PATIENT EXPECTATIONS FOR HEALTHCARE EXPERIENCES AMONG THE TAIWANESE POPULATION

By

I-Wen Chang

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Nursing)
In the University of Michigan
2012

Doctoral Committee:

Professor Richard W. Redman, Chair
Professor Beatrice J. Kalisch
Senior Research Scientist Steven G. Heeringa
Assistant Professor Wui-Chiang Lee, National Yang-Ming University, Taiwan

DEDICATION

To the loves of my life, Dad, Mom, Hua-Shan, and Chung-Sheng**.**

ACKNOWLEDGEMENTS

It was a tough decision to pursue a doctorate at University of Michigan. However, without the guidance from the following mentors, this journey would never have been so fulfilling and this research would never have blossomed.

Deeply sincere appreciation goes to Dr. Richard Redman, the academic advisor for my doctoral program as well as the chair of my dissertation committee. This five year journey was never smooth. Dr. Redman pointed out the directions when I was lost, wondering and struggling in the forest of knowledge. He constantly encouraged me to keep the faith and march forward. Without his encouragement, I would never have been able to complete this journey.

Heartfelt thanks go to Dr. Beatrice Kalisch for being such a wonderful advisor in the health care administration area. Her incredible work in nursing images, healthcare policy and nursing research has broadened my viewpoint and strengthened my ability to execute my research.

Dr. Steven Heeringa laid out a solid foundation in survey methodology for me and his advice on constructing regression models enlightened this research. Dr. Wui-Chiang Lee provided a comprehensive perspective on health care quality as well as patient satisfaction. Without his input in regards to the psychological aspect of patients, this research would never have been so rich.

Sharp intuition and firm guidance from Dr. Kerby Shedden assisted me in exploring the underlying meaning of my research dataset. Without his support

and insights, I would never have been able to make it through the most challenging last mile.

Also, special appreciation goes to the Taipei Veterans General Hospital nursing department; without full support from Dr. Teresa Yin and Dr. Sherry Chen, I would never have had the opportunity to begin the PhD program or obtain the resources to finish it. Without the support from theTaipei Veterans General Hospital orthopedic department, Dr. Tain-Hsiung Chen, Dr. Chien-Lin Liu, and Dr. Wei-Ming Chen, this research would never have been completed.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

While measuring patient satisfaction is a conventional approach to understanding patients' evaluation of health care encounters, there are several theoretical and methodological concerns in doing so. Affective characteristics of satisfaction survey, ceiling effects and reliability of satisfaction measures remain problematic for assessment of satisfaction. Instead of relying exclusively on patient satisfaction to guide quality improvement efforts, patient expectations regarding their health care experience was proposed to provide a deeper understanding and better approach to designing and improving health care delivery. **PURPOSES:** The purposes of this study were to (a) understand patient expectations of the outcomes of surgery in the Taiwanese population; (b) understand patient expectations post-surgery in the Taiwanese population and (c) understand whether patient expectations change over time. **METHODS:** This study utilized a prospective research design with data collected pre and post total knee replacement surgery. Total sampling was used with patients drawn from a major health care system, located in northern Taiwan. Data were collected one day before and six weeks after surgery. Study instruments included the Expectations Questionnaire (Razmjou et al., 2009), SF-36, and WOMAC (The Western Ontario and McMaster Universities Osteoarthritis Index). **RESULTS:** A total of 250 patients were interviewed before surgery with 170 of those participating after surgery. Six questions representing six domains of

expectations for surgery outcomes were investigated. Expectations on all domains were highly skewed. Principal component factor analysis was performed to condense the six questions and reduce the skewness. Analysis revealed two factors with eigenvalues exceeding 1 on both time points and explaining a total of 57% and 74% of variance respectively. Principal component factors were computed for each patient by summing up the score of each expectation question times loading score. Multiple linear regression models were computed for principal component factors and patient factors, expectation antecedents and functional status. Before surgery, PCF 1 (principal component factor one), explaining 13% of variance, portrayed patient expectations focusing primarily on knee function; education level, quality of life physical aspect, personality type, heard information about surgery experience before and general health belief were significant predictors. PCF2, explaining 5% of variance, described patient expectations focusing on interaction with others. After surgery, PCF3, explaining 18% of variance, presented patient expectations for knee function, where age, procedure type, insurance, region, and physical aspects of quality of life were significant predictors. PCF4, explaining 21% of variance, described patient expectations concerning recovery, age, mother tongue, physical aspects of quality, WOMAC--function were significant predictors. **CONCLUSIONS:** Patient expectations for outcomes of total knee replacement surgery were high in general among the Taiwanese population. Expectations changed over time. Patient factors, personality type, expectation antecedents, and functional status

were predictors of patient expectations and suggest important factors to consider when treating patients undergoing knee replacement surgery.

CHAPTER ONE

INTRODUCTION

For clinicians as well as nurse managers of in-patient units, the ultimate goal of providing therapeutic interventions and managing human and physical resources is to deliver high quality patient care service that ensures patients' needs are met. This undertaking begins with recruiting competent staff, providing continuing opportunities for ongoing education, making advanced medical equipment and devices available, and embedding continuous quality improvement practices within the organization (Laing, 2002). However, the question remains whether these efforts have produced the desired goal—delivery of high quality health care, in which patient needs are fulfilled and their expectations consistently met.

In his 1980 work, Donabedian stated that meeting clients' needs and expectations should be the final goal for all clinicians, and that patient satisfaction should serve as the ultimate evaluation for health care outcomes (Donabedian, 1980). With this statement, he set the standard with regard to critical indicators for health care success. For the past three decades, measuring patient satisfaction has served as a major vehicle for comprehending the patient's perspective. Patient satisfaction survey results have been utilized as a compass to guide subsequent healthcare quality improvement efforts. Quality improvement efforts based on patient satisfaction surveys, however, often do not result in

meeting patients' needs. In addition, patient satisfaction surveys have had long standing use as a major source of evaluation for quality.

A 2009 study at Taipei City Hospital of 283 medical staff and 258 inpatients compared how inpatients and medical staff viewed patient rights. The results of this study revealed that the degree of attention given to patient rights' issues was significantly higher in medical staff than in the inpatient population. However, the degree of perceived protection and observance of patient rights was higher for medical staff than for inpatient population. There was a discrepancy between the perception of the importance of patient rights and the actual protection and observance of patient rights from a patient's experience. The study also reported that patients generally had the perception that significantly less attention is paid to protecting patient rights than they expected (Wang, 2009). A study exploring the quality gap analysis in the practice the service of traditional Chinese medicine investigated 223 traditional Chinese medicine physicians and 1,102 patients in Taiwan. The study revealed that patient expectations of service obtained through providers of traditional Chinese medicine are higher than physicians anticipated them to be. The investigation reported that patient satisfaction after experiencing non-traditional medical service was lower than their expectations of service from practitioners of traditional Chinese medicine (Lee, 2007).

These studies provide evidence that some patient needs remain unmet, and there is still considerable room for improvement in the subjective quality aspect of health care among the Taiwanese population. Instead of relying solely

upon patient satisfaction as an indicator to guide quality improvement efforts, research is needed to obtain and synthesize a deeper understanding of patient expectations with respect to their experiences within the health care system, and then see how these expectations might serve as the “true north” for designing and improving any health care delivery system.

While patient satisfaction is a conventional approach to understanding patients' evaluation of health care encounters, there are,several theoretical and methodological concerns in taking that approach. In addition to often not measuring the discrepancy between expectations and actual experience, there is a primary focus on the affective element in satisfaction measurement. This characteristic results in satisfaction measures often viewed as affective, not evaluative (Aharony & Strasser, 1993; Maciejewski, Kawiecki, & Rockwood, 1997). Psychometric and sampling issues are also involved in the investigation of patient satisfaction (Wensing & Elwyn, 2003). A review of patient satisfaction studies reveals that only 46 % reported some attention to reliability (Sitzia, 1999). Satisfaction survey results vary in the satisfaction measured (Ross, Steward, & Sinacore, 1995). The patient satisfaction results are likely to demonstrate ceiling effects as well. Actual health care experiences may not be reflected on satisfaction surveys, because patients have cognitive involvement while responding to satisfaction surveys (Ware, 1997; Williams, 1994; Williams, Coyle, & Healy, 1998). Given these considerations, it is problematic to rely on patient satisfaction survey results as the only means for both understanding patients' perceptions of their health care encounters and as a reference for quality

improvement. Instead of relying exclusively on patient satisfaction to guide quality improvement efforts, a deeper understanding of patient expectations in regards to health care experience is proposed as a better approach to design and improve health care delivery.

The value of examining patient expectations has been well documented. Besides satisfying patient demands, understanding and meeting patient expectations can increase patient compliance with recommendations and a care plan (Redman & Lynn, 2005; Sherbourne, Hays, Ordway, DiMatteo, & Kravitz, 1992), can create greater satisfaction with health care, and can result in less hospital-shopping and a lower propensity of malpractice lawsuits (Hickson et al., 1994; Levinson, Roter, Mulloly, Dull, & Frankel, 1997). From the health care administrator's perspective, understanding patient health care expectations provides a practical reference point for better allocating limited resources and identifying niches of competition. From the policy maker's perspective, understanding patient expectations could be the keystone of good institutional and national policy making (Kravitz, 2001).

Statement of the Problem

Patient expectations about their health care have been examined in qualitative studies conducted in Western countries (Redman & Lynn, 2005; Schroder, Ahlstrom, & Wilde-Larsson, 2006). Less attention has been paid to the potential change in patient expectations over time. Little is understood from the patient's perspective of health care experiences, especially among the Taiwanese. In order to better design health care service and interventions which

fit a patient's health care needs, it is critical to explore patient expectations about their health care experiences. This study focused on developing a deeper understanding of patient expectations among the Taiwanese population. The scope of change in patient expectations over time was examined. Furthermore, this study has endeavored to clarify which selected patient factors, functional status and beliefs are predictive of realistic patient expectations about health care among the Taiwanese.

