Stage 3: System View Model because the nursing and organizational domains of concern are interdependent rather than separate and distinct competing elements. The nursing administrator assessment and intervention are from a system level rather than from the level of direct patient contact. The goal at this Stage 3: System View is to enhance quality nursing and organizational effectiveness rather than one or the other (Scalzi & Anderson, 1989).

Data collection, data aggregation, and data analysis at the institutional level encompasses some of the more difficult nursing administration challenges. Familiarity with these data related issues is necessary as quality outcome reporting has now become required by regulatory agencies and health plans, and is available for public review. Healthcare industry and specifically nursing related patient care model reform demands institutional and inter-hospital data comparison of nursing related performance concepts such as quality outcomes and patient-centered care models.

Effectively implementing patient-centered care rests on the shoulders of all nursing administrators. The link between patient-centered care and quality outcomes such as patient satisfaction, length of stay, readmission, cost per case and productive nursing hours per patient day has been postulated, however to date little to no research has been conducted examining this issue. The need clearly exists to examine the questions in this study.

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CHAPTER 2

Review of Relevant Literature

The review of the literature was conducted through the use of library and internet based computerized resources using key words such as patient satisfaction, patientcentered care, quality of care, inpatient care, and health consumer. Additional references were obtained through bibliographies, lists of journals, books, reports, and personal communication. References written in English were included. The review is presented under three broad headings: patient satisfaction, patient-centered-care and Planetree patient-centered care.

Patient Satisfaction

The consumer revolution has changed the face of business from an industry and institution focus to the primacy of the consumer. Product delivery in nearly every facet of our culture has been transformed to meet the needs of the individual customer. Today nearly all purchases including homes, cars, computers and even coffee are offered with custom options. Individuals may choose from hundreds and even thousands of possible options resulting in an individually customized product. Business growth and financial viability are critically linked to customer loyalty and customer satisfaction. Managed care is now helping patients use the health system instead of denying access. Consumers are responsible for more of their health related expenses as employers shift the financial burden to enrollees. Healthcare facilities and organizations are competing against one another on multiple quality indicators; this information is publically reported on websites and patient satisfaction will soon be added to these many critical measures of success (Naisbett & Aburdene, 1990; Society for, 2003).

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Healthcare consumers contribute to the definition of quality by influencing how "health" and "healthcare" are defined. Collectively, and as individuals, health care consumers define quality by appraising the expected benefits and risks to health. By expressing their values and expectations regarding the management of the interpersonal process, consumers are the primary definers of healthcare quality. Patient satisfaction provides information on the success or failure of the provider to meet the expectations of the patient and represents the patient's assessment of the quality of care. Patient satisfaction is an element of psychological health and therefore is one objective of care (Committee on Quality Health Care in America, 2001; Centers for Medicare, 2006; Donabedian, 1980; Press, 2002; The Joint Commission; 2006). Determinants of patient satisfaction have been reported in previous studies and include age, education, and clinical condition-health status, relationship between health care providers and patients and hospital size (Cleary et al., 1991; Covinsky et al., 1998; Finkelstein, Singh, Silvers, Neuhauser, & Rosenthal, 1998; Gesell & Wolosin, 2004; Hall & Dorman, 1990; Hargraves et al., 2001; Kane, Maciejewski, & Finch, 1997; Larsen & Rootman, 1976).

In the early 1950's research describing patient perceptions of medical providers began. Rose Laub Coser, a sociologist, observed patient, employee, and physician behavior on a medical surgical unit in an Eastern United States metropolitan hospital while wearing a white lab coat. In addition, she conducted 51 post-discharge interviews. Her findings described two patient types. A little over half of the patients viewed the hospital as a time-limited technical provider of care, and viewed the physician's goodness within technical terms and themselves as autonomous participants in their health experience. Less than half the patients viewed the hospital as another home, and viewed

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the physician's goodness in terms of personal interest, caring and kindness and themselves a dependent unquestioning recipient (Coser, 1956). Shiloh, in 1965, also described two differing patient types: "equalitarian" and "hierarchal" (Shiloh, 1965). Equalitarian patients jointly participated during their hospitalization to achieve an efficient successful treatment with prompt discharge while hierarchal patients had similar goals but they took on a more subservient hospital role. More recent studies indicate the passive compliance of the "good" patient may be the result of learned helplessness and increased during lengthy hospitalizations even as the acute illness resolved (Raps, Jonas, Peterson, & Seligman, 1982). While patient type and behavior may play a part in how care is perceived, researchers began to identify key factors associated with patient satisfaction.

In 1961, Freidson interviewed members of a hospital-based prepaid practice. The participants represented a wide range of occupations, varied education levels, with diverse religious and ethnic backgrounds. Personal interest and competence were both reported as equally important attributes of good care (Freidson, 1961). These findings have been supported in subsequent outpatient clinic based research with one additional yet lesser impactful category being identified: cost and convenience (Hulka, Zyzanski, Cassel, & Thompson, 1971;; Ware & Snyder, 1975; Zyzanski, Hulka, & Cassel, 1974).

Over the past fifteen to twenty years hospitals have been routinely measuring patient satisfaction; however the majority of published research analyzing and evaluating patient satisfaction has been limited to the outpatient setting. Hospitals and healthcare organizations often developed their own satisfaction instruments and analyzed their own data. As a result, wide variations in definition, measurement, reliability, and validity plagued the measurement of patient satisfaction (Strasser & Davis, 1991; Yi, 1991).

In 1988, a nation-wide telephone quality survey of 6,455 adults recently discharged from the medical surgical services of 62 large public and not-for-profit hospitals revealed 45% of patients were not told about their daily routine, 39% of patients did not have a trusting relationship with any hospital staff other than their primary physician, more than 25% felt the nurses seemed overworked and too busy to care for them, 20% felt hospital staff did not go out of their way to meet their needs, approximately 20% felt they either had no physician in charge of their care or that the physician was not available to answer questions, they were not told how much pain to expect, or they were not told whom to ask for help. Almost 17% of patients worried because they were not told how much they would have to pay. When preparing for discharge, 30% of patients said they were not informed about foods they could or could not eat nor the important side effects of their medications and 25% of patients were not told about danger signals or when they could resume normal activities. Using the patient characteristics as the factor and the problem score as the dependent variable, an analysis was conducted using multiple linear regression to control for potentially confounding factors. The analysis found the reports of problems were related to patient factors such as age, health status, and socioeconomic status. Nearly twice as many problem scores were reported by patients reporting poor health when compared to the problem scores of patients reporting excellent health (p < 0.01). Poor patients with an annual income of equal to or less than \$7500, and patients of color, both black and Hispanic also reported significantly higher problem scores (p

<0.01) and although younger patients between the ages of eighteen to forty four, and women also reported more problems the difference was not as large (Cleary et al., 1991).

To further understand the relationship between health status and patient satisfaction a longitudinal study examined the health status upon admission, health status upon discharge and patient satisfaction upon discharge among 592 older (79 years or older) medical patients hospitalized in a teaching hospital. Using multiple linear regression and controlling for age, gender, race, activities of daily living and co-morbidities the analysis demonstrated that better health status on admission (p .04) and better/improved health status at discharge (p <.001) were associated with greater patient satisfaction. (Covinsky et al., 1998).

In response to the growing dissatisfaction with healthcare, The Consumer Assessment of Healthcare Providers and Systems (CAHPS) is a public-private initiative initially launched to develop standardized surveys to measure health plan enrollee and patient satisfaction. This initial goal was expanded to included inpatient hospital satisfaction survey development.

In its first phase (CAHPS I), reports, questionnaires, data collection protocols and analysis methods were used to help purchasers and consumers select a health plan. Over time, the focus has expanded to address a range of healthcare services and provide comparative information for health care consumers, purchasers, health plans, providers and policymakers. Currently in its second phase, CAHPS II, the project continues to refine the health plan survey and in addition has begun development of survey products for behavioral health, hospitals, hemodialysis centers, nursing homes and is now adapting questionnaires to accommodate physically impaired healthcare consumers, and non-English speaking healthcare consumers (Mathematica Policy, 2005; Agency for, 2006).

The CAHPS hospital survey was developed by the AHRQ in partnership with Harvard Medical School, RAND, American Institute for Research and the CMS. In May 2005 after extensive field testing, stakeholder input and public comment a 27-item instrument was endorsed by the National Quality Forum. In April 2006, several hundred hospitals and health systems participated in a pilot demonstration project using the survey instrument with approximately 17,000 respondents. The seven composite measures generated by the hospital survey include nurse communication, nursing services, doctor communication, physical environment, pain control, communication about medicines, discharge information, and overall rating of care/recommendation of hospital to others. The results of the 2006 pilot have not been made public. However, national implementation of the survey followed in October 2006 with CMS planning to publically report this information by late 2007 as part of the National Voluntary Hospital Reporting Initiative launched by the American Hospital Association, the Federation of American Hospitals, the Association of American Medical Colleges (Agency for, 2006).

Despite the increased hospital measurement and reporting of patient satisfaction, little is known about why variations in satisfaction occur and how survey data can actually be used in quality improvement. A positive and satisfying patient experience is expected to lead to the patient's reuse of the hospital and/or the patient's recommendation to use the hospital. The predictive validity of a patient satisfaction instrument therefore is the degree to which individual items or scales which comprise items on the instrument predict the patients' intention to reuse/recommend. A series of multiple regression analyses demonstrated all items on the Press Ganey inpatient satisfaction survey are significant predictors of the patients' likelihood to recommend the unit (p <.001) and the survey instrument in total explains approximately 77% of the variance in the patient's likelihood to recommend the unit (Kaldenberg, Mylod, & Drain, 2002; Press Ganey Associates, 2002). Quality improvement research suggests that the extent to which organizational quality improvement is institutionalized is a function of structure, culture and implementation approach (Shortell et al., 1995). Healthcare leaders attribute unclear patient-centered values, attitudes and behaviors, organizational and workforce resistance, competing financial priorities and data problems among the barriers to effectively using patient survey information to improve performance (Davies & Cleary, 2005; Tasa, Baker, & Murray, 1996). Retrospective case studies of organizations that have successfully improved patient satisfaction scores are needed to identify effective improvement tactics (Ovretveit & Gustafson, 2002).