Study Aims and Research Questions

The aims of this study and research questions were as follows.

Aim 1: To understand patient expectations of the outcomes of surgery in the Taiwanese population.

Research questions:

1a) What are patient expectations of the outcome of surgery within a particular health care system?

1b) What is the relationship between selected patient factors and patient expectations?

1c) What is the relationship between expectation antecedents and patient expectations?

1d) What is the relationship between functional status and patient expectations?

1e) What are the predictors of patient expectations?

Aim 2: To understand patient expectations post-surgery in the Taiwanese population.

Research questions:

2a) What are patient expectations post-surgery within a particular health care system?

2b) What is the relationship between selected patient factors and patient expectations post-surgery?

2c) What is the relationship between expectation antecedents and patient expectations post-surgery?

2d) What is the relationship between functional status post-surgery and patient expectations post-surgery?

2e) What is the relationship between system outcomes and patient expectations post-surgery?

2f) What are the predictors of patient expectations post-surgery?

Aim 3: To understanding the change of patient expectations over time.

Research questions:

3a) What is the degree of change in patient expectations after surgery?

3b) What are the relationships between pre-surgery and post-surgery patient expectations?

3c) Do patients change their expectations after surgery?

This study employed a pre-test/post-test prospective research design. Quantitative questionnaires and the survey method were chosen to explore patient expectations and functional status. Information about basic demographics (age and gender), personal features (mother tongue, education level, insurance information, procedure type, comorbidity, zip code) were gathered. Three short

questions were asked to portray patients' personality. Information about complications and system outcome were also collected. Two methods were chosen to execute the interview, face-to-face and telephone interviews for pre-surgery and post-surgery respectively. The time points for data collection were one day before surgery and six weeks after surgery.

Exploring patient expectations prior to surgery and how expectations may have changed after surgery provides clinicians important insights with regards to their service population. The results serve as an evaluation for delivery of current health care services and also provide potential evidence for re-engineering and re-designing delivery systems for true patient-centered care. Moreover, understanding basic demographics, personal features, functional status, personality, and antecedents related to patient expectations will contribute toward knowledge development around patient-centered care. The relationship between outcomes and expectation fulfillment after surgery will provide a clearer direction for health care administrators when managing the quality of health care services.

The concept of expectation was introduced and examined after a systemic review of the literature. The conceptual framework was established and is presented in Chapter Two. Chapter Three covers the research design and methods. Data analysis results are reported in Chapter Four. Discussion of study findings and recommendations for practice and future research are presented in Chapter Five.

CHAPTER TWO

REVIEW OF LITERATURE

Background

Quality of health care

Optimal quality of health care is always the ultimate goal for every health care provider and administrator. Before developing health care quality benchmarks, it is essential to clarify what health care is and how health care quality is defined. Definitions of health care are varied and contested in the literature (Heyman, 1995; McCance, McKeena, & Boore, 1997; C. Webb, 1996). Health care is defined as being composed of health care systems and actions taken within them designed to improve well-being and health (Campbell, Roland, & Buetow, 2000). Donabedian first proposed a system-based framework of structure, process, and outcome, which has provided the major template for evaluation of health care. (Donabedian, 1980, 1988). Ever since then, Donabeidan's model has been widely used as a framework for evaluating health care quality.

The structure of health care refers to the organizational factors that constitute the institutions in which care is provided. The two domains of structure are physical characteristics (such as resources and management) and staff characteristics (e.g. staffing matrix and teamwork). The process of care involves

the interactions between users and the health care structure. Process is the actual delivery of health care. Technical interventions and inter-personal interventions are two key processes. Outcomes are consequences or results of care. Health status and user evaluations are two outcome categories (Donabedian, 2003).

Any health care encounter will involve all three dimensions discussed above. Health care providers and patients are the two key characters. The payer, the manager, and the society also interact directly or indirectly with health care processes to a certain extent. So, when trying to define quality of health care, the perspective taken will influence how health care quality is defined and measured.

Health care quality is a multi-dimensional concept. People of divergent perspectives involved in the health care encounter will consequently assess health care quality differently. A number of attributes can characterize the quality of health care service (Donabedian, 2003; Wyszewianski, 2009). Several attributes in the literature are utilized to examine and categorize health care quality. However, different aspects within the health care process and among different health care provider groups tend to value certain attributes more than others and, as a result, health care quality is portrayed accordingly. This is illustrated in Table 1.

The next level of inquiry arises with the question of who should be at the center when health care quality is evaluated. The answer to this question might vary depending on who engages in this pursuit (Brown, 2007). The Institute of Medicine (IOM) report, *Crossing the Quality Chasm: A New Health System for*

the 21st Century, released by the Committee on the Quality of Health Care in America (2001), answered this inquiry by pointing out the importance of patient-centered care. Based on this report, the current health care delivery system fails to provide consistent, high quality medical care. In order to reform the health care system, six aims for improvement and ten rules for redesign of health care delivery were proposed. Most important of all, subjective patient experience is recognized as the fundamental element in any redesign of the health care system. Patient-centeredness along with safety, effectiveness, timeliness, efficiency, and equity are the critical issues that need to be addressed immediately. The patient's perspective is once again emphasized and serves as a guide for needed performance improvement.

Table 1 Stereotypical Differences in Importance of Selected Aspects of Care to Key Stakeholders' Definitions of Quality

	Technical Performance	Interpersonal Relationship	Amenities	Access	Patient Preference	Equity	Efficiency	Cost Effectiveness
Clinician	+++	+	+	+	+	+	+	–
Patient	++	+++	+++	++	++	+	+	–
Payer	+	+	+	+	+	+	+++	+++
Manager	++	+	+++	+++	+	++	+++	+++
Society	+++	+	+	+++	++	+++	+++	+++

Note: From Wyszewianski, L. (2009). Basic concepts of health care quality. In S. B. Ransom, M. S. Joshi & D. B. Nash (Eds.), *The Healthcare Quality Book* (pp. 29). Chicago: Health Administration Press.

Patient perception of health care quality

In 1987, the Picker/Commonwealth Program conducted a large scale qualitative study, "*Through the Patient's Eyes,*" that examined health care experiences from the patient's perspective, interviewing 6,400 recently hospitalized patients, caregivers, family and friends. Seven main themes were identified: (1) respect for patients' values, preferences, and needs; (2) coordination 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; and (7) transition and continuity (Gerteis, Edgman-Levitan, Daley, & Delbanco, 1993). Patients and family caregivers reported that they felt powerless, unrecognized and unimportant when managing their health care. These are indeed wake-up calls for first line health care providers.

Patients' perceptions of high quality health care have also been investigated. Limited studies have examined how patients' own definitions of quality health care were formed. Small sample populations, semi-structural interviews and focus groups were utilized as the main methods for this inquiry. Major categories identified were: patient-centered care; access; communication and information; courtesy and emotional support; technical quality; efficiency of care and organization; and structure and facilities (Anderson, Barbara, Weisman, Scholle, & Binko, 2001; Attree, 2001; Infante, Proudfoot, David, Bubner, & Holton, 2004; Larrabee & Bolden, 2001; Ngo-Metzger, Massagli, Clarridge, Manocchia, & Davis, 2003; Radwain, 2000; Stichler & M.E., 2000). Patient-

centered care is the first priority of a patient's perception of receiving high quality health care.

Patient satisfaction as quality measure

Much attention has been given to the value of patients' perceptions of their health care experiences and their evaluations of encounters. Also, patient-defined needs and expectations of health care are increasingly recognized as the essence of health care quality (Hudak, Hogg-Johnson, Bombardier, McKeever, & Wright, 2004). The traditional approach to designing patient-centered care, however, has been to utilize patient satisfaction survey results as a major reference. There are several pitfalls in doing so.

First, using patient satisfaction as a measurement of the quality of health care service views the patient primarily as a health care customer. One major difference between business and health care contexts relates to their primary goals. Since the goal for business is maximizing profits, rising customer satisfaction translates into increased profits. For health care professionals, the primary aims are to maintain health and prolong life; goals for treatment and interventions are to eliminate the patient's complaints of pain and increasing functioning. This mismatch between primary goals and outcome measures can be problematic (Jennings, Heiner, & Loan, 2005). Secondly, the product or service that is measured for customer satisfaction metrics is usually a one-time episode, which does not take into account the fact that health care encounters usually involve many different personnel, departments, and professionals. If we take the measurement of a single episode or experience as the evaluation for a

whole health care encounter, the entire health care process is oversimplified (Jennings, et al., 2005).

Thirdly, patient satisfaction surveys often begin with the provider interpretations of what the patients may want and need. If the patient's perspective is the goal, it is necessary to design patient satisfaction surveys from the patient's point of view. Patient and provider may have very different views of what is important. Furthermore, satisfaction is measured as a discrepancy between expectations and actual experience. Satisfaction results often blend the discrepancy between expectations and experiences and affect attached to this experience. It is not appropriate or complete to make decisions based only on the satisfaction results without addressing what patients are expecting in their health care encounters.

There are also several methodological challenges — validation, psychometric and sampling — to patient satisfaction surveys (Wensing & Elwyn, 2003). First, patient satisfaction surveys are usually designed by health care institutions and do not have strong psychometric properties. In a review of patient satisfaction studies, only 46% reported some degree of validity or reliability of the data. Reliability information is rarely reported in satisfaction investigations. The lack of sound psychometrics will produce invalid results (Sitzia, 1999). Results from different survey tools on the same population may vary (Ross, et al., 1995). Sampling methods and non-responders are both concerns (Etter & Perneger, 1997; Rubin, 1990). Satisfaction surveys are usually distributed after health care encounters, either by hand to patients in person or sent by mail. Patients who are

willing to fill out and turn in satisfaction surveys tend to be those who have had better experiences and functional status. The skewness of the sample population and non-response bias could potentially bias the interpretation (Perneger, Chamot, & Bovier, 2005). There is also cognitive reasoning involved in responding to satisfaction surveys. A study performed in the UK explored the phenomenon that most patient satisfaction surveys undertaken report high levels of satisfaction. In-depth interviews were employed, and the results revealed that although patients' experiences were less than desired during health care service encounters, they tended to rationalize the situation and make excuses for the providers (Williams, et al., 1998). Finally, health care service satisfaction surveys are associated with social desirability bias, especially if the anonymity issue is not carefully handled (Sabourin et al., 1989).

Expectation: the Concept

Expectation versus Expectancy

Two main terms found in the literature are *expectation* and *expectancy*. In ordinary conversation, expectation seems to be the word used more often, but an examination of the existing scientific literature reveals that expectancy also appears frequently. Do these two terms describe the same concept, and can they truly be used interchangeably? Based on definitions found in the American Psychological Association's Dictionary of Psychology (VandenBos, 2007), expectation is a state of tense, emotional anticipation. On the other hand, expectancy – as understood in cognitive psychology – is an attitude or mental set that determines the way in which a person approaches a situation.

Working from this framework, expectancy is mutual, more open to possibilities and without very strong emotional anticipation for future direction; in contrast, expectation is the emotional anticipation that is related to a particular context, with a tendency to lean in a certain direction. Thus, expectancy can be considered as the basic concept. When the concept of expectancy as defined above is applied to certain contexts, events, services, or products, it can be expressed as expectation. Although these two terms can be carefully distinguished in a scientifically rigorous fashion, in the literature they are used interchangeably.

Definitions

In the psychological literature, the term “expectancies” has been qualified in two major ways: probabilistic or normative. First, probabilistic expectancies are beliefs about the future, or perceived contingency likelihoods. Normative expectancies, on the other hand, are obligations or proscriptions that individuals perceive for themselves and others (i.e., what should happen, as opposed to what will or will not happen). This is viewed as probabilistic expectancy.

As previously explained, expectancies are beliefs about future events. Expectancy represents the mechanism by which past experiences and knowledge are used to predict a future event. When any action is initiated, a person will have an assumption (expectancy) about the ways in which that action will be interpreted by others. Often times expectancies are generated consciously or explicitly (e.g., when one dreads a dentist's appointment), yet many expectancies are generated unconsciously or implicitly (e.g., when one is

startled by misjudging a step down). Expectancies constitute the fundamental blocks of behavioral choices, and are a basic function not only of the human brain, but also of the brains of most other ambulatory organisms (Olson, Roese, Zanna, Higgins, & Kruglanski, 1996).

What is the origin of expectancy? At the most fundamental level, it is expectancy that allows us to use previous contingencies to regulate later actions. The purpose for this mechanism is the simplest motivation: the tendency to approach pleasant things and to avoid harmful matters. As Dennet (1991) describes, the fundamental purpose of brains is to produce the upcoming future. Memory must have implications for the future to maximize rewards and minimize punishment. Learning that behavior A leads to reward B is significant to the organism, to the extent that the organism can form a representation in the present of a future relation between behavior A and reward B. The evolutionary process has favored those that manage to construct predictions regarding future contingencies (i.e. expectancies). This ability to form representations about how certain actions will be linked to specific future results is the core feature of the human brain (Lewin, Dembo, Festinger, & Sears, 1944).

Antecedents

Expectancies are derived from beliefs and concern a future state of affairs. Beliefs are articles of knowledge that link object with attitude; all beliefs imply expectancies. What is not clear is where these beliefs arise from, namely, the antecedents of expectancies. Expectancies are derived from three different categories: personal experience, communication, and other beliefs.

Fazio and Zanna (1981) documented the importance of direct personal experience in the formation of beliefs and attitudes. The attitudes of persons with actual experience of a certain event will be more clear and confident regarding predictions of future behavior than those who lack such experience. Those beliefs generated by personal direct experience will be considered more trustworthy and are more confidently held compared to beliefs arising from other sources.

The second source of beliefs comes from communication with others, which can be considered indirect experience. Word-of-mouth from peer groups, schools or religious institutions all wield powerful social influence over an individual's beliefs. Mass media serve as another important source of information that also influences beliefs, especially when an issue is new, the person has a lack of personal experience, or the existing belief is weak (Jessop, 1982; Kinder & Sears, 1985).

The third source of beliefs is influence of other beliefs. That is to say, beliefs can be inferred logically from other beliefs in an inductive or deductive way. The particular type of belief that influences expectancies is causal attribution. When results are attributed to the same causes, perceivers form the expectancy that similar results will occur in the future. Logical inference might play a role in the development of all expectancies (Weiner, 1986), even those from direct or indirect experiences. Existing beliefs guide our inferences about objects and our willingness to rely on indirect sources.

Properties

The concept of expectancy holds different dimensional properties. The certainty of an expectancy refers to subjective probabilities linking the future event with a result at some degree of probability. Expectancies can range from a very low likelihood (lower than 20%) to an almost certain likelihood (higher than 80 %) (Ditto & Hilton, 1990; Higgins & Bargh, 1987).

Another property is explicitness. Not all expectancy is consciously generated. Some expectancy in daily life, generated without thought, is the likelihood of an occurrence. Most factual expectancies one might hold about the nature of the world are simply assumed to be true without any deliberate consideration or examination. Thus, any contradicting situation will definitely generate surprise. This is illustrated by people experiencing surprise when climbing a ladder but having a sudden misstep. The importance of expectancy is its motivational significance. More important expectancies have stronger implications than less important expectancies for underlying needs or motives of the individual.

Cognitive effect

The reasons that expectancy holds a significant position are the types of consequences it produces: cognitive consequences, affective consequences and behavioral consequences.

Expectancies affect a range of cognitive functioning, including attention, interpretation, attribution, counterfactual thinking and memory. Expectancies direct one's attention and influence what information is encoded; people often

see what they expect to see and notice instances that confirm expectancies accordingly. Also, expectancies guide the interpretation of information, especially for ambiguous information. Interpretation and attribution are closely related to the effect of expectancies. The basic effect of expectancies on attributions is that unexpected events trigger attribution processing; therefore, the disconfirmation of expectancies leads to more vigorous attributional thinking (Higgins & Bargh, 1987).

Counterfactual thoughts are representations of what might have been; that is, reconstructions of past outcomes in which some antecedent element is altered and a resulting alternative outcome is specified. Expectancies exert a central impact on counterfactual generation. Whereas an expected outcome evokes representations that are mainly consistent with the outcome, an unexpected outcome evokes thoughts of what might have been or what should have been. Counterfactual thoughts may also influence subsequent expectancies. If, for example, a student thinks, “If only I had studied harder, I would have passed my exam,” this student has identified a causally potent antecedent action that may be implemented in the future. This inference may lead directly to the expectation that studying harder in the future will result in passing, furthermore resulting in an intention to study harder for the next quiz, and an expectation of heightened performance (Bruner, 1957).

Because expectancies direct attention toward information that is either consistent or inconsistent with expectancies, both consistent and inconsistent information will result in better recall than irrelevant information. On the one

hand, expectancies provide a cognitive structure that facilitates the encoding and retrieval of consistent information. On the other hand, expectancies serve to make unexpected information surprising and salient, which increases the processing and memorability of inconsistent materials.

Application to social Issues: self-fulfilling prophecies

As discussed previously, expectancies are inevitable and essential components of daily life. Notably, expectancies are intertwined with social issues such as stereotypes, prejudice, the quality of educational opportunities, the accessibility and adequacy of health care, political and personal perceptions, and gender role socialization. When applying the expectation concept to a social issues problem, one important behavioral consequence initiated by expectation is the *self-filling prophecy* (Merton, 1948). In a self-fulfilling prophecy, a person's expectancy serves to elicit behavior from the target that confirms the expectancy and which might not have occurred absent the modifier of expectancy. Therefore, expectancy has the consequence of either changing the behavior of others or selectively pressuring others' behaviors in a direction consistent with the expectancy.

One classic and well known experiment by Rosenthal and Jacobson (1968) tested expectancy effects among teachers. Elementary school teachers were told that some of their students had been identified by an IQ test as "bloomers" who would show dramatic increases in intellectual performance. In reality, the so-called high IQ students were identified randomly by the researchers. Tests at the beginning and end of the school year showed that

bloomers manifested a significantly greater increase in IQ than did students who were not labeled. The important point illustrated by this study is that expectancies have consequences not only for the behavior of people holding those expectancies, but also for others around them (Rosenthal & Jacobson, 1968).

Application to marketing: disconfirmation paradigm

One field in which the expectation concept is often applied is marketing, especially in the study of customer satisfaction. The most central concept in the study of satisfaction is the disconfirmation paradigm. Satisfaction evaluation is based on expectations. In marketing, expectation and actual service experience are compared after experiencing a specific service or product. If an experience is better than expected, the evaluation will be positive and the consumer will be satisfied; likewise, if an experience is less or worse than expected, the consumer will rate it as unsatisfactory. Thus, the key to maximizing satisfaction is answering and meeting the expectation (Hoyer & MacInnis, 2007).

There are two traditional sayings in marketing regarding consumer expectations: "It is necessary to exceed customer expectations" and "Customers who expect and receive a poor level of quality will reduce their level of preference for the brand." Studies done by Rust and associates (1999) contradicted conventional thinking and demonstrated the importance of meeting consumer expectations.