Patient-Centered Care

Descriptive articles have been published indicating hospital units practicing patientcentered care generally emphasize greater involvement of the patient, plus personalized care with a focus on patient education (Martin et al., 1998; Roter, 1987). Consistent with these findings, yet many years earlier, Abdellah described a need to transition nursing education away from procedure and diagnostic-centered curricula and practice to a more patient-centered approach focused on patient specific needs and health education with an emphasis on restorative and preventive measures (Abdellah, Beland, Martin, & Matheney, 1960). While nursing education programs may have transitioned to focus on the specific need of the patient through individualized patient care planning and nursing diagnosis, the inpatient acute care hospital experience changed very little. A majority of hospitals in America were built between 1950 and 1970 in the post war era when hospitals were organized for efficiency. In describing the typical hospital environment authors spanning nearly three decades report similar findings. Room numbers and diagnosis serve as main patient identifiers. Admission procedures require that all personal belongings be removed. Explanations are often withheld and replaced with statements such as "everything will be alright" and activities are scheduled around the convenience of the hospital providers (Matheney, Nolan, Hogan, & Griffin, 1962/1972; Moore & Komras, 1993). It is little wonder that by the late 1970's patients while generally satisfied with their last visit to the doctor and the quality of care they had received from that physician also reported that health care was in crisis (Robert Wood Johnson, 1978).

In 1993, Gerteis, Edgman-Levitan, Daley and Delbanco identified seven core components of patient-centered care: (1) respect for patients' values, preferences and expressed needs; (2) coordination and integration of care; (3) information, communication and education; (4) physical comfort; (5) emotional support and alleviation of fear and anxiety; (6) involvement of family and friends; (7) transition and continuity (Gerteis, Edgman-Levitan, Daley, & Delbanco, 1993). NRC Picker has identified eight patient-centered dimensions of care. These include the seven core components outlined by Gerteis et al above along with access to care as the eighth dimension (NRC+Picker, 2007).

A Cochrane team of reviewers defined patient-centered care as a philosophy of care that encourages (a) shared control of the consultation, decisions about interventions or management of the health problems with the patient, and/or (b) a focus in the consultation on the patient as a whole person who has individual preferences situated within social contexts (in contrast to a focus in the consultation on a body part or disease). The Cochrane team reviewed eleven studies to assess patient satisfaction; six demonstrated significant differences in favor of the intervention group on one or more measures. This evidence demonstrates that training health care providers in patient-centered approaches to patient care and consultation may positively impact patient satisfaction (Lewin, Skea, Entwistle, Zwarenstein, & Dick, 2006).

Planetree Patient-Centered Care

The Planetree patient-centered model of care was developed in the late 1970's by Angelica Thieriot. Theiriot, a former patient was so traumatized by her own hospital experience that she set out to create a new model of patient care delivery. She founded the not-for-profit Planetree Organization and began to examine how every aspect of the patient care experience could be humanized, personalized and demystified (Frampton, Gilpin, & Charmel, 2003).

By conducting focus groups with patients, families and healthcare team members the Planetree Organization designed a model hospital unit with a home-like environment designed using nature themed art and colors to enhance the healing process and staffed by nurses trained in providing personalized primary care. Patients were taught self-care activities, educated about nutrition and wellness and given individualized written materials from a health resource center. Music, meditation, relaxation and humor were also important aspects of the patients' care provided through the direct interaction with caregivers. When direct interaction was not possible audio tapes and/or video tapes were provided to enhance meditation and relaxation. A thirteen-bed Planetree model medicalsurgical unit began operations in June 1985 at California Pacific Medical Center (Martin et al., 1998).

Over the next 38 months 760 English speaking patients, eighteen years or older, well enough to complete an admission interview were enrolled in a randomized controlled study. The study compared patient satisfaction, patient education, patient health status, patient use of services, length of stay, cost of care, physician satisfaction and nursing satisfaction on the Planetree unit against four traditional care units in the hospital. Upon discharge patients reported significantly higher satisfaction with the technical aspects of care, the unit's environment and architecture, the opportunity to see family and friends, the involvement of nurses in providing personalized and nurturing care (p < 0.0001). In addition, they were also more satisfied with their health education (p < 0.001), and reported more implementation of that health education and participating in the educational and self-care programs (p < 0.0001). There were no differences in patient health status or use of coping strategies, nor were there differences in six health behaviors assessed, the use of health services, cost of care or length of stay (Martin et al., 1998). While it is noted that the p values reported here may be suspect because they represent an alpha level of .05, the values p < 0.0001 are those reported in the published research article. In addition, when examining the original manuscript prepared for the Henry J. Kaiser Family Foundation dated March 31, 1990 all tables referencing patient satisfaction do not list the p value but rather the tables state the Planetree patients as "significantly more satisfied (University of, 1990)". The use of p<0.0001 instead of the actual p value is acknowledged as a limitation and validates the need for further research in this area.

The Planetree Organization expanded the patient-centered care model implementation from one inpatient acute care unit in 1984 to five designated model sites in 1991 all located in the United States. In 1992 Griffin Hospital in Derby, Connecticut, worked with the Planetree Organization to become an affiliate hospital with freedom to customize the implementation of the Planetree patient-centered model of care to the hospital's particular needs. This new flexible implementation approach resulted in more hospitals joining the movement and this new hospital status became known as the Planetree Hospital Membership Network of Hospitals and Healthcare Organizations. By 2000, 32 facilities in the United States had begun using this innovative patient-centered model of care and the implementation of the model continued to expand by an average of 12 new health care facilities each year over the next seven years. Today over 117 acute care hospitals, long-term care facilities and health libraries throughout the world have adopted the Planetree patient-centered model of care representing over 600,000 annual patient admissions, 10,000,000 out-patient visits, 90,000 births, and over 80,000 health care professionals. The majority of facilities are located in the United States; however, facilities in Canada, Japan, India, and the Netherlands are either currently implementing or are currently exploring how to implement Planetree's patient-centered care model (S. Frampton, personal communication, February 28, 2007; Frampton, 2005; Frampton, Gilpin, & Charmel, 2003).

Becoming a Planetree hospital takes approximately three years and requires a strong commitment not only of hospital administration, but of the entire hospital. Annual fees varying depending on unit or healthcare organization size but can range from \$12,000 to \$25,000 with additional consulting fees required based on the needs of the unit and/or organization. Planetree consultants work with new units providing guidance and education in addition to conducting patient, physician and employee focus groups. Findings from the initial visit are combined with the information gleaned from the focus groups and presented to the unit as a recommended implementation plan. The implementation plans include such recommendations as (1) forming an implementation steering committee made up more than half non-managerial positions so frontline employees participate in creating their new organizational culture, (2) creating a Planetree Coordinator position that dedicates a minimum of twenty hours per week to the Planetree implementation, (3) conducting staff retreats focused on the Planetree philosophy and how the unit can implement and enhance patient satisfaction and employee satisfaction, and (4) formalizing reward and recognition programs. Within three years it is expected that the unit will demonstrate significant progress in implementing programs and processes that facilitate the ten components of the Planetree patient-centered model of care: human interaction, architectural & interior design, food and nutrition, patient and family education, family involvement, spirituality, human touch, healing arts, complementary/alternative therapy and healthy communities. Annually each unit then participates in on-site Planetree reviews including physician, employee and patient focus groups to assess their implementation progress. (HCPro, 2005; Frampton, Gilpin, & Charmel, 2003).

No additional published research regarding the Planetree patient-centered model of care is available. The vast majority of information regarding this model of care is

unpublished anecdotal and/or case study. This study will document how the Planetree patient-centered care contributes to effectively enhancing the patient hospital experience.

Summary

Hospital patient satisfaction measurement tools are being standardized across the United States and very soon hospital patient satisfaction results will be publicly reported and linked to Medicare and Medicaid reimbursement. Little is known about how patient satisfaction survey data can actually be used in quality improvement.

Patient-centered care is a concept that has many definitions with no consistent outcome measure. Most agree key components include involvement of patient, personalized care with a focus on patient education and the patient as a whole person who has individual preferences. Implementation of patient-centered care is a key imperative for all healthcare providers. Federally funded research demonstrating the impact of patient-centered care is now pending; however, to date no results have been made available.

The Planetree patient-centered model of care provides a framework and operational guidance on how to implement programs and processes within ten core components: human interaction, architectural & interior design, food and nutrition, patient and family education, family involvement, spirituality, human touch, healing arts, complementary/alternative therapy and healthy communities. The primary significance of this study is its potential contributions to nursing and hospital administration knowledge about the impact of Planetree's model of patient-centered care on organizational quality outcome performance. This information can lead to important patient-centered care improvements.

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CHAPTER 3

Framework

The impact of the patient-centered model of care on hospital quality outcomes is suggested by Donabedian's model. This model has been used in nursing literature and investigation since his original writings (Given, Given, & Simoni, 1979). Quality not only impacts medical care, but healthcare, and is not an abstract concept but a construct that can be explicitly defined and measured. This multidisciplinary model links (a) hospital unit structure and (b) the process of providing care to (c) quality outcomes (Donabedian, 1980; Donabedian, 2003). The functional relationship among the three elements (a, b, and c) means that structural characteristics of the care settings influence the process of care so that its quality is diminished or enhanced. Likewise, changes in the care process will influence the effect of care on health status and other quality outcomes. Structural variables are those conditions under which care is provided and the way health care systems are set up such as financial model, physical plant, and human resources philosophy. Process variables are those activities that constitute and contribute to health care usually carried out by professional staff such as treatment, patient education, and rehabilitation. The Planetree patient-centered model of care contributes to the overall process of health care and is carried out by professional caregiver staff. Outcomes are changes in individuals or populations that can be attributed to the receipt of health care as measured by changes in patient satisfaction, changes in knowledge that may impact future care, and changes in health status (Donabedian, 1980; Donabedian, 2003). Although not specifically included in the in the original work by Donobedian, changes in length of stay, cost of care, readmission rates and nursing hours per patient day are also

changes in individuals or populations that can also be attributed to the delivery of health care. The conceptual relationships identified in the study can be seen in Figure 1 below.



Figure 1

This model uses the inpatient hospital unit as the structure, the Planetree patientcentered model of care as a measure of the hospital care process, and patient satisfaction, length of stay, readmission rate, cost per case, productive nursing hours per patient day as quality outcomes measures. In Donabedian's terms, the model involves a measure of process, Planetree patient-centered model of care, and its impact on quality outcomes.

Research Questions

When evaluating the treatment unit pre and post implementation, the research questions to be addressed were: (1) what is the impact of the Planetree patient-centered model of care on patient satisfaction, (2) what is the impact of the Planetree patientcentered model of care on clinical outcomes (length of stay and readmission rate), and (3) what is the impact of the Planetree patient-centered model of care on the cost of providing care (cost per case and productive nursing hours per patient day).

When comparing the control unit to the treatment unit the questions to be addressed were: (1) what is the impact of the Planetree patient-centered model of care on patient satisfaction, (2) what is the impact of the Planetree patient-centered model of care on clinical outcomes (length of stay and readmission rate), and (3) what is the impact of the Planetree patient-centered model of care on the cost of providing care (cost per case and productive nursing hours per patient day).