Mathematical analytical models and cross-sectional and longitudinal studies with 160 undergraduate students at two large universities were investigated with respect to these two tenets of consumer expectations. The first

tenet is: “It is necessary to exceed customer expectations.” Both the analytical model and the longitudinal experiments contradict this conventional wisdom. The longitudinal study showed significant positive preference shifts as long as the customer expectations were met exactly. Based on the analytical model, these experiences cause a shrinkage in the variance of the predictive distribution for the next transaction; that is, experience of a product leads to decreased perception of risk, and decreased perception of risk leads in turn to greater consumer preference. Thus, meeting expectations should unambiguously result in higher preference.

The second tenet is: “Customers who expect and receive a poor bad level of quality will reduce their level of preference of the brand.” The analytical model and related experiments contradict this seeming truism. In cross-sectional experiments, subjects did not lower their quality perceptions of a service when their expectations were met. The longitudinal experiment referenced above showed significant positive preference shifts even for the non-preferred options, indicating that even when expectations were low, meeting expectations raised preference. The study’s results illustrated the importance of expectations to increased preference in future transactions, and the critical importance of meeting customer expectations (Rust, Inman, Jia, & Zahorik, 1999).

Patient Expectations

Several terms found in the literature describe patient anticipation as it relates to upcoming health care encounters, and patient requests, expectations, desires, wishes and preferences are also words in the literature (Uhlmann, Inui, & Carter,

1984). The concept of patient expectations consists of two definitional orientations (Kravitz, 1996). One views expectation as probability and the other views expectation as value. When used in a probabilistic sense, patient expectations are beliefs about the likelihood of future clinical outcomes. When viewing patient expectations in a value sense, patient expectations are desire, necessity, entitlement and attitude. Patient desires and wishes are included in this value expectation. In other words, patient expectations refer to the things patients thought *would* (probability sense) or *should and hopefully will* (value sense) happen in the clinical health care encounter (Kravitz, 1996b; Kravitz et al., 1996; Ross, Forommelt, Hazelwood, & Chang, 1987). When patients are asked about their expectations of health care encounters, these two dimensions are usually intertwined in their mind. Patient expectations have been defined as anticipation that given events are likely to occur during or as a result of medical care (Mahomed et al., 2002; Uhlmann, et al., 1984). Notably, patient expectations may change over time (Saban & Penckofer, 2007).

Patient preferences are ideas about what should occur in a health care encounter (Wensing & Elwyn, 2003), from an individual's point of view about clinical treatment. The patient's request, on the other hand, looks at the provider's perspective, perceiving the patient's explicit expectation as it is verbalized to the provider (Kravitz, 2001; Uhlmann, et al., 1984).

When patient expectations are queried, the level of specificity is one major concern. In the application of expectation to a clinical context, it is important to clarify whether it refers to a general health care encounter or, alternately, to any

specific visit or procedure. This specificity should also include the specialty of the service (pediatric or orthopedic), the health care setting (hospital or clinic) and the visit type (walk-in clinic or scheduled procedure). Furthermore, the category of health care encounter (structure, process, and outcome) to which the expectation applies also needs to be addressed.

Other concerns are methodology and measurement issues related to patient expectations. Mode of administration, timing of measuring and length of instruments were investigated. In the literature, patients disclosed more expectations for care on a structured written checklist than in a semi-structured interview. On the questionnaire format, ethnic minority patient groups reported more expectations than white patient groups, but this was not the case in the interview format. Finally, the combination of pre-visit and post-visit surveys to assess patient expectations and their perceived fulfillment added little to the post-visit survey alone in predicting visit satisfaction. The length of the patient expectation instrument seems to have no effect on the research results (Kravitz, Callahan, Azari, Antonius, & Lewis, 1997).

The expectation investigations typically contain a single or a few questions designed by researchers to elicit patient expectations toward specific clinical outcomes cross-sectionally. Occasionally the literature identifies studies that investigated the relationship between pre-encounter expectation and post-encounter satisfaction (Lee, 2007; Schroder, et al., 2006; Spear, 2003). How expectations changed over time has not yet been explored.

Below is a summary of issues about patient expectation research to date (Dawn & Lee, 2004):

1. Definitional orientation: probability vs. value expectation.
2. Specificity: visit-specific, procedure-specific or ongoing care.
3. Clinical setting type: primary care, medical or surgical service, or other specialty.
4. Visit type: walk-in clinic, scheduled procedure.
5. Content: structure, process or outcome of health care encounter.
6. Timing of data collection: pre-visit, post-visit, or remote.
7. Administration mode: semi-structured interview, or structured questionnaire

Kravitz's model

Kravitz proposed a theoretical model describing the relationship of expectation with both the perception of symptoms and the evaluation of care. Patient perception of symptoms is a major influence on the degree to which expectations affect patient perceptions of what might be wrong (cognitive status) and patient reaction to illness (emotional status). Perceived vulnerability to illness, past experiences with the health care system, and acquired knowledge all influence expectation both by shaping the interpretation of symptoms and by establishing an implicit standard of care. Patient perceptions of events during medical encounters are based on actual occurrences but are also subject to interpretation. Evaluation of a given visit, which begins during the encounter and continues, will result from a comparative process, where the perceived events

are compared with expectancies and values (Kravitz, 2001). Evaluations may also occur through a recent process. The evaluation of care is influenced by age, gender, sex, ethnicity, and health status and cultural beliefs (Bertakis, Helms, Clallahan, Azari, & Robbins, 1995; Hall, Irish, Roter, Ehrlich, & Miller, 1994).

The initial patient expectation literature began by asking what specific health care interventions (test, diagnosis discussion, medication) patients anticipate receiving during different health care encounters. In 1994, Kravitz et al. explored internal medicine patient expectations for care during office visits. The study results reported that prior to office visits, patients considered certain elements of care to be necessary. Up to 38 % of patients reported not receiving those "necessary" elements of care. This absence was associated with lower visit satisfaction (Kravitz, Cope, Bhrany, & Leake, 1994).

The relationship between patient expectations for testing and visit satisfaction in walk-in medical clinics at a Veterans Affairs Medical Center was later examined by Froehlich and Welch in 1996. The study measured the walk-in clinic patient expectations for common tests, visit-specific satisfaction, perception of provider behavior, and patient reports of whether specific tests were received. The results revealed that meeting patient expectations for tests was not associated with higher satisfaction. Rather, interaction with providers as reflected in the humanism score was strongly associated with higher visit satisfaction (Froehlich & Welch, 1996).

Expectation studies

Patient expectations for physicians' antibiotics prescribing behavior and referral behavior during health care encounters were studied (S. Webb & Lloyd, 1994). Among pediatric patient populations, meeting parental expectations regarding communication events during the visit was the only significant predictor of parental satisfaction. This was also confirmed in adult respiratory infections patient populations (Mangione-Smith, McGlynn, Elliott, Krogstad, & Brook, 1999). It is still disputed whether a patient's receiving a prescription for antibiotics is associated with increased patient satisfaction (Hamm, Hicks, & Bemben, 1996; Macfarlane, Holmes, Macfarlane, & Britten, 1997). Unmet expectations for health care encounters are often associated with decreased patient satisfaction and more post-visit health resources contacts (Bell, Kravitz, Thom, Krupat, & Azari, 2002; Hooper, Rona, French, Jones, & Wessely, 2005; J. L. Jackson & Kroenke, 2001; Joos, Hickam, & Borders, 1993). Dissatisfied patients re-consulted the same systems twice as often as satisfied patients (Macfarlane, et al., 1997).

Patient expectations around specialty services, such as Chinese medicine, psychiatric, medical-surgical, and general hospitalization experiences were examined. Lee investigated the gap between patient expectations and satisfaction with Chinese medicine service in 2007. A total of 223 Chinese medicine physicians and 1,102 patients were investigated in Taiwan. The study results demonstrated that patient expectations toward Chinese medicine service are higher than their satisfaction in facilities and professional reliability dimensions (Lee, 2007). Furthermore, in responding to the items "medical staff

should inform service procedure," "medical staff should promptly address or answer patient questions," "medical staff should be professionally knowledgeable in order to answer patient's inquiries" and "medical staff should meet patient needs", patient satisfaction scores were significantly lower than patient expectation scores. General patient expectation toward Chinese medicine service was lower than satisfaction. The factors associated with the gap are patient education level and the level of medical institution (hospital vs. clinic).

Patient expectations around psychiatric service was investigated by Swedish scholars (Nobel, Douglas, & Newman, 2001; Schroder, Larsson, & Ahlstrom, 2007). A qualitative approach was first initiated to explore patient expectations toward service for the psychiatric population (Schroder, et al., 2006). The results from qualitative studies were further utilized to develop the instrument "quality in psychiatric care (QPC)" in order to understand patient expectations and satisfaction with psychiatric care service. Patient expectations did not vary across groups. The service satisfaction results demonstrated that patients who reported a correct date for discharge displayed a significantly higher score in recovery dimensions than those who did not. In addition, patients who experienced very good psychiatric health at discharge displayed a significantly higher score in both recovery and participation dimensions. This result revealed that patients who perceived themselves to have better psychiatric status and more control of their disease progress perceived higher satisfaction.