Definition of Variables

The selection of variables is determined by the research questions. Patient satisfaction, the cost of care and length of stay have been measured in hospital quality of care outcome investigations. Selection of these variables was based on the research question, the investigator's healthcare executive perspective and the research area of special interest. In the hospital, nurses provide the majority of patient care. Therefore the impact of this model of care merits nursing exploration.

The Planetree patient-centered model of care for managing the care of patients and their families represents the independent variable in this study. The Planetree patientcentered model of care defines structures and protocols consistent with ten core components (human interaction, architectural & interior design, food and nutrition, patient and family education, family involvement, spirituality, human touch, healing arts, complementary/alternative therapy and healthy communities) for managing the care of patients and their families.

Quality outcomes are defined as the product of science and technology and their application in practice (Donabedian, 2003). In this study, the dimensions of quality operationalized were patient satisfaction, length of stay, readmission rate, cost per case, and productive nursing hours per patient day, all of which represent the dependent variable in this study. Patient satisfaction with the hospital stay was measured using the overall survey score and composite scores including admission, room, meals, nurses, tests and treatments, visitors and family, physician, discharge and personal issues on the Press Ganey inpatient satisfaction tool. Length of stay was measured as the date and time of admission through date and time of discharge. Hospital readmission within thirty days of discharge was the measure for readmission. Cost per case was measured as the average direct expense per discharged inpatient minus the cost of the prosthetic joint implant. Direct expenses do not include any overhead (indirect) expenses. Productive nursing hours per patient day was measured as the number of worked, direct care-giving nursing hours per census day. A census day is measured for each inpatient that is in a bed at midnight. Hours included in the calculation are straight-time, over-time, double-time, and call-back hours (if a nurse was on-call). Excluded was training, meeting, sick, on-call, vacation, or any other paid time where staff is not present (i.e. jury, bereavement). All dependent variable data was aggregated to the group level and calendar year level creating group-calendar year cohorts.

A cohort represents a group of respondents who follow each other through formal institutions. Such cohorts are useful for quasi-experimental purposes when the cohort groups are similar in characteristics including organizational history because they have received similar treatment, in similar or like institutions, and archival data is available for comparison (Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002).

Identification of Assumptions

Assumptions of ANOVA include random and independent samples from populations, the distributions of the populations from the selected samples are normal and homogeneity of variance is assumed for the dependent variable scores. The effects of violating these assumptions vary. If a statistical procedure is little affected by violating an assumption the procedure is deemed robust with respect to that assumption (Cohen, 1988; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002; Tabachnick & Fidell, 1996/2007).

CHAPTER 4

Methods and Procedures

Description of Research Design

A quasi-experimental retrospective design was used to assess the impact of the Planetree patient-centered model of care program on patient satisfaction, length of stay, readmission rate, cost per case and productive nursing hours per patient day.

Patient Satisfaction

The Press Ganey inpatient satisfaction survey was developed in the late 1980's, was updated and refined in 1997 and was revalidated in 2002 using 2,700 surveys from 721 hospitals in 48 states. The initial conceptualizations of the patient's experience were gathered during a one year observational study that rotated through all hospital services. Using this information, major components of the patient visit including admission, room, meals, nursing, tests and treatments, physicians, visitors and family, discharge, personal issues and overall ratings were identified. Information was further gathered from patients and inpatient facilities through focus groups and structured conference calls. A client advisory committee including inpatient hospital clientele was also formed to provide valuable feedback during the inpatient survey tool development. To measure the major components, many questions were used to gather information about the patients' multi-dimensional perceptions of care and service. The following five-point Likert type scale was used: 1 = very poor, 2 = poor, 3 = fair, 4 = good and 5 = very good. For data analysis this scale was converted to a zero to one hundred scale with very poor = 0, poor = 25, fair

= 50, good = 75, and very good = 100. Using the Flesch-Kincaid Index based on average number of syllables per word and word per question, this instrument was estimated to be at the fifth and sixth grade reading level. Factor analysis identified the dimensions or components that exist in a set of questions. The resulting dimensional structure of nursing, physician, room, tests, admission, discharge, meals, visitors and personal issues was used to group the 49 questions into dimension sections. Cronbach's alpha was used to establish internal consistency demonstrating the overall survey at .98 with alphas for the individual dimension sections of nursing, physician, room, tests, admission, discharge, meals, visitors and personal issues ranging from .78 to .95 (Kaldenberg, Mylod, & Drain, 2002; Press Ganey Associates, 2002).

Item analysis was used to assess how well each individual item correlated with other items within each respective dimension and how well each individual item correlated with the overall survey. The item to dimension correlation should be higher than the correlation of the item to the overall survey with a suggested item to overall survey. For example, questions regarding discharge would correlate higher with the discharge dimension than with the overall survey. Because there is a perfect correlation between an item and itself, the calculation was corrected (the item was removed from the dimension total) before the correlation was calculated. The average corrected item to dimension correlations ranged from .62 to .87 and average item to overall survey correlations ranged from .40 to 59. (Kaldenberg, Mylod, & Drain, 2002; Press Ganey Associates, 2002).

A positive and satisfying patient experience is expected to lead to the patient's reuse of the unit and/or the patient's recommendation to use the unit. The predictive validity of a patient satisfaction instrument therefore is the degree to which individual items or scales which comprise items on the instrument predict the patients' intention to reuse/recommend. A series of multiple regression analyses demonstrated all items are significant predictors of the patients' likelihood to recommend the unit (p <.001) and the survey instrument in total explains approximately 77% of the variance in the patient's likelihood to recommend the unit (Kaldenberg, Mylod, & Drain, 2002; Press Ganey Associates, 2002).

For this study patient satisfaction was measured using the overall survey score and composite scores including admission, room, meals, nurses, tests and treatments, visitors and family, physician, discharge and personal issues and on the Press Ganey inpatient satisfaction tool. Length of stay was measured as the date and time of admission through date and time of discharge. Cost per case was measured as the average direct expense per discharged inpatient minus the cost of the prosthetic joint implant. Direct expenses do not include any overhead (indirect) expenses. Productive nursing hours per patient day was measured as the number of worked, direct care-giving nursing hours per census day. A census day was measured for each inpatient that was in a bed at midnight. Hours included in the calculation are straight-time, over-time, double-time, and call-back hours (if a nurse was on-call). Excluded was training, meeting, sick, on-call, vacation, or any other paid time where staff is not present (i.e. jury, bereavement). Hospital readmission within thirty days of discharge was the measure for readmission. All dependent variable data was aggregated to the group level and calendar year level creating group-calendar year cohorts.

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Identification of the Population and Sample

Given that all data was retrospective, no participant recruitment was needed. Data was obtained electronically by the primary investigator from hospital system and entity organizational representatives with a minimum n=64 participants per group. Using retrospective quarterly all-inclusive patient satisfaction data for the two units a power analysis was conducted. This power analysis was calculated based on the following parameters: (1) a medium effect size of .5 [Cohen's δ], (2) desired power of .80 and (3) level of significance (α) of .05. To demonstrate significance in mean comparisons, a minimum of 64 participants per group was required (for medium effect size using Cohen's d which is a standardized effects size you need 64 per group).

Determinants of patient satisfaction have been reported in previous studies and include self-reported health status, the relationship between health care providers and patients, age, gender, level of education and hospital size. The strongest indicator of patient satisfaction is health status with patients reporting poor health status being more likely to report poor patient satisfaction. Additional but less impactful indicators to poor patient satisfaction include uninsured patients having no prior relationship with their health care provider, younger patients age 18-44, poor patients earning less than \$7500 per year, patients with less than a high school education and women and patients in large hospitals with greater than 200 beds (Cleary et al., 1991; Covinsky et al., 1998; Finkelstein, Singh, Silvers, Neuhauser, & Rosenthal, 1998; Hall & Dorman, 1990; Hargraves et al., 2001; Kaldenberg, Mylod, & Drain, 2002; Kane, Maciejewski, & Finch, 1997; Larsen & Rootman, 1976). To be included, patients must have been English speaking, over age eighteen, who underwent primary elective surgical knee or primary elective hip total joint replacement between January 2002 and December 2006 and who also completed the post-discharge patient satisfaction survey. Patients not meeting the above criteria were excluded from the study.

Selection of the Setting

The treatment inpatient hospital unit is a 30 bed medical surgical telemetry unit located within a small 46 acute care and 158 long term care bed community hospital with less than one hundred acute care beds. The control inpatient unit is a 22 bed surgical telemetry unit located within a large 464 bed metropolitan community hospital with greater than three hundred licensed acute care beds.

Both hospitals are located within fifteen miles of each other in a large urban county. Because of their close proximity, both are required to be in compliance with the same state and federal requirements including the state mandated nurse to patient ratio for telemetry units and for medical/surgical and/or mixed telemetry and medical surgical units. On August 23, 2003 California Assembly Bill 394 Nurse Staffing Ratio Regulations were implemented. The bill defined the minimum nurse-to-patient ratio allowed by law. For medical/surgical and/or mixed telemetry and medical surgical units a 1:6 nurse-to-patient ratio was initially implemented with a required reduction to 1:5 on January 1, 2005. For telemetry units a 1:5 nurse-to-patient ratio was initially implemented with a required reduction to 1:4 on January 1, 2008. Both units are orthopedic post-surgical units with a majority of post-surgical elective knee or hip total joint replacement patients. They are managed by the same large vertically and horizontally integrated not-for-profit healthcare system whose management structures (one manager for each unit with three - four assistant managers known as lead clinical nurses), skill mix (two registered nurses and one health care assistant for each 8-10 patients), pay rates, supply costs, policies, procedures, contracts and regulatory compliance programs are developed as a system and applied throughout all entities. This system management process allows some entity customization as it relates to individual hospital differences in levels of care and/or complexity of service.

In 2001, this large vertically and horizontally integrated not-for-profit healthcare system made an organization-wide cultural shift which gave strategic priority to its patients, workforce and physicians. Employees at all levels of the organization were mobilized through meetings with top management where they were encouraged to become the architects of change. Goals were set and aligned across the organization. Performance on these goals was measured and regularly shared through report cards. Service, attitude and behavior expectations were defined and implemented. Leadership began attending regular professional development sessions with the expectation of disseminating the knowledge throughout the organization. Employees across the organization were called to action and participated in teams dedicated to enhancing relationships, environments, systems, processes, quality and service. Both hospitals in this study were and still are involved in this vast cultural transformation .The impact of this cultural shift will similarly impact both facilities therefore minimizing the impact on the study results.

The treatment hospital concurrently began the implementation of Planetree's patientcentered model of care. As a small community hospital, this unit had struggled to
compete with the many large urban hospitals located nearby. As a strategy to differentiate itself in the market, this unit focused not only on the organization-wide cultural shift, but focused itself on using the Planetree framework to enhance its hospital transformation. This model of care was chosen after an advisory committee of hospital and corporate executives, hospital board and foundation board members, physicians and community members completed a thorough community healthcare service utilization survey and lengthy nation-wide evaluations of and focused site visits to similar small geographically isolated but financially robust community hospitals. Through this lengthy process the committee identified key factors of success. Each of the small financially robust facilities had incorporated a component of their unique local culture into the hospital identity and provision of services. Two of those successful facilities had used Planetree's patientcentered model of care as a vehicle for hospital-wide cultural transformation. The community survey results also indicated a strong desire for wellness and boutique spa-like services which are a component of the Planetree patient-centered model of care. By combining the Planetree patient-centered model of care and the local unique island resort culture, the advisory committee molded a vision of creating a high-end island beach resort within the walls of a hospital. What follows is a chronological description of programs and efforts developed and implemented to achieve this vision in addition to the larger organization-wide cultural shift efforts.

In January of 2002, this small community hospital began its Planetree implementation. An advisory committee was formed to oversee the implementation. This committee membership included representatives from the board of directors, medical staff, management, staff and past patients. A smaller group of eight management and staff

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joined an action team with the goal of implementing programs and protocols consistent with the ten core components of the Planetree patient-centered model of care (human interaction, architectural & interior design, food and nutrition, patient and family education, family involvement, spirituality, human touch, healing arts, complementary/alternative therapy and healthy communities).

First, in July of 2002 every employee attended a mandatory patient-centered care retreat where they learned about the Planetree patient-centered model of care. During these retreats employees took part in group exercises focused on understanding the patient's hospital experience perspective. The education reinforced the need to critically evaluate every aspect of the hospital experience. Standard visiting hours and overhead pages were eliminated. Patient gowns were upgraded to provide full coverage of the body rather than the usual open back patient gown. Fruit, coffee and tea were placed in the lobby and waiting areas, live plants were purchased and strategically placed in public areas, cookies were baked in the hospital and quarterly music programs began featuring Celtic harps, violins, guitarists and small groups such as string quartets.

In 2003, the Planetree action team of eight team members continued with the previous year's programs while they also developed and implemented new programs. Individualized patient information packets were distributed, same day meal service was offered by a dietary patient ambassador, a family accommodation package was created for family members who wanted to stay near their loved one, and in the hospice unit clinical aromatherapy and healing touch was offered to the patients by the nursing staff, massages were offered by a massage therapist and these same services were made available for purchase to outpatients. Focus groups with past outpatients were hosted to

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identify service improvement opportunities. Low cost massage, free healing touch and clinical aromatherapy treatments were offered to employees, physicians and volunteers. The main lobby, business office and physician's lounge were remodeled using calming serene colors consistent with an island beach resort. Reward and recognition for outstanding performance took center stage with hosted quarterly pizza parties and monthly ice cream deliveries for the highest and most improved patient satisfaction percentile rank.

In 2004, the Planetree action team transformed into a hospital-wide workgroup with every department manager and an employee partner participating. This group created a department certification program and devised an application blending the goals and objectives of the larger health care organization with the Planetree model of patientcentered care. Once the certification criteria were finalized the applications were disseminated and each department was strongly encouraged to apply. The hospital-wide workgroup served as the approval body for all department applications. This group then focused on more patient-centered program development throughout the unit. A massage, healing touch and clinical aromatherapy program was implemented for inpatients, a waiting area for outpatients was created, a baby grand player piano was obtained for the lobby, a pet therapy program was initiated, a care partner program for inpatients was implemented, an open medical record program was implemented, the café menu was revised and daily offerings from the "Wellness and You" menu were offered to patients and staff and the "Wellness, Health and Safety Program" for employees was developed. In the fall of 2004, the unit was informed that the hospital had been chosen to be the host hospital for the 2006 Annual Planetree Convention.

In 2005, the hospital-wide work group approved department applications representing nearly half the hospital. As the departments became certified, new creative programs proliferated. Environmental services created a host-hostess program delivering warm wash clothes twice a day and offering to assist with anything the patient might need; anxious pre-surgical patients were offered sea shell "angel wings" to rub as a method of stress relief; activity baskets and rolling carts were readied each day and stocked with games, magazines, music and even bubbles. Follow-up quality verification programs such as discharge patient mystery phone calls became critical in an effort to assure that all programs were consistently offered. As units were remodeled the calming beach resort atmosphere expanded through the emergency room, the intensive care unit and a new fluoroscopy suite.

In 2006, the remaining departments became certified and the hospital-wide workgroup continued its deployment of new and expanded patient-centered programs. A hotel-type guest service guide was created and placed in each patient room; softer hotel grade bath towels and wash clothes were purchased; a resident chaplain began addressing the spiritual and emotional needs of the patients and staff; a calming audio system was purchased for use of pre-surgical patient; a computer-based patient education system was purchased extensively expanding the available health-related discharge education materials; the café and hospital menu was revised to include ethnically diverse and updated entree choices; acupuncture was added to the outpatient complementary therapy program; the first floor public corridor finishes were upgraded to reflect a calming beach resort atmosphere; and three outdoor areas previously unused were redesigned and upgraded to healing gardens. In October of 2006, over 300 Planetree conference attendees participated in hospital guided tours. These tours highlighted the new and improved finishes but the people who had uniquely transformed the unit from the inside out were what made a lasting impression on all tour participants.

In summary, comparing units managed by the same organization, caring for the same types of patients, using the same skill mix, with standardized organizational pay rates, supply costs, policies, procedures, contracts and regulatory compliance programs, treated by physicians practicing at both facilities provides a unique opportunity to evaluate the impact of the Planetree patient-centered model of care practiced in the treatment unit on inpatient quality outcomes.

Presentation of Subject's Rights

No potential physical, psychological, social, economic, or legal issues have been identified. All data was held confidential and only accessible to individuals directly involved in the study. Raw data was kept in a locked cabinet in the office of the Principle Investigator, Susan Stone. Only the Principle Investigator had access to the raw data. Any dissemination of the results of the study will be in the aggregate. No individual will be identified.

Selection of Measurement Methods

The process variable, Planetree patient centered care, was measured at the unit level. Data on cost per case, length of stay and patient satisfaction were measured at the individual patient level and aggregated to the unit level. Data on productive nursing hours per patient day were measure at the unit level. In the hospital, nurses provide the majority of patient care therefore the impact of this model of care merits nursing exploration.

Data Collection

All data was retrospective, no participant recruitment was needed. Data was obtained electronically by the primary investigator from system and entity organizational fiscal and clinical data bases following approval from the educational and organization Institutional Review Boards.

Data Analysis

Data were analyzed using a two by five ANOVA and logistic regression (readmission only). This was a study of five separate cohorts grouped by calendar year rather than a study of repeated measures. The Planetree patient-centered model of care program was implemented over a four year period of time beginning in January, 2002. No patient specific pre-test/post-test data was available and because this was a retrospective study it was not possible to assign patients to a treatment versus control group. To be included patients were over age 18, who underwent primary elective surgical knee or primary hip total joint replacement between 1/2002 and 12/2006 and who also completed the English language post-discharge patient satisfaction survey. This two by five ANOVA design analyzed outcome data (patient satisfaction, length of stay, readmission, cost per case and productive nursing hours per patient day). It was expected that the treatment group patient satisfaction and length of stay would outperform the control group. This two by five factorial study design is represented below in Table 1.

Table 1 Study Design

1/2002 —	2003	2004	2005	2006
6/2002				

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Treatment	O_1	Х	O ₂	O ₃	O ₄	O ₅
Control	O1		O ₂	O ₃	O_4	O ₅

ANOVA examines the difference in mean scores within groups and between groups to determine whether the mean score differences are due to random error. If the difference within and between groups differs more than expected then the difference is attributed to belonging to one group versus the other as opposed to random error. Once a significant difference in mean score is established (p=<.05) it is important to identify the degree to which the independent and dependent variables are associated. Calculating the effect size determines the degree of relationship associated between the independent variable and the dependent variable. Clinical and education studies typically tend to have smaller effects than sociology, economics and psychology studies. In 1988 Cohen presented guidelines (small $\eta^2 = .01$, medium $\eta^2 = .059$ and large $\eta^2 = .138$) for effect size (Cohen, 1988; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002; Tabachnick & Fidell, 1996/2007).

Assumptions of ANOVA include random and independent samples from populations, and that the distributions of the populations from the selected samples are normal and homogeneity of variance is assumed for the dependent variable scores. The effects of violating these assumptions vary. If a statistical procedure is little affected by violating an assumption the procedure is deemed robust with respect to that assumption (Cohen, 1988; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002; Tabachnick & Fidell, 1996/2007).

Readmission being a dichotomous variable (yes or no) does not allow for comparison of mean scores, therefore alternative statistical analysis methodology was required. Logistic regression allows prediction of a discrete outcome such as group membership from a set of continuous, discrete and/or dichotomous variables (i.e. readmission). Logistic regression assumes all responses are independent, different cases having no relationship to one another, and therefore is a between-subjects evaluation. There are no assumptions about distributions of the predictor variable and normal distribution; linear relationship and/or equal variance are not assumed. The analysis may have little power if an expected frequency is smaller than one and more than 20% of the expected frequencies are less than five (Cohen, 1988; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002; Tabachnick & Fidell, 1996/2007).

Limitations

Limitations of this study include inadequate pretreatment sample size, unequal sample sizes due to a lower control unit survey return rate, retrospective convenience sampling methodology, self reported health status with no independent verification source and a portion of the treatment unit patients covered by one insurance provider self reported readmission information.

The overall sample size of n=587 for the treatment group and n=282 for the control group are unequal. Both units utilize the same third party patient satisfaction vendor and send 100% of all inpatients a patient satisfaction survey; however, the control unit has a lower return rate resulting in a smaller sample size. When investigating the cause of the lower return rate, the corporate consumer research division indicated that the return rate difference may be related to how or if the hospital team members are educating patients

regarding the survey process during the hospital stay. Actively educating hospitalized patients about the survey results in a higher patient satisfaction survey return rate.

Because there was no random assignment to treatment group versus control group the findings cannot be generalized.

Health status was self reported. Although self reported health assessment has been reported as an indicator of illness and predictor of mortality, verification of this information from an independent source is preferred.

Some patients in the treatment unit self reported the readmission data. Because one major insurance provider is not electronically connected to system and entity organizational clinical data bases the patients covered by this provider and cared for in the treatment unit self reported readmission via follow up phone calls made up to one year following discharge.