Patient expectations toward hospitalization experiences were studied. Wang and his associates (Wang, Lee, & Fetzer, 2006) performed a study on inpatient

expectations of the hospitalization experience at a Class-Three-Grade-A hospital in China. A total of 359 inpatients were surveyed using a five dimension, self-developed questionnaire. The five dimensions consisted of medical staff attitude and ethics, medical service quality, hospital environment, medical costs and fees, and treatment related information. Of these five dimensions, the issues of most concern to inpatients were medical staff attitude and medical ethics, such as accountability and reliability of medical practice, sincerity of manner in treating all patients equally, respectful communication with patient and family, and rejection of bribery. The first dimension is followed in rank by service quality and professional capability, hospital environment, reasonable medical costs and fees, and treatment related information. Furthermore, different patient groups revealed different expectations depending on their diagnosis, gender, marital status and payment method of medical fees. Patients with gynecological diagnoses reported the highest expectation of service quality; patients with gynecological and surgical diagnoses reported significantly higher expectations of treatment outcomes than patients with medical diagnoses. Female patient populations demonstrated higher expectations of service quality dimensions, while male groups reported higher expectations of hospital environment. Married patient groups had higher expectations of hospital environment, while patients on public insurance reported the highest expectations of service quality and professional capability.

Redman and Lynn assessed expectations for medical center hospitalization experiences among medical-surgical patients (Redman & Lynn, 2005).

Qualitative methods were employed and 70 items were finalized. The themes of patient expectations for care were provider competence, provider behavior, respect and caring, hotel service, education/ communication, anticipation of need, individualization of care, and discharge status.

After items were generated, a total of 276 patients from 20 adult medical-surgical units at a Midwestern academic hospital were recruited for Patient Expectation for Care Survey (PECS) development. Exploratory factor analysis was carried out with three factors: “comprehensive understanding of patient”, “empathic caring” and “outcome of hospitalization experience” (Redman, Lynn & Chang, 2009). After finalizing the PECS with validity and reliability, analyses regarding related factors were conducted. Patients with college degrees demonstrated the highest expectation for the “comprehensive understanding of patient” aspect of care. Older patients reported higher expectations for the “empathic caring” aspect of care. Patients with cancer diagnoses and patients with private insurance reported higher expectations for health care outcomes.

The relationship between patient expectations and health care outcomes was investigated. Among sciatica patient populations, patient expectations about the need for surgery and the duration of recovery were associated with surgical outcomes. Physician expectations were overly optimistic (Lutz et al., 1999). Low back pain patient populations were examined. Higher expectations for recovery were associated with greater functional improvement (Myers et al., 2006). Patient expectations upon outcome of spinal surgery, and quality of life following spinal surgery were studied. Gender and SF-36 physical component scores were

associated with high expectations. Patients with higher expectation also reported greater improvement in SF-36 role psychical domain scores after surgery (Yee, Adjei, Do, Ford, & Finkelstein, 2008). Furthermore, increased fulfillment of expectations was associated with better postoperative quality of life among lumbar spinal surgery patients (Saban & Penckofer, 2007).

The relationship between patient expectations and outcomes was also studied in oral surgery (McCarthy, Lyons, Weinman, Talbot, & Purnell, 2003), prostatic hyperplasia surgery (Flood, Lorence, Ding, McPherson, & Black, 1993) and prostate cancer surgery (Symon et al., 2003). The results of these studies were consistent in the directions that higher pre-surgery expectations are associated with better outcomes.

In cataract surgery, however, some patients arrived with unrealistic expectations of cataract surgery outcomes—the improvement in vision. By itself, the improved visual functions were not correlated with satisfaction in vision. The expectation-outcome discrepancy in vision was significantly correlated with satisfaction. This result revealed that to maximize patient satisfaction, managing and controlling patient expectations may be more effective than improving patients' operative outcomes (Pager, 2004; Tipperman, 2008).

Expectation studies on orthopedic population

Orthopedic populations have attracted more attention in studies of pre-surgery expectations of surgical outcomes. This may be due to the fact that most orthopedic surgery is not life-saving, but rather to increase patient's functioning, reduce pain, and promote quality of life. The operation is usually a scheduled

procedure, and patients are allowed sufficient time prior to surgery to discuss the prognosis with surgeons. Patients with unsatisfied surgical outcomes typically come back to clinics for further interventions. Patient expectations for hallux valgus surgery were studied (Tai et al., 2008). Younger female patient populations reported higher expectations for hallux valgus surgery outcomes (improved walking, reduced pain, and ease of wearing shoes). The patient expectations, satisfactions, and outcomes were examined in hand surgery patient populations (Hudak, et al., 2004). The study results revealed that satisfaction with treatment outcomes was significant correlated with embodiment (body-self unity). Three confounders—the extent to which surgery successfully addressed the patient's most important reason for surgery, expectations, and compensation from employer—were also significant. Patient expectations regarding shoulder surgery were examined (Mancuso et al., 2002). Expectations varied by demographic characteristic (age, gender, educational status, marital status, and work status), diagnosis and functional status. Patients with high expectations for shoulder surgery outcomes reported better improvement than low expectation patients. Outcome expectations and shoulder function changes significantly predicted patient perception of fulfilled expectancies, but their interaction was not statistically significant (O'Malley, Roddey, Gartsman, & Cook, 2004). A different study on patients' preoperative expectations and the outcomes of rotator cuff repairs echoed this finding (Henn, Tashjian, Kang, & Green, 2007). Greater preoperative expectations correlated with better postoperative performance as well as with greater improvement. Greater expectations were a

significant independent predictor of better performance and greater improvement at one year after surgery.

Over the last few decades, total knee arthroplasty (TKA) surgery has been one of the most common procedures among aging populations and has provided an effective means of pain relief and improved function in arthritis patients. The association between patient expectations, functional status, and patient characteristics remains inconclusive (Lingard, Sledge, & Learmonth, 2006; Mahomed, et al., 2002; Venkataramanan, Gignac, Mahomed, & Davis, 2006). Expectations for recovery are important in influencing patient satisfaction. (Lochman, 1983). Longitudinal studies have used postoperative subjective scores as the dependent variable, and baseline or follow-up expectations and baseline characteristics as independent variables (Lingard, et al., 2006; Mahomed, et al., 2002). Cross-sectional studies have used expectation as the dependent variable, and baseline characteristic as the independent variable (Mancuso et al., 2001; Venkataramanan, et al., 2006). The approach to quantifying patient expectations for TKA has been varied. Venkataramanan et al. (2006) suggested that expectations of revision TKA should be a multi-dimensional construct.

Mahomed et al. explored the importance of patient expectations in predicting outcomes after total knee and hip replacement surgeries (Mahomed, et al., 2002). A total of 102 total hip replacement patients and 89 total knee replacement patients were examined for the relationship between pre-surgery expectations and post-surgery functioning outcomes, as measured by the

Medical Outcomes Study Short Form (SF-36) and the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) six months after surgery. Patient expectations were measured by four self-developed questions on patient expectations regarding pain, limitation of usual activities, success of surgery and onset of complications. Patient expectations regarding surgery were not associated with age, gender, marital status or race. In addition, expectations were not correlated with their pre-operative functional health status. However, expectation of complete pain relief after surgery was an independent predictor of better physical function and improvement in pain at 6 months post-surgery.

Razmjour further examined the relationship between preoperative patient characteristics and expectations for total knee arthroplasty patients (Razmjou, et al., 2009). A cross-sectional analysis was performed on a total of 254 TKA candidates, and six-domains of expectations, demographic characteristics, presence of comorbidity, WOMAC, and SF-36 were collected. The study reported that presence of comorbidity was associated with pain relief. Preoperative mental health was related to expectations for a return to activities of daily life; age, gender, and physical and mental health were related to expectations for improved leisure, recreational and sports activities. No baseline factors were associated with expectation to improvement in range of motion or for providing care to and interacting with others.

Summary

Patient expectation has been defined as the anticipation that given events are like to occur during or as a result of medical care. Patient expectations of

specific health care encounters and procedure outcomes were investigated. Patient expectations are associated with patient characteristics (such as age, gender, marital status, presence of comorbidity, insurance type, educational level), and hospital facilities among certain patient populations. However, there are still other constructs associated with patient expectations that have not been explored. Functional status is associated with patient expectations among total knee replacement surgery patient populations. The change of patient expectations over time has not yet been explored, and the associations between factors related to the change of expectations are still undetermined. Based on a review of the literature and theories, a conceptual framework was developed, as follows.

Conceptual Framework

This study was conducted based on a conceptual framework which has been developed from an extensive review of the literature on patient expectations. Patient expectations have been defined as anticipation that given events are likely to occur during or as a result of medical care. In 1996, Olson et al. wrote that direct experience, indirect experience and other beliefs are the three constructs of expectation antecedents that will influence patient expectations. Patient characteristics are associated with patient expectations. Among certain patient populations, functional status is associated with patient expectations prior to intervention (Razmjou, et al., 2009). Intervention refers to any healthcare encounter, for example, a surgical procedure (Figure 1).

An examination of patient expectations post-intervention necessarily must center on the degree of fulfillment of expectations. Among certain patient populations, functional status is associated with patient expectations. Complications of interventions are associated negatively with functional status post-intervention, and may influence patient expectations post-intervention. Outliers and adverse events may be associated with functional status post-intervention and may influence patient expectations post-intervention.

The following are the major components of the model.

Patient expectations arise from anticipation that given events are likely to occur during or as a result of medical care.

Expectation antecedents are beliefs concerning a future state, from which expectations are derived. Direct experience refers to prior personal experience with this upcoming event. Indirect experience refers to other people's direct experience with health care obtained though communication with them about their experience. Expectation is also influenced by other beliefs (logical inference) in an inductive or deductive fashion.

Functional status is an individual's ability to perform the normal daily activities required to meet basic needs, fulfill customary roles, and maintain health and well-being.

Complications are defined as unexpected, undesirable events in medical conditions that arise in the course of a diagnosis or treatment which affect or modify the original progress.

In health care reimbursement, outliers are identified as those patients whose stay generates unusually high medical costs. An adverse event is defined as an untoward or undesirable occurrence in the healthcare process which has or will have some negative impact on a patient, such as infection, and may be due to some part of the health care process.

The next chapter provides the operational definition for all study variables.