Findings

The data analysis results are organized into sections consistent with the research questions. For each research question the discussion is organized by the method used to examine and analyze the data relative to that particular question. The first section provides a demographic summary of the sample. The second section examines the impact of the Planetree patient-centered model of care on patient satisfaction. The patient satisfaction 2 X 5 ANOVA and the 2002-2006 summary ANOVA results are presented and discussed. The third section examines impact of the Planetree patient-centered model of care on length of stay and readmission. Results of the length of stay 2 X 5 ANOVA are presented and discussed followed by the binary logistic regression and 2 X 2 Chi-square results for readmission. The fourth section examines the impact of the Planetree patient-

centered care model on the cost of providing care. Results of the productive nursing hours per patient day comparison are presented and discussed followed by the cost per case ANOVA.

Sample Demographics

The patient satisfaction sample size consisted of 869 total patients, 67.5% n=587 patients in the treatment unit and 32.5% n=282 in the control unit. Of the 869 patients 43% n=375 were men and 57% n=494 were women. In the treatment unit 63% n=370 of patients were women as compared to the control unit where 56% n=158 of patients were men. Patients in the treatment unit were only slightly older with 89.2% n=524 ranging in age from 56-85 as compared to the control unit with 93.3% n=263 of patients ranging in age from 46-85 as referenced in Table 2. Patients at both units had nearly equivalent mean ages and self reported health status. The mean age in the treatment unit was 67.3 as compared to 64.4 in the control unit. The self reported health status mean score of 4.2 indicates equivalent health status in the two groups. In the treatment unit 65.6% n=385 of patients reported insurance as limiting their choice of physician as compared to 53.2% n=150 of the control unit patients as referenced in Table 2.

In summary, the treatment unit and the control unit patient populations differ only slightly with the treatment unit having more total patient satisfaction surveys returned (as a result of more survey education), more women, a slightly older mean age and more patients reporting restricted choice of physician. Previously discussed determinants of low patient satisfaction pertinent to this study are the larger percentage of women in the treatment unit and patients in the control unit with greater than 200 beds (Cleary et al., 1991; Covinsky et al., 1998; Finkelstein, Singh, Silvers, Neuhauser, & Rosenthal, 1998; Hall & Dorman, 1990; Hargraves et al., 2001; Kaldenberg, Mylod, & Drain, 2002; Kane, Maciejewski, & Finch, 1997; Larsen & Rootman, 1976).

		Treatment		Control	
		Sample		Sample	
		Size=n	Percent	Size=n	Percent
Gend	er				
	Men	217	37.0	158	56.0
	Women	370	63.0	124	44.0
	Total	587	100.0	282	100.0
Age					
	30-35	0	0	2	.7
	36-45	10	1.7	13	4.6
	46-55	49	8.4	47	16.7
	56-65	174	29.6	88	31.2
	66-75	239	40.7	85	30.1
	76-85	111	18.9	43	15.3
	86+	4	.7	4	1.4
	Minimum	40		33	
	Maximum	88		87	
	Mean	67.33		64.4	
	Range	48		54	

Table 2 Demographic Summary

			·	
Poor	2	.3	1	.4
Fair	51	8.7	25	8.9
Good	266	45.3	151	53.5
Very Good	158	26.9	83	29.4
Total	477		260	
Missing	110	18.7	22	7.8
Mean	4.2(Good))	4.2(Good)	
Choice of MD				
Limited by Ins.				
Yes	385	65.6	150	53.2
No	77	13.1	103	36.5
Missing	125	21.3	282	10.3

Research Question #1: What is the Impact of the Planetree Patient-Centered Model of Care on Patient Satisfaction

Patient Satisfaction 2 X 5 ANOVA and Summary 2002-2006 ANOVA

Histograms visually displaying the sampling distributions of the means were created and demonstrated an abnormal distribution of means with negative skewness ranging from -.691 to -2.008, positive kurtosis ranging from .572 to 5.055 and a Shapiro-Wilk test of normality significant at p = <.05 for all survey composite sections (see Figures 2-11). While transformation was considered and applied, the abnormal distribution of means was not corrected. Central Limit Theorem when applied to this situation indicates for large sample sizes sampling distributions of means are distributed regardless of the distributions of variables and therefore the *F* test is sufficiently robust to violations of normality of variables and to the sample size inequality (Tabachnick & Fidell,



Admission Section

Figure 2

Nurses Section



Figure 4

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Visitors and Family Section



Figure 5

Physician Section



Figure 6

Discharge Section



Figure 7

Personal Issues Section



Figure 8

Overall Assessment Section



Figure 9

Overall Mean Score



Figure 10

Room Section



Figure 12

Patient satisfaction was measured using the composite scores for admission, meals, nurses, tests and treatments, visitors and family, physician, discharge and personal issues, overall assessment, overall mean score and room on the Press Ganey inpatient satisfaction tool. Utilizing the 2 X 5 ANOVA each of the patient satisfaction composite scores was examined by year comparing the two different units. The 2 X 5 ANOVA composite mean score comparison was significant for meals in years 2003 & 2006, for nurses in years 2002 & 2003 and for physicians in years 2003, 2005 & 2006. The treatment unit demonstrated significance in the meals and nurses composite while the control unit demonstrated significance in the physicians composite. In the treatment unit the areas of significance included: (1) the 2003 meals composite mean scores *F* (1, 812) = 8.026, p = .005 ($\eta^2 = .010$) with a larger mean obtained for the treatment unit78.797 as compared to 72.468 for the control unit, (2) the 2006 meals composite mean scores F(1, 812) = 4.902, p = .027 ($\eta^2 = .006$) with a larger mean obtained for the treatment unit 83.349 as compared to 77.083 for the control unit, (3) the 2002 nurses composite mean scores F(1, 823) = 4.133, p = .042 ($\eta^2 = .005$) with a larger mean obtained for the treatment unit 90.741 as compared to 76.967 for the control unit and (4) the 2003 nurses composite mean scores F(1, 823) = 7.189, p = .007 ($\eta^2 = .009$) with a larger mean obtained for the treatment unit 87.386 as compared to 81.208 for the control unit. In the control unit areas of significance included: (1) the 2003 physician composite mean scores F(1, 795) = 6.916, p = .009 ($\eta^2 = .009$) with a larger mean obtained for the control unit 90.891 as compared 85.430 for the treatment unit, (2) the 2005 physician composite mean score F(1, 795) = 7.172, p = .008 ($\eta^2 = .009$) with a larger mean score obtained for the control unit 92.316 as compared to 85.711 for the treatment unit and (3) the 2006 physician composite mean scores F(1, 795) = 7.328, p = .007 ($\eta^2 = .009$) with a larger mean obtained for the control unit 95.353 as compared to 88.112 for the treatment unit as referenced in Table 3.

A Post Hoc ANOVA, also referenced in Table 3 was performed examining all mean scores years 2002 through 2006 comparing treatment unit to control unit and verified meals, nurses and physician composites were significantly different as summarized in Table 3. The treatment unit demonstrated significance in the meals composite mean scores F(1, 846) = 12.99, p = .000297 ($\eta^2 = .015$) with a larger mean obtained for the treatment unit 80.728 as compared to 76.211 for the control unit and in the nurses composite mean scores F(1, 858) = 9.88, p < .05 ($\eta^2 = .011$) with a larger mean obtained for the treatment unit 88.647 as compared to 84.704 for the control unit. The control unit

demonstrated significance in the physician composite mean scores $F(1, 827) = 25.44, p < .05 (\eta^2 = .03)$ with a larger mean obtained for the control unit 92.530 as compared to 87.405 for the treatment unit.

					Partial
	Treatment	Control			Eta
	Mean/n	Mean/n	F	Sig.	Squared
Admission					
2002	87.037/9	87.50/25	.010	.920	.000
2003	90.478/203	88.438/80	1.718	.190	.002
2004	93.071/89	91.599/62	.570	.450	.001
2005	93.10/125	90.369/61	2.203	.138	.003
2006	94.760/132	95.035/47	.019	.891	.000
2002-2006	92.420/246	91.311/246	3.242	.072	.004
Meals					
2002	76.389/9	68.917/25	1.313	.252	.002
2003	78.797/197	72.468/79	8.026	.005**	.010**
2004	81.226/86	79.772/62	.271	.603	.000
2005	79.587/124	76.947/61	1.013	.315	.001
2006	83.349/131	77.083/48	4.902	.027**	.006**
2002-2006	80.728/503	76.211/246	12.99	.000**	.015**
Nurses					

Table 3 Patient Satisfaction 2 X 5 ANOVA Composite Mean Score Summary

2002	90.741/9	76.967/25	4.133	.042**	.005**
2003	87.386/201	81.208/80	7.189	.007**	.009**
2004	88.202/89	89.449/62	.187	.666	.000
2005	85.495/127	82.418/61	1.285	.257	.002
2006	90.178/131	85.964/48	2.054	.152	.002
2002-2006	88.647/503	84.704/246	9.88	.002**	011**
Tests and					
treatments					
2002	87.235/9	81.274/25	1.159	.282	.001
2003	85.421/200	85.247/79	.008	.927	.000
2004	86.945/88	86.804/62	.004	.952	.000
2005	87.058/122	86.698/57	.025	.875	.000
2006	91.769/131	88.170/48	2.244	.135	.003
2002-2006	87.939/503	86.194/246	2.294	.130	.003
Visitors and					
Family					
2002	83.594/8	78.977/22	.504	.478	.001
2003	85.647/190	85.111/75	.062	.803	.000
2004	88.084/82	85.082/56	1.209	.272	.002
2005	83.726/122	85.344/57	.410	.522	.001
2006	87.861/127	83.056/45	3.091	.079	.004
2002-2006	86.920/503	84.604/246	2.393	.122	.003
Physicians					

2002	85.833/9	89.467/25	.359	.549	.000
2003	85.430/191	90.891/80	6.916	.009**	.009**
2004	88.209/87	93.333/60	3.835	.051	.005
2005	85.711/116	92.316/61	7.172	.008**	.009**
2006	88.112/130	95.353/46	7.328	.007**	.009**
2002-2006	87.405/503	92.530/246	25.44	.000**	.03**
Discharge					
2002	83.565/9	84.417/25	.016	.898	.000
2003	84.438/198	82.188/80	.986	.321	.001
2004	83.310/88	85.243/60	.456	.500	.001
2005	82.661/124	80.157/61	.876	.350	.001
2006	87.786/131	86.924/47	.088	.767	.000
2002-2006	85.326/503	83.681/246	.538	.463	.001
Personal					
Issues					
2002	86.759/9	76.633/25	2.294	.130	.003
2003	83.804/200	80.641/80	1.934	.165	.002
2004	83.642/89	86.981/61	1.364	.243	.002
2005	83.159/127	83.600/61	.027	.870	.000
2006	86.976/132	87.252/47	.009	.925	.000
2002-2006	85.554/503	84.209/246	.395	.530	.000
Overall					
Assessment					