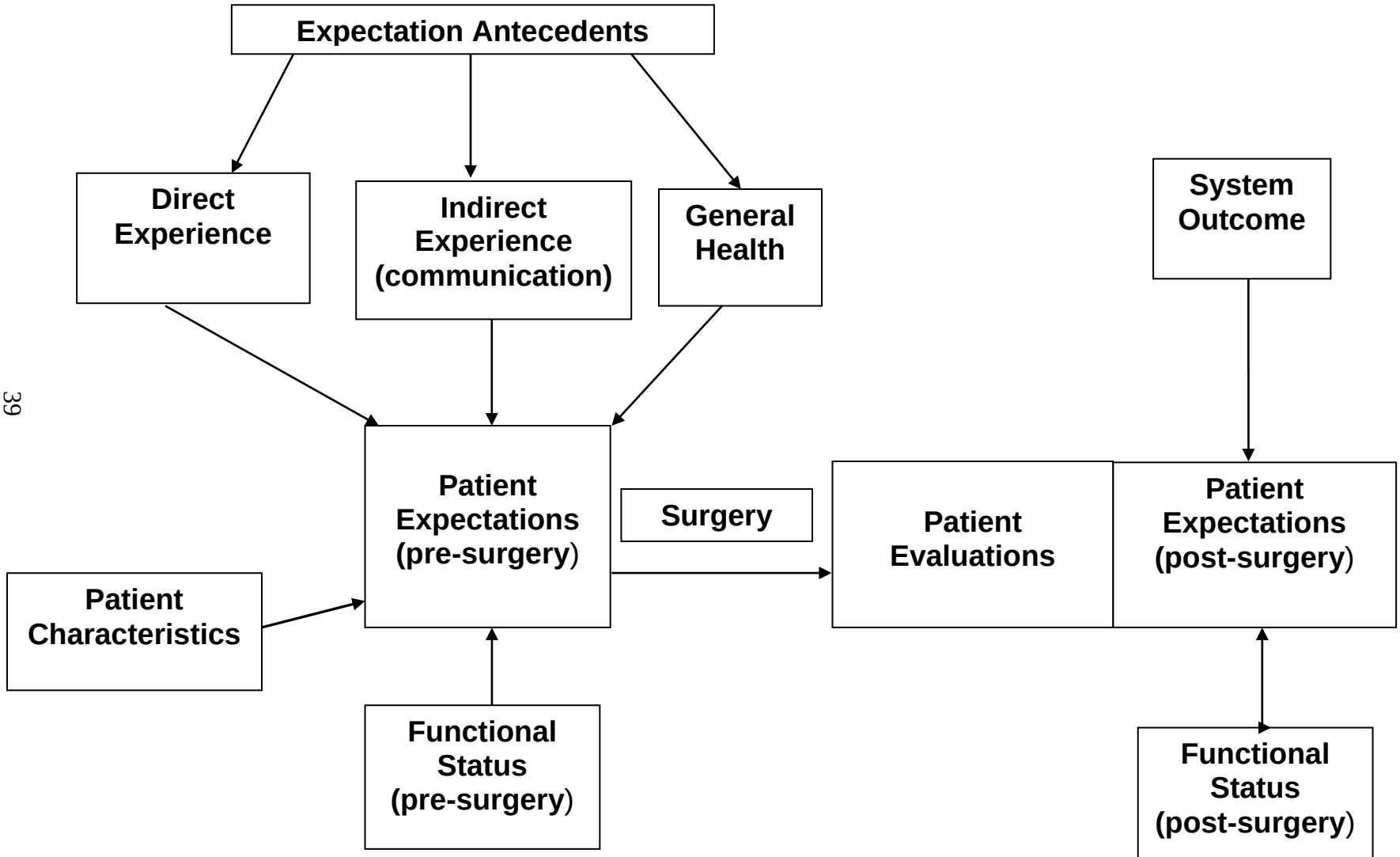


Figure 1 Conceptual framework

CHAPTER THREE

RESEARCH DESIGN & METHODS

The purpose of this study was to examine patient expectations in total knee replacement surgery patients among the Taiwanese population. The relationships among patient factors, expectation antecedents, and functional status were examined. The change in patient expectations after surgery was investigated. In this chapter, the study methodology is presented including the study design, sampling method, survey procedure, measures employed, human subjects review, and data analysis plan.

Design

This study employed a pre-test/post-test prospective research design. Quantitative questionnaires and the survey method were chosen to explore patient expectations and functional status. Information about basic demographics (age and gender), personal features (mother tongue, education level, insurance information, procedure type, comorbidity, zip code) was gathered. Three short questions were asked to ascertain patients' personality. Questions about direct and indirect experiences of both total knee replacement surgery and the hospital were asked to represent expectation antecedents. Information about complications and system outcome was also collected. Two methods were chosen to execute the interview, face-to-face and telephone interviews for pre -

surgery and post–surgery, respectively. The time points for data collection were one day before surgery and six weeks after surgery.

Sample

Target population

The sample of patients scheduled to receive a total knee replacement procedure in the following week was drawn from a major health care system located in northern Taiwan. The tertiary medical center has two thousand and five hundred beds in the general medical-surgical and intensive care units, and serves medical-surgical, pediatric, cardio-vascular, oncology, transplantation and trauma patients. A total of five thousand staff is employed, of which two thousand four hundred are nurses.

There were four rationales for studying this population. First, total knee replacement surgeries are elective, quality-of-life improving procedures. Patients who are scheduled to receive this procedure are looking to eliminate pain and improve functioning, not cure a life-threatening disease. If patients are scheduled for life-saving procedures or treatments, such as those for cancer, survival will be the only concern and expectation for this population. Thus, patients scheduled for life-saving procedures are not an ideal sample population for examining expectations. Secondly, total knee replacement surgeries are one of the most common procedures performed on aging populations around the world. Generally, people have high awareness of this procedure and commonly receive related information from friends, relatives, or the media; it is commonplace to encounter people in a community who have had knees replaced. People who

learn about this procedure in a natural environment will form their own expectations prior to upcoming surgery. Thirdly, since total knee replacement surgeries are one of the most common procedures around the world, any orthopedic department in a medical center has set up standard care protocol for this patient population, e.g., diagnoses guidelines, operative procedures, pre-op and post-op nursing interventions, and discharge planning. This characteristic insures that every patient will go through the same care process throughout the health care system. This aspect enhances the standardization of the intervention in the study. Lastly, patients who plan total knee replacement surgeries are seeking this procedure for a variety of reasons. Although the major reason for undergoing the procedure is the degeneration of the joint, infection, loosening, and other trauma can exist and constitute other valid reasons for total knee replacement. The range of reasons for undergoing this elective procedure adds variation into the sample population.

Sampling plan

The sample was drawn from patients who are scheduled for total knee replacement (TKR) at a major health care system located in northern Taiwan. The predictors for patient expectations in regards to total knee replacement surgery are: age, gender, mother tongue, education year, insurance type, procedure type, comorbidity, ZIP code, personality (optimistic vs. pessimistic), personality (general-oriented vs. detail-oriented), personality (outgoing vs. introspective), direct experience of TKR, direct experience of hospital, indirect experience of TKR, indirect experience of hospital, general health beliefs, SF-36

physical dimension, SF-36 mental dimension, WOMAC (The Western Ontario and McMaster Universities Osteoarthritis Index) pain subscale, WOMAC function subscale, and WOMAC stiffness subscale. The sampling plan will be a total population sampling using a convenience sample. The *a priori* sample size for this study was calculated using the following elements: (1) an alpha of .05; (2) a power level of .80; (3) a small effect size (0.2); and (4) 21 predictors. The power analysis was performed, and 124 subjects were needed. Approximately 155 patients were expected to participate, estimating a 20% attrition rate for the pre-test and post-test design.

Inclusion and exclusion criteria

The inclusion criteria for sample selection were: (1) patients who are scheduled to receive total knee replacement (TKR) procedures (single or bilateral) regardless of the reasons (e.g. infection, loosening, degeneration); (2) first-time TKR and experienced patients were both included regardless of whether the previous procedure was performed at the same institution; (3) patients with controlled chronic medical conditions, such as controlled DM, hypertension, Rheumatoid Arthritis, hemophilia, or Systemic Lupus Erythematosus (SLE), were included. The exclusion criteria were: (1) patients who receive the procedure as an emergency surgery; (2) patients with limb trauma diagnoses; (3) patients with cancer diagnoses and under ongoing treatment; (4) patients with uncontrolled chronic medical conditions, such as dementia, stroke, hemodialysis, Systemic Lupus Erythematosus (SLE), or organ transplantation performed within the preceding year. Patients with the previously

mentioned medical conditions tend to have an urgent medical need for knee replacement surgery. As a result, the patient did not have too many choices when discussing the decision making with the orthopedic surgeon. This premise means the knee replacement surgery was a required procedure, and no longer an elective procedure. Therefore, patients with such conditions were not included in this expectation study.

Measures

Patient factors

Socio-demographic data including age, gender, mother tongue, education year, insurance type and ZIP code were obtained from the patients. Medical information including medical diagnosis and procedure code (single or bilateral knee) were obtained by chart review. Patients' clinical information was evaluated by an orthopedic surgeon for estimating the Charlson Comorbidity Index. The Charlson Comorbidity Index was first developed in 1987 to help clinicians predict the one year mortality rate for patients who may have a range of comorbid conditions. Each condition is assigned a score of 1, 2, 3 or 6, depending on the risk of dying associated with the condition (Charlson, Pompei, Ales, & MacKenzie, 1987). The scores are summed into a total score which predicts mortality. Other than being used in the clinical environment, there is a need in clinical research for the assessment of comorbidity. The Charlson Comorbidity Index has been compared with other comorbidity instruments and has been demonstrated to be a valid and reliable method in clinical research to measure comorbidity (Groot, Beckerman, Lankhorst, & Bouter, 2003).