2002	92.969/8	82.083/25	2.295	.130	.003
2003	87.377/203	85.100/79	.942	.332	.001
2004	86.915/89	91.499/62	2.454	.118	.003
2005	86.696/127	86.919/61	.007	.935	.000
2006	90.925/132	88.723/46	.529	.467	.001
2002-2006	89.571/503	88.161/246	.342	.559	.000
Overall Mean					
Score					
2002	85.073/9	80.266	.989	.320	.001
2003	84.349/204	82.684/80	1.031	.310	.001
2004	85.572/89	86.838/62	.379	.538	.000
2005	84.244/127	84.403/61	.007	.935	.000
2006	88.507/132	86.896/48	.591	.442	.001
2002-2006	86.366/503	85.105/246	.920	.338	.001
Room					
2002	78.611/9	77.300/25	.045	.833	.000
2003	76.555/202	76.292/80	.016	.901	.000
2004	77.921/89	78.387/62	.031	.860	.000
2005	76.696/126	80.478/61	2.308	.129	.003
2006	83.378/132	80.842/48	.888	.346	.001
2002-2006	79.152/503	79.446/246	.052	.052	.000

**p = <.05 with Eta squared = >.01

Estimated Marginal Means of Admission Section



Figure 12





Figure 13

Estimated Marginal Means of Nurses Section



Figure 14



Estimated Marginal Means of Tests and Treatments Section

Figure 15



Estimated Marginal Means of Visitors and Family Section

Figure 16



Estimated Marginal Means of Physician Section

Figure 17



Estimated Marginal Means of Discharge Section

Figure 18



Estimated Marginal Means of Personal Issues Section

Figure 19

Estimated Marginal Means of Overall Assessment Section



Figure 20



Estimated Marginal Means of Overall Mean Score

Figure 21



Estimated Marginal Means of Room Section

Figure 22

The 2X5 ANOVA and summary 2002-2006 ANOVA provided an answer to the question of what impact Planetree patient-centered care has on patient satisfaction. The treatment unit mean scores demonstrated a positive patient satisfaction impact in the meals composite sections both in the overall 2002-2006 summary comparison and in the individual year comparisons of 2003 and 2006. The patients were more satisfied with the meals provided by the treatment unit. In addition, the treatment unit mean scores analysis demonstrated a positive patient satisfaction impact in the nurse composite section both in the overall 2002-2006 summary comparisons of 2003 and 2006. The patient unit mean scores analysis demonstrated a positive patient satisfaction impact in the nurse composite section both in the overall 2002-2006 summary comparison and in the individual year comparisons of 2002 and 2003. The patients were more satisfied with the nursing services provided by the treatment unit.

The control unit mean score analysis demonstrated a positive patient satisfaction impact in the physician composite section both in the overall 2002-2006 summary comparison and in the individual year comparisons of 2003, 2005 and 2006. The patients were more satisfied by the physician services provided by the control unit.

Composites not demonstrating statistical significance and referenced in Table 3 for both the 2 X 5 ANOVA and the summary 2002-2006 ANOVA include admission, tests and treatment, visitors and family, discharge, personal issues, overall assessment, overall mean score and room. The plot graphs in Figures 12-22 demonstrate that while there was not a statistical significance in the 2 X 5 ANOVA mean score differences in the above mentioned composite areas, the treatment unit mean scores were higher 64% or 35/55 of the time for all composite areas as compared with the control unit achieving higher mean scores 36% or 20/55 of the time. When comparing the individual annual composite mean scores the treatment unit mean scores were higher in 9 out of 11 composite areas including admission, meals, nurses, tests and treatment, visitors and family, discharge, overall assessment, overall mean score and room. It is also important to note when comparing the 2002-2006 summary composite mean scores, that the treatment unit mean scores were again higher than the control unit 81.8% (9/11) as compared to the control unit achieving higher mean scores 18.1% (2/11). In fact, the treatment unit achieved higher mean scores more often (\geq 3/5) in the 2 X 5 ANOVA and in the summary 2002-2006 ANOVA for the admission, meals, nurses, tests and treatment, visitors and family, discharge, personal issues, overall assessment and overall mean score composite sections. These differences while not statistically significant are important in evaluating the overall impact of the Planetree patient-centered model of care on patient satisfaction.

The patient satisfaction composite mean score evaluation demonstrates that the treatment unit is different from the control unit. Statistical significance was demonstrated

both in the meals and nurses composite categories in individual yearly comparisons and the summary comparison. In addition, in the individual annual and summary mean score composite comparisons the treatment unit demonstrated higher mean scores in 9 of the 11 composite categories. This evidence validates that the Planetree patient-centered model of care treatment unit implementation had a positive impact on patient satisfaction scores. *Research Question #2: What is the Impact of the Planetree Patient-Centered Model of Care on Length of Stay and Readmission*

Length of Stay 2 X 5 ANOVA

A histogram visually displaying the sampling distributions of the means was created and demonstrated an abnormal distribution of means with positive skewness of 1.819, positive kurtosis of 7.033 and a Shapiro-Wilk test of normality significant at p = <.05(see Figure 23). While transformation was considered and applied, the abnormal distribution of means was not corrected. Central Limit Theorem when applied to this situation indicates for large sample sizes sampling distributions of means are distributed regardless of the distributions of variables and therefore the *F* test is sufficiently robust to violations of normality of variables and to the sample size inequality (Tabachnick & Fidell, 1996/2007).

Histogram



Figure 23

Length of stay was measured as the date and time of admission through date and time of discharge. Utilizing 2 X 5 ANOVA statistical analyses each patient's length of stay was examined by year comparing the two different units. The 2 X 5 ANOVA was significant for 2003. The treatment unit demonstrated significance $F(1, 859) = 6.952, p = .009 (\eta^2 = .008)$ with a lower mean length of stay obtained for the treatment unit 3.26 as compared to 3.51 for the control unit as referenced in Table 4. The plot graph in Figure 24 demonstrates that while there was not a statistical significance in years 2002, 2004, 2005 and 2006 the treatment unit mean length of stay was lower in every year as compared to the control unit. These differences while not statistically significant are an important indicator of performance and assist in evaluating the impact of the Planetree patient-centered model of care on length of stay.

Because organization-wide orthopedic total joint replacement clinical pathways and case management practices have been adopted the similarity in the mean length of stay is not surprising. While both units demonstrated a decrease in overall length of stay, the treatment unit consistently maintained a lower mean length of stay nearly proportional to the control unit. This consistent difference is an important indicator of performance and assists in evaluating the impact of the Planetree patient-centered model of care on length of stay.

						Partial
		Treatment	Control			Eta
		Mean/n	Mean/n	F	Sig.	Squared
LOS						
	2002	3.55/33	3.89/28	3.602	.058	.004
	2003	3.26/204	3.51/80	6.952	.009**	.008**
	2004	3.11/89	3.23/62	.927	.336	.001
	2005	3.27/127	3.46/61	2.971	.085	.003
	2006	3.15/134	3.22.51	.321	.571	.000
Total						
2002-	2006	3.23/587	3.42/282			
Minin	num	2	2			
Maxin	num	7	8			

Table 4 Length of Stay 2 X 5 ANOVA Summary

**p = <.05 with Eta squared = >.01

Estimated Marginal Means of LOS



Figure 24

The length of stay evaluation demonstrated that the treatment unit is different from the control unit. Statistical significance was demonstrated in the 2003 comparison. In addition, in each of the five annual mean length of stay comparisons the treatment unit consistently demonstrated a lower mean length of stay. This evidence validates that the Planetree patient-centered model of care treatment unit implementation had a positive impact on length of stay.

Readmission Logistic Regression and 2 X 2 Chi-Square

Hospital readmission within thirty days of discharge was the defined measure for readmission. Utilizing binary logistic regression, with hospital as the dummy coded vector as predictor, all dependent variable readmissions were examined comparing the two units. The results demonstrated no significance $\chi^2(1) = 3.05$, p = .081. When

examining the individual variable, hospital unit is not a significant predictor of readmission b = -1, p = .112 as referenced in Table 5.

		Treatment	Control		
		<u>n</u>	n	χ^2	Sig.
Readm	nission			3.05	.081
	yes	1	3		
	no	586	279		
	Total	587	282		

Table 5 Readmission Logistic Regression Summary

The logistic regression results were verified by using a 2 X 2 Chi-Square analysis. Chi-square is a test of association comparing two discrete variables. Row and column totals are used to calculate an expected frequency to which the observed frequency is compared. Assumptions of Chi-square include independent observations, mutually exclusive row and column variables, and like logistic regression the expected frequency is no smaller than one and no more than 20% of the expected frequencies should be less than five (Cohen, 1988; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002; Tabachnick & Fidell, 1996/2007). The 2 X 2 Chi-square results verified the findings of the logistic regression analysis and found no significance $\chi^2(1) = 3.32$, p = .068, phi = -.062 as referenced in Table 6.

Because organization-wide orthopedic total joint replacement clinical pathways have been adopted the similarity in the readmission rate is not surprising. In, addition the sample similarity of equivalent "good" (4.2 on a 5 point scale) self reported health status, and nearly equivalent age (67.33 versus 64.4) may also have contributed to this finding.

		Treatment	Control			
		n	n	χ ²	Sig.	phi
Readr	nission			3.32	.068	062
	yes	1	3			
	no	586	279			
	Total	587	282			

Table 6 Readmission Chi Square Summary

Research Question #3: What is the Impact of the Planetree Patient-Centered Model of Care on Productive Nursing Hours per Patient Day and Cost per Case

Productive Nursing Hours Per Patient Day Comparison

Productive nursing hours per patient day was measured as the average number of worked, direct care-giving nursing hours divided by census day. Because the raw data and standard deviation information were unavailable, the average annual productive nursing hours per patient day is summarized and general differences between the units discussed. In the future, obtaining raw data would allow more adequate statistical analysis. In addition, the control unit data for year 2002 was not available and therefore not included in the comparison. Job classifications included in the summary are technicians, registered nurses (RN), licensed vocational nurses (LVN), aides and clerks. Technicians and clerks are assistive personnel who do not directly provide patient care; however, the job duties may or may not be absorbed by the aide and/or RN depending on
the unit personnel structure/skill mix. In Table 8, each unit's average productive hours per patient day for the five years were summarized. Overall on average the treatment unit consistently used more productive nursing hours per patient day ranging from a difference of 2.33 average productive hours per patient day in 2003 reducing each year to a difference of 1.2 in 2006. The total number of patient days trended upward from 6232 to 8048 for the treatment unit as opposed to the control unit trend downward from 7332 to 6896. No major differences were noted in the technician average productive hours per patient day. The treatment unit on average consistently used more clerical average hours per patient day ranging from 1.26 to 1.64 and had a slight upward trend of aide/LVN average productive hours per patient day ranging from 3.13 in 2003 to 3.64 in 2006 as demonstrated Figure 26. In the treatment unit aides and LVN's function comparably for the majority of worked hours, however in times of increased census the LVN may work with the Charge RN taking a patient assignment. The average productive RN hours per patient day trended upward from 5.28 in 2003 to 7.01 in 2006 for the control unit as opposed to the slight downward trend in the treatment unit from 5.56 in 2003 to 5.24 in 2006. The upward trend in the control unit may be the result of two factors. First, the slight decrease in total patient days will result a slightly higher average RN hours per patient day. Second, the implementation in the control unit of a more RN rich skill mix will result in higher average RN hours per patient day.

		Treatment	Control	Trt–Ctl
		Mean	Mean	Difference
Hours per				
Patient Day				
2003				
	Tech	0.00	0.00	0.00
	RN	5.56	5.28	.28
	LVN	.77	.09	.68
	Aide	2.36	2.35	.01
	Clerk	2.03	.67	1.36
Total	HPPD	10.72	8.39	2.33
Total Pt Days		6232	7332	-1100
Hours	per			
Patien	t Day			
2004				
	Tech	.11	.22	.11
	RN	5.40	5.48	08
	LVN	.14	0.00	.14
	Aide	3.03	2.43	.06
	Clerk	1.67	.25	1.42
Total HPPD		10.35	8.38	1.97
Total Pt Days		6650	7095	- 445

Table 8 Nursing Productive Hours Per Patient Day Summary

Hours per						
Patient Day						
2005	2005					
	Tech	.27	.22	.05		
	RN	5.22	6.53	-1.31		
	LVN	.23	0.00	.23		
	Aide	3.04	2.42	.62		
	Clerk	1.90	.26	1.64		
Total HPPD		10.66	9.43	1.5		
Total Pt Days		7290	7026	264		
Hours per						
Hours	s per					
Hours Patier	s per nt Day					
Hours Patier 2006	s per nt Day					
Hours Patier 2006	s per nt Day Tech	.24	.18	.06		
Hours Patier 2006	s per nt Day Tech RN	.24 5.24	.18 7.01	.06 -1.77		
Hours Patier 2006	s per at Day Tech RN LVN	.24 5.24 .43	.18 7.01 0.00	.06 -1.77 .43		
Hours Patier 2006	s per at Day Tech RN LVN Aide	.24 5.24 .43 3.21	.18 7.01 0.00 1.99	.06 -1.77 .43 1.22		
Hours Patier 2006	s per at Day Tech RN LVN Aide Clerk	.24 5.24 .43 3.21 1.56	.18 7.01 0.00 1.99 .30	.06 -1.77 .43 1.22 1.26		
Hours Patier 2006 Total	s per at Day Tech RN LVN Aide Clerk HPPD	.24 5.24 .43 3.21 1.56 10.68	.18 7.01 0.00 1.99 .30 9.48	.06 -1.77 .43 1.22 1.26 1.2		



Average Means of Aide and LVN Productive Hours per Patient Day



Average Means of Registered Nurse Productive Hours per Patient Day





Cost per Case ANOVA

Cost per case was measured as the average direct expense per discharged inpatient minus the cost of the prosthetic joint implant (the prosthetic joint implant cost was not available from one large medical group at the treatment unit making it necessary to eliminate the cost of prosthetic implants from both the treatment and control unit). Utilizing ANOVA, the treatment unit and the control unit cost per case were compared by year. All comparisons in each of the five years (2002-2006) were significantly different as summarized in Table 7. In 2002 the treatment unit demonstrated significance $F(1, 938) = 134.24, p < .05, \eta^2 = .125$ with a lower cost per case \$5,732.91 as compared to the control unit \$7,823.20. In 2003 the treatment unit demonstrated significance F(1, 1) $(959) = 306.01, p < .05, \eta^2 = .24$ with a lower cost per case \$6,271.43 as compared to the control unit \$9,695.85. In 2004 the treatment unit demonstrated significance F(1, 900) =173.47, p < .05, $\eta^2 = .161$ with a lower cost per case \$6,142.52 as compared to the control unit \$9,158.24. In 2005 the treatment unit demonstrated significance F(1, 1024) =134.17, p < .05, $\eta^2 = .116$ with a lower cost per case \$7,183.96 as compared to the control unit \$9,777.39. In 2006 the treatment unit demonstrated significance F(1, 1071) =134.17, p < .05, $\eta^2 = .052$ with a lower cost per case \$8,845.61 as compared to the control unit \$10,492.17 as referenced in Table 7.

				Partial
Treatment	Control			Eta
Mean/n	Mean/n	F	Sig.	Squared

Table 7 Cost Per Case ANOVA Summary

Cost per						
Case	2002	\$5732.91/474	\$7823.20/466	134.244	.000**	.125**
	2003	\$6271.43/464	\$9695.85/497	306.01	.000**	.24**
	2004	\$6142.52/355	\$9158.24/547	173.47	.000**	.161**
	2005	\$7183.96/477	\$9777.39/549	134.17	.000**	.116**
	2006	\$8845.61/513	\$10492.17/560	134.17	.000**	.052**

**p = <.05 with Eta squared = >.01

Estimated Marginal Means of Cost per Case





The plot graph in Figure 25 visually demonstrates the significant difference in cost per case in years 2002, 2003, 2004, 2005 and 2006. The treatment unit cost per case was lower in every year as compared to the control unit. These significant differences indicate the Planetree patient-centered model of care treatment unit implementation had a positive impact on the cost per case (lower cost in the treatment unit). While both units demonstrated an increase in cost per case, the treatment unit consistently maintained a statistically lower cost per case nearly proportional to the control unit. This consistent difference is an important indicator of performance and assists in evaluating the impact of the Planetree patient-centered model of care on cost per case.

The cost per case evaluation suggests that the treatment unit is different from the control unit. Statistical significance was demonstrated in every year 2002-2006. When comparing the mean length of stay plot graph in Figure 24 and the cost per case plot graph in Figure 25 it is important to note the nearly identical mirror image trends verifying that length of stay is a major contributor to the cost per case. The consistently lower length of stay in the treatment unit in years 2002-2006 contributed greatly to the statistically lower cost per case. In addition, the treatment unit slightly reduced the higher cost average RN productive hours per patient day through an increased use of lower cost per cost per case and LVNs). This evidence validates that the Planetree patient-centered model of care treatment unit implementation positively impacted the cost per case resulting in lower cost for the treatment unit.

Summary of Findings

This retrospective quasi experimental study validated that the Planetree patientcentered model of care had a statistically significant impact on patient satisfaction, length of stay and cost per case quality outcomes.

When comparing patient satisfaction results, the patients from the treatment unit were more satisfied with meal and nursing services while the patients from the control unit were more satisfied with physician services. In addition, while not statistically significant the treatment unit also demonstrated higher mean scores in both the individual annual and summary patient satisfaction mean score composite comparisons for admission, meals, nurses, tests and treatment, visitors and family, discharge, overall assessment, and overall mean score.

When comparing length of stay and readmission, the patients from the treatment unit had a lower length of stay with no difference in readmission rates noted between units. In 2003, the length of stay for patients in the treatment unit was statistically lower than the control unit. In addition while not statistically significant, in years 2002, 2004, 2005 and 2006 the patients in the treatment unit also demonstrated a lower length of stay.

When comparing cost per case, the treatment unit had a statistically lower cost per case in every year (2002 through 2006). In each of the years (2002-2006) the treatment unit had an increase in the total number of patient days as opposed to the decrease in the control unit. In addition, while the treatment unit used more overall productive nursing hours per patient day, the use of lower cost clerical and aide/LVN hours increased while there was a slight decrease in the higher cost RN hours as compared to the control unit increase in high cost RN hours.

CHAPTER 5

Discussion

The purpose of this study was to use existing inpatient hospital unit data to assess the impact of Planetree's patient-centered model of care process on key quality outcome variables. The functional relationship among the three elements (inpatient hospital unit, Planetree patient-centered model of care and quality outcomes) means that changes in the care process will influence the effect of care on health status and other quality outcomes (Donabedian, 1980; Donabedian, 2003). Hospital unit comparisons were used representing nursing administration system level of analysis with the goal of providing information to enhance quality nursing and organization effectiveness (Scalzi & Anderson, 1989). Previous research has demonstrated that the traditional health care process is not meeting the needs of patients and their families. The link between patient-centered care and quality outcomes such as increased patient satisfaction, length of stay, readmission, cost per case and productive nursing hours per patient day has been postulated; however, to date little to no research has been conducted examining this issue.

A convenience sample of two hospitals belonging to the same large healthcare system located in a large southern California healthcare market was used. Retrospective data was obtained electronically from system and entity organizational fiscal and clinical data bases. Data on cost per case, length of stay and patient satisfaction were measured at the individual patient level and aggregated to the unit level. Data on productive nursing hours per patient day were measured at the unit level. This chapter presents an overview and discussion of the findings organized by the three research questions followed by implications for research, practice and education.

Overview of Findings

Research Question #1: What is the Impact of the Planetree Patient-Centered Model of Care on Patient Satisfaction

Three observed overall patterns were noted. First, in the 2 X 5 ANOVA positive symmetrical trends were noted in both the treatment and control units indicating the influence organization-wide cultural shift efforts focused on patient satisfaction and the national movement toward publicly reporting patient satisfaction information. Generally the upward mean score trends of 2003 and 2004 were followed in 2005 with a slight downward trend immediately followed by a strong upward surge in the 2006 patient satisfaction mean scores. Further research is necessary to determine what organization-wide causal factors resulted in lower scores for this one year.

Second, the control unit demonstrated statistically significant higher patient satisfaction mean scores in the physician composite section both in the individual year comparisons of 2003, 2005 and 2006 and in the overall 2002-2006 summary. Within the parameters of this analysis the only physician-related factor potentially relevant to this finding is the higher percentage and greater number (65.6%, n=385) of patients in the treatment unit who reported insurance as limiting their choice of physician as compared to the percentage (53.2%, n=150) of the control unit patients. It is unknown whether the limited patient control over their choice of physician negatively impacted satisfaction with their doctor. It is important to use this information to further examine through physician focused research the behaviors associated with achieving these higher scores.

Third, the treatment unit mean scores were consistently higher than the control unit. In the 2 X 5 ANOVA statistical significance was demonstrated both in the meals and nurses composite categories in individual yearly comparisons and in the summary year's comparison, validating that the treatment unit patient satisfaction mean scores were significantly higher. In addition, while not all the composites demonstrated statistical significance ,it is also important to note the treatment unit demonstrated a greater percentage ($\geq 60\%$) of higher mean scores in 9 of 11 or 81.8% composite categories in the annual and summary mean score composite comparisons. This evidence validates that the Planetree patient-centered model of care treatment unit implementation had a positive impact on patient satisfaction scores.