Expectation antecedents

In this research, there are three antecedents for patient expectations: 1) direct experience, 2) indirect experience, which can be obtained by communication with others, and 3) other beliefs, which arise from a variety of sources. Dichotomous, self-developed questions were employed to understand patients' direct and indirect experiences with respect to total knee replacement surgery and the hospital. The construct of other beliefs was measured by five questions in the general health domain of the SF-36 instrument. The five questions in the general health domain asked respondents how they perceive their health in general.

Measure for Expectation

An expectation questionnaire developed by Razmjou and associates was utilized to measure patient expectations about total knee replacement surgery outcomes (Razmjou, et al., 2009). The questionnaire was developed after a thorough literature review and incorporated expert opinions. Six distinct domains related to pain, range of motion (ROM), ability to perform activities of daily living (ADL), ability to care for others, ability to return to previous leisure, recreational, or sport activities, and perception of the potential to achieve full recovery following surgery were evaluated. Responses to questions were quantified by three- or four- point scales with a not-applicable option. The test-retest reliability was examined in 25 shoulder surgery patients prior to surgery. Weighted kappa statistics were calculated and the kappa values varied from 0.42 to 0.78, demonstrating moderate to substantial reliability. The questionnaire is also able

to discriminate between men and women in the rotator cuff disease population. The patient expectation concept was evaluated by six domains separately.

After surgery occurred, patients were interviewed by telephone at the time point of six weeks after surgery, which was around their second post-op follow up visit. Patients were first asked about their current evaluation of the total knee replacement surgery, followed by the knee function questionnaire (WOMAC) and quality of life questionnaire (SF-36). At the end of the interview, the patient expectation questionnaire was given again.

The measure of evaluation of surgery is derived from the measure of expectation, and consists of six questions describing six domains related to pain, range of motion (ROM), ability to perform activities of daily living (ADL), ability to care for others, ability to return to previous leisure, recreational, or sport activities, and perception of the potential to achieve full recovery following surgery. The arrangement of the anchor for each question is the same as in the expectation measure. The wording of each question is the same except for the verb; for example, the question changed from “Do you expect TKR will relieve your pain?” to “How did you evaluate the TKR relieve your pain?”

Functional Status

Generic measurement – The Medical Outcomes Study Short Form (SF-36)

The Medical Outcomes Study Short Form (SF-36) (Ware & Sherbourne, 1992) was chosen to serve as the generic measurement tool. SF-36 is a health-related quality of life measurement containing 36 questions. SF-36 yields an

eight-scale profile of scores as well as physical and mental health summary measures. It is a generic measure, as opposed to a targeted one examining a specific age, disease, or target population. Physical Functioning, Role-Physical, Bodily Pain, and General Health domains constitute the physical health summary measure, and the mental health summary measure consists of Vitality, Social Functioning, Role-Emotional, and Mental Health domains. There are summarized rating methods and standardized SF-36 scoring algorithms provided for researchers to follow. The SF-36 has been used extensively as a generic functional status measure and is well referenced.

The reliability of the eight scales and two summary measures has been estimated using both internal consistency and test-retest methods. With rare exception, published reliability statistics have exceeded the minimal standard 0.70. Studies of validity of the SF-36 have been compared with that of other widely used generic health surveys. Systematic comparisons indicate that the SF-36 includes eight of the most frequently measured domains (McHorney, Ware, Lee, & Sherbourne, 1994). The validity of each of the eight scales and the two summary measures has been shown to differ markedly, as would be expected from factor-analysis studies of their construct validity. Mental Health, Role-Emotional, and Social Functioning scales and the MCS summary measure have been shown to have the strongest validity of the SF-36 scales as mental health measures (McHorney, Ware, & Raczek, 1993). This pattern of results has been replicated in both cross-cultural and longitudinal tests (Ware, Keller, Gandek, Brazier, & Sullivan, 1995; Ware, Snow, & Kosinski, 1993). The SF-36 is

suitable for self-administration, computerized administration, or administration by a trained interviewer in person or by telephone, to persons aged 14 years of older. The SF-36 has been administered successfully in general population surveys in the United States and other countries, as well as in younger and older adult populations with specific diseases. It can be completed in 15 minutes with acceptability and data quality (Ware, et al., 1995; Ware, et al., 1993). The extent to which SF-36 is valid and reliable in patients diagnosed with osteoarthritis was also documented (Kosinski, Keller, Ware, Hatoum, & Kong, 1999) and internal consistency of SF-36 subscales has been reported from 0.72 to 0.95 among primary total knee replacement surgery patients (Escobar et al., 2007).

Condition-specific measurement – the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was developed in 1982 and is a self-administered disease-specific outcome measure (Bellamy, Buchanan, Goldsmith, & Stitt, 1988). This index was developed with three domains: pain (5 items), function (17 items) and stiffness (2 items) to assess functional status of knee and hip osteoarthritis patient populations. The answers are quantified from 0 (none) to 10 (extreme), equally weighted and reported as sums. Higher numbers indicate greater levels of symptoms or disability. Subscale scores were seen to possess the following range of values; pain: 0-50; stiffness: 0-20; function: 0-170. The internal consistency of the WOMAC of pain, stiffness and function are reported to be 0.93, 0.81, and 0.81 respectively in primary knee replacement surgery

candidates (Escobar, et al., 2007). In a study of pain and physical function of knee replacement surgery, Bombardier and colleagues demonstrated that a generic measure (SF-36) was unable to distinguish patient's pain status in relation to the need of surgery prior to surgery, but a condition-specific measure (WOMAC) was able to do so. After surgery, however, patient recovery was such that the WOMAC was unable to do so (Bombardier et al., 1995). Pairing the SF-36 and WOMAC instruments – generic and condition-specific measurements – results in the ability to accommodate a patient's change prior to and after surgery, and is therefore the best encapsulation of the patient's condition.

Complications

Data on four types of complications was tracked: infection, deep vein thrombosis, seven-day readmission, and 14-day readmission. All data were collected by chart review and coded as dichotomous variables. The time period for collecting data on complications was six weeks after surgery. Infection complication was defined as the appearance of an infection diagnosis on the chart, and/or the continuous prescription of antibiotics. Deep vein thrombosis was defined as the appearance of a deep vein thrombosis diagnosis. Seven-day readmissions and 14-day readmissions were obtained by chart review.

System Outcomes

Data on outliers and adverse events were collected as follows: outlier of medical fee, inpatient fall and medication error. All data was collected as dichotomous variables and the time period for collecting system outcomes was the hospitalization period. Orthopedic departments regularly collect a patient's

medical fee information, and the outliers were identified accordingly. Inpatient falls and medication error information were obtained from the orthopedic nursing quality committee. Underreporting of these system outcomes was anticipated.

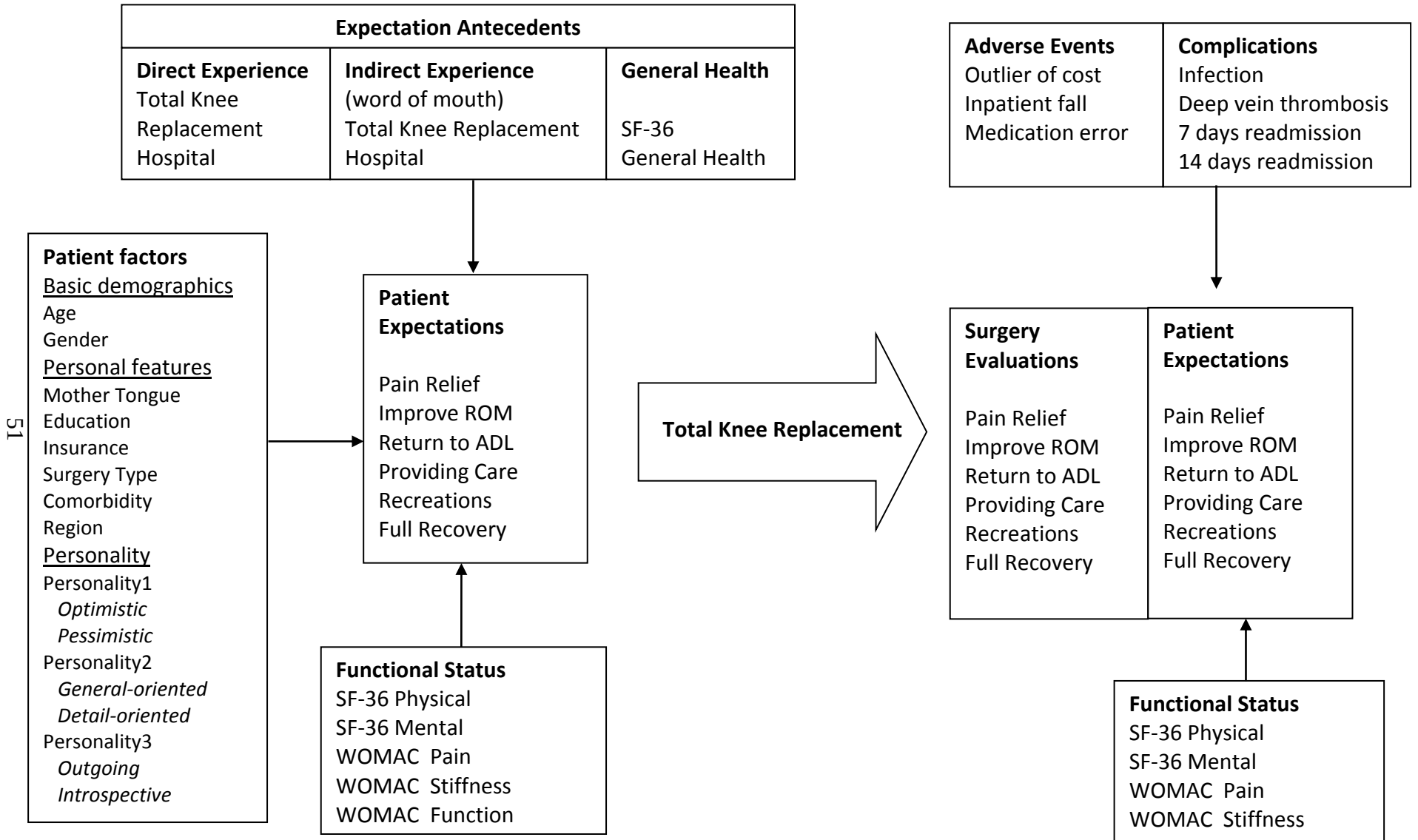


Figure 2 Conceptual framework with measurements

Procedures

Translation of expectation measure

Both the SF-36 and WOMAC are available in Mandarin. In order to distribute the patient expectation measure, it was essential to translate the patient expectation measure into Mandarin. Birslin's (1970) translation model was utilized (Brislin, 1970, 1986). The patient expectation measure was first translated from English to Mandarin by two bilingual people; one was a female professional school graduate and the other a male university graduate. A reverse translation from Mandarin to English was next carried out by one bilingual person. Finally, the investigator compared the original version to the back-translated version, identified discrepancies and finalized the measure.