In reviewing the Planetree program implementation records the following food and nutrition relevant changes were made in 2003 and 2006. In 2003, the dietary department implemented a same-day dining service. A patient ambassador personally began visiting every patient in the morning to discuss and verify the day's restaurant style menu options. Patient preferences and dietary restrictions are reviewed and discussed. General questions are answered, minor non-clinical requests are attended to and any additional requests made by the patient are immediately conveyed to and addressed by the patient's nurse. In 2006, the dietary department revised and updated all the hospital recipes with increased emphasis on taste and nutritional value in addition to providing increased ethnically diverse menu options consistent with restaurant choices. On the patient care units,

nursing team members (nurses and nursing assistants) and dietary team members work together to assure that the patients and their rooms are readied for meal service thus assuring meals are delivered and offered to the patients without delay.

In reviewing the Planetree program implementation records, several nursing-relevant human interaction, human touch, complementary/alternative therapy changes were made in 2002 and 2003. In 2002 every employee, including the nursing staff, attended a mandatory retreat where they learned about the Planetree patient-centered model of care and the hospital-wide adoption of this model of care. During these retreats employees took part in group exercises focused on understanding the hospital experience from the patient's perspective. The mandatory education reinforced the need to critically evaluate every aspect of the hospital experience with the patient perspective as central to all components of care. Partnering with patients and their family members as if members of one's own family became the nursing-patient relationship standard. In 2003, after receiving Medical Staff approval, nursing team members began providing patients Clinical Aromatherapy and/ or Healing Touch. The Buckle Institute method of utilizing essential oils was identified as the Clinical Aromatherapy benchmark. Working with a Clinical Aromatherapy Consultant trained by the Buckle Institute, Department Guidelines for the use of nine essential oils were developed and approximately 35 nurses were trained. Healing Touch International Level I was identified as the Healing Touch minimum competency benchmark. Two Healing Touch Level IV trained nurses employed at the treatment unit lead training for approximately 40 nurses. Daily patient rounds by the Charge Nurse provided an opportunity to verbally verify that these unique stress-reducing techniques had been offered.

Research Question #2: What is the Impact of the Planetree Patient-Centered Model of Care on Length of Stay and Readmission

Four observed overall patterns were noted. First, in the 2 X 5 ANOVA a symmetrical downward length of stay trend was noted in both the treatment and control units indicating the influence of organization-wide efforts focused on decreasing length of stay. Because organization-wide orthopedic total joint replacement clinical pathways and case management practices have been adopted, the similarity in the mean length of stay is not surprising.

Second, while both units demonstrated a decrease in overall length of stay, the treatment unit consistently maintained a lower mean length of stay nearly proportional to the control unit. This consistent difference is an important indicator of performance and assists in evaluating the impact of the Planetree patient-centered model of care on length of stay. Generally the decreasing length of stay trends of 2003 and 2004 were followed in 2005 with an upward trend immediately followed by a downward trend in 2006. Further research is necessary to determine what organization-wide causal factors resulted in the increased length of stay for this one year.

Third, the length of stay 2 X 5 ANOVA evaluation demonstrated that the treatment unit is different from the control unit. Statistical significance was demonstrated in the 2003 comparison. In addition, in each of the five annual mean lengths of stay comparisons the treatment unit consistently demonstrated a lower mean length of stay. This evidence validates that the Planetree patient-centered model of care treatment unit implementation had a positive impact on length of stay.

In reviewing the Planetree implementation records many changes may have contributed to the lower length of stay. Open visitation encourages family members to be present and involved no matter the day or time, a formal Care Partner Program provides an opportunity for family and/or significant others (identified by the patient) to be formally recognized and involved in patient care, open medical records encourage the use of the medical chart as a teaching aide thus providing a proactive opportunity for patients and their family members to clarify any aspects of care that are not fully understood, individualized patient and family health care information packets are developed during the hospital stay providing everyone a much-needed health care resource for current and future use. All programs were and continue to be implemented with the goal of shifting from an environment of passive patient and family participation to an environment that encourages and nurtures active, involved, and engaged patients and family members who work hand in hand with the health care team to achieve three patient and family goals: live life with dignity and optimal health, heal to the highest degree of function possible and grow in all the ways that have meaning for them. As a constant reminder of the ongoing unique effort implemented to improve the health care environment for our patients, our team members and our physicians, the words Live + Heal + Grow were and continue to be used.

Fourth, the readmission rate 2 X 2 Chi-square and logistic regression analyses found no significant difference between the two units. Because organization-wide orthopedic total joint replacement clinical pathways and case management practices have been adopted the similarity in the readmission rate is not surprising. In, addition the self reported health status in both units of "good" (4.2 on a 5 point scale), nearly equivalent

age (67.33 versus 64.4), and the treatment unit variance of some patients self reporting readmission may also have contributed to this finding.

Research Question #3: What is the Impact of the Planetree Patient-Centered Model of Care on Productive Nursing Hours per Patient Day and Cost per Case

Because the raw data and standard deviation information were unavailable, the average annual productive nursing hours per patient day was summarized and general differences between the units discussed. In the future, obtaining raw data would allow more adequate statistical analysis. In addition, the control unit data for year 2002 was not available and therefore not included in the comparison.

Five observed overall patterns were noted. First, on average the treatment unit consistently used more productive nursing hours per patient day. The treatment unit on average consistently used more clerical average hours per patient day and had a slight upward trend of aide/LVN average productive hours per patient day. In the treatment unit aides and LVN's function comparably for the majority of worked hours, however in times of increased census the LVN may work with the Charge RN taking a patient assignment.

Second, the total number of patient days trended upward from 6232 to 8048 for the treatment unit as opposed to the control unit trend downward from 7332 to 6896.

Third, the average productive RN hours per patient day trended upward in the control unit as opposed to the slight downward trend in the treatment unit. The upward trend in the control unit may be the result of three factors; the slight decrease in total patient days, a greater reduction in the nurse to patient ratio (i.e. going from 1:6 to 1:4 rather than 1:6 to 1:5) and the implementation of a more RN-rich skill mix. Fourth, the cost per case ANOVA a symmetrical upward trend was noted in both the treatment and control units indicating the organization-wide influence and cost of care efforts. Because organization-wide orthopedic total joint replacement clinical pathways and case management practices have been adopted the similarity in cost per case is not surprising.

Fifth, the ANOVA cost per case analysis demonstrated the treatment unit is different from the control unit with a statistically significant lower cost per case in every year 2002-2006. While both units demonstrated an increase in cost per case, the treatment unit consistently maintained a statistically significant lower cost per case nearly proportional to the control unit. When comparing the mean length of stay trends and the cost per case trends it is important to note the nearly identical mirror image trends verifying that length of stay is a major contributor to the cost per case. The lower length of stay in the treatment unit contributed greatly to the lower cost per case. In addition, the treatment unit slightly reduced the higher cost average RN productive hours per patient day through an increased use of lower cost personnel (clerks, aides and LVNs). This evidence validates that the Planetree patient-centered model of care treatment unit implementation had a positive impact on cost per case.

Implications

Implications for Research

Continued work needs to be done on developing and collecting consistent preimplementation and post-implementation data so that meaningful comparisons of quality outcome measures may be made. The proliferation of publically reported quality outcome data will assist in this effort, however, in addition it is recommended that hospitals and

healthcare systems develop and implement and maintain standardized clinical and financial historical archives as a part of the Planetree patient-centered model of care implementation process.

The assessment of productive nursing hours per patient day was limited to a general comparison rather than a statistical analysis due to a lack of comparative historical information. When developing financial historical archives hospitals and healthcare organizations are encouraged to collect pay period to pay period nursing hours per patient day information. Examination of the skill mix and hours per patient day variation would provide a better understanding of how the Planetree patient-centered model of care can be most efficiently and effectively implemented.

Because of the limited retrospective convenience sample involved in this study the findings cannot be generalized. Additional research is needed to assess the impact of Planetree's patient-centered model of care in and amongst different settings including, but not limited to; hospital units, patient populations, levels of care, outpatient and primary care settings and local-regional-national-international healthcare markets,.

Better understanding of how the Planetree patient-centered model of care impacts employees and physicians is also needed. Key elements of the Planetree patient-centered model of care such as healthcare team member annual retreats, formal reward and recognition programs and formal caring for the care giver programs are directed to improve the working environment for all healthcare team members. While it is known that the treatment facility employees and physicians have reported increasingly high satisfaction rates, this information is anecdotal and formal research is necessary. In addition, an informal survey conducted within the treatment facility indicated that not

only are the employees increasingly satisfied, recruitment and retention has been improved. The nursing and physician shortage is ever more concerning, effective recruitment and retention strategies are imperative to hospitals and healthcare organizations. Formal research demonstrating Planetree's impact on recruitment and retention is a logical next step.

Implications for Education

While the findings of this study are specific and cannot be generalized, implementation of Planetree's patient-centered model of care may improve the performance of health care institutions. The improved quality outcomes and reduced costs exemplified by the treatment unit inform healthcare and nursing administrators and educators as to the potential benefits of the Planetree patient-centered care model. By including this model of care in healthcare and nursing administrative educational programs, students will be able to consider such a model of care.

Implications for Practice

Research validating the varying definitions of patient-centered care is scarce. This study provides much needed verification that by using the Planetree's patient-centered model of care the treatment unit effectively and efficiently improved the patient's hospital experience, clinical outcomes and the unit's financial performance. This research provides direct evidence supporting the use of Planetree's model of care. Hospitals and healthcare organizations seeking an evidenced based approach to the implementation of patient-centered care will benefit from the information in this study.

Hospitals across the nation are striving to improve clinical outcomes, patient satisfaction and financial performance. Consumers, regulators, legislators, and insurers are demanding, monitoring, rewarding improvements and soon reimbursement will be linked to such demonstrated improved quality outcome performance. Implementing patient-centered care programs is currently under consideration as one such performance measure. Requiring implementation of patient-centered care requires that there be an identified framework or implementation guideline. Without such foundational information inconsistent and/or nonexistent improvements are at risk. This study provides consumers, regulators, legislators and insurers supporting documentation regarding the effectiveness of the Planetree's patient-centered model of care.

In conclusion, in this group of hospitalized adults undergoing elective total knee or total hip joint replacement surgery also completing and returning the English speaking inpatient satisfaction survey the findings indicate the Planetree patient-centered model of care positively impacted patient satisfaction, length of stay and cost per case. Nursing and hospital administrators seeking to improve the inpatient hospital experience should consider implementation of the Planetree patient-centered model of care.

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