A pilot test was used to validate the translated version of measurements for the study. Six total knee replacement patients were interviewed by the investigator to understand the appropriateness of wording and clarity of each item.

Data collection

This study was approved by the Institutional Review Board of the University of Michigan in the United States, and the Taipei Veterans General Hospital in Taiwan. The directors of the Nursing and Orthopedic Departments were contacted to request their permission in support of this study. The research proposal was presented to each orthopedic surgeon to obtain permission to

recruit his patients to participate. The research proposal was also presented to the orthopedic head nurses and on-site staff.

Eligible patients were identified from the operating room list two days prior to surgery. Research assistants approached eligible patients the day before surgery in the orthopedic unit. All patients were informed with regards to the purposes and the procedure of the study, as well as given information about the security protocol. Informed consent was obtained if patients were willing to participate in the study. Patients were entitled to ask questions regarding any aspect of the study and to withdraw their consent for participation at any point during the study period. Face to face interviews were employed and patient factors, expectation antecedents, expectation questionnaire, WOMAC and SF-36 were included in the interview. It took around 35-40 minutes for the entire interview, including obtaining informed consent. A small gift was provided in recognition of their time. A reminder that there would be a follow up telephone interview six weeks later was also given to each participant.

Four senior university nursing students were recruited as research assistants. Research assistants were trained in describing the purposes and procedures of the study, obtaining informed consent from patients, answering possible questions, handling unexpected questions, interacting with house staff, survey management and data entry. Validity training for the interviewers was performed and validity evaluation of these four interviewers was done. If a trainee interviewer had different responses compared with the trainer's interview

responses, then there would be discussion about how to score the questions in order to clarify and reach agreement among all trainee interviewers.

Telephone interview research assistants contacted patients approximately six weeks after surgery. This follow up telephone interview consisted of a current assessment of the knee surgery, the WOMAC, SF-36 and patient expectation for an upcoming surgery. It took 30 minutes to finish the entire telephone interview. Patients were contacted up to a maximum of three times to finish the interview. If the interview was still incomplete, this case was dropped from the study.

Each questionnaire was stamped with serial numbers to match pre-test and post-test survey data. A key file contained the patient's contact information, hospital administration number, and the matching survey package number. This key file served as a link between the patient's personal information and the research data. Only research-related personnel were able to access this key file. Once the research is complete, the key file will be destroyed, and the link will be broken. The patient lists, lists of code numbers, the survey package, completed questionnaires and completed informed consent documentation will be stored in a locked filed cabinet in a locked room only accessible to the researchers.

Data Analyses

Sample

Eligible patients screened from the total knee replacement surgery list were asked to participate in the study the day before surgery. For those who were not willing to participate, gender and age information was still collected. An independent t-test was utilized to assess the basic demographic features to see if there was a difference between the sample and refusal populations.

Data entry

After data collection by research assistants, all data were entered into the computer system. Read and eye ball inspection were employed for data cleaning. A descriptive analysis and a frequency test were used to check sample distribution, ensuring the accuracy as well. When strange data came out of the descriptive or frequency analysis, the raw data would be rechecked for clarification.

Research assistants were asked to go through the whole survey kit, checking for the completeness after completing the interview. The first time for data collection was one day before surgery. It was usually done between 5 and 8 pm in the evening when patients were admitted to the unit, underwent blood work, had their anesthesiologist visit, and received patient education materials. Sometimes, patients were anxious about the upcoming surgery, or the new facility, and elderly patients may have felt tired in the middle of the pre-operative process. For these reasons patients may have been impatient or refused to

answer some interview questions. Research assistants were reminded that patients were entitled to end the interview at any time in the interview process.

Missing data

Missing information in the demographic section was rechecked in the patient's health record for the possibility of obtaining the desired information. Missing information in personality, expectation antecedent or function status section was coded. Other than factor analysis, missing data in the expectation concept was handled as it was and was not imputed by statistical software for all analysis. Available data analysis is implanted in this study for the whole data analysis process.

In the later analysis, a principal component factor was generated. . Missing data was replaced by means on each item when computing the principal component factors.

Dependent and independent variables

Dependent variables in this study are expectation concept measured by six expectation questions at pre-surgery and post-surgery time points. On the other hand, there are 28 independent variables categorized in 7 domains in this study. Twenty-one variables in five domains were collected at the pre-surgery time point; these five domains are basic demographics, personal characteristics, personality, expectation antecedent, and functional status. Basic demographic features include age and gender. Education level, mother tongue, insurance, procedure type, comorbidity, and region belong to personal characteristics. Personal attributes, such as optimistic versus pessimistic, general versus

detailed-oriented, and outgoing versus introspective belong to personality variables. SF-36 physical and mental components measured the generic health aspect quality of life, while WOMAC-pain, stiffness, and function domains measured the knee-specific functional status.

There were seven independent variables in adverse events and complications collected at six weeks after surgery. All of them were dichotomous variables. Adverse event consisted of the outliers of cost, inpatient fall and medication errors. Complication domain included deep vein thrombosis, infection, 7 days readmission and 14 days readmission.

Univariate analysis

Univariate analysis was first performed to understand the characteristics of sample population. Descriptive statistics were computed for age and comorbidity score; mean, standard deviation, minimum, and maximum were explored. Frequency test was examined for gender, mother tongue, education level, insurance type, procedure type, region, and personality styles.

In the meantime, previous personal experience of knee replacement surgery, previous hospitalization experience at Taipei Veterans General Hospital, heard of others' knee replacement surgery experience, heard of others' Taipei Veterans General Hospital hospitalization experience and general health belief were explored by frequency statistics.

Functional status as measured by WOMAC-pain, stiffness and function domains was explored by descriptive statistics. Quality of life in physical

component and mental component by SF-36 were studied on mean, standard deviation, minimal, and maximum as well.

Descriptive analysis was performed on expectation concept, measured by 6 items of the expectation questionnaire. The histogram and skewness coefficient were utilized to understand the distribution of expectation concept.

Negative skewness and little variance were captured by the histogram and skewness coefficient on all six expectation questions. This skewness of expectation concept influenced the statistical analysis methods on board, as well as the statistical power. The expectation responses analyzed as categorical variables, or used to define continuous factors. Moreover, expectation concept was treated as dichotomous variables, where patient responses of 4 were coded as 1 and responses if 0,1, 2, or 3, were coded as 0.

Marginal association analysis

Six expectation questions constituted the expectation concept and each one of them served as one dependent variable. After bi-variates analysis was explored, marginal association between one dependent variable and one independent variable were next examined. Due to the skewness of the expectation concept, non-parametric technique was employed. The Mann-Whitney U test was utilized to explore the relationship in a binary variable; gender, insurance type, procedure type, have personal TKR experience before, have personal TVGH experience before, heard of TKR experience before and heard of TVGH experience before. The Mann-Whitney U score, the significance level and r were obtained to understand the extent of the relationships.

The categorical variables, on the other hand, were examined by the Kruskal-Wallis test for their relationship within groups. Variables of mother tongue, education level, and region were tested by Kruskal-Wallis statistics. Chi-square, degree of freedom, z score, and significance level were read. Multiple tests were employed; the test results should be treated cautiously.

Finally, the relationship between one dependent variable and the other continuous independent variables were tested by Spearman correlation technique. Variables in age, comorbidity, general health belief, SF-PCS, SF-MCS, and WOMAC-pain, stiffness, and function were computed for Spearman correlation. The correlation coefficient was calculated to understand the relationships.

Plots, such as histogram or boxplot, were used to visualize the marginal distributions comparison among variables.

Information obtained from marginal association was useful for understanding the relationship between one independent variable and one dependent variable. However, the real world situation consisted of multiple variables exiting concurrently. Understanding only the marginal association can serve as baseline information but not enough for study inquiry. The interaction between two or more independent variables on dependent variables was not clear. Thus, joint association was further pursued.

Factor analysis

The central concept in this study inquiry is patient expectation which was measured by six expectation questions. It is preferable to condense six questions

into core patterns to better portray the underlying expectation mindsets among the sample population.

The six expectation questions were subjected to principal component analysis. KMO and Bartlett's test were first checked. The scree plot and eigenvalues in total variance were next examined. The number of components extracted from the principal component analysis was identified. A component matrix was approached to review the loading score on each question of each component. The number of the loading score demonstrated the extent and above or below zero showed the direction. The component plot in rotated space revealed the clusters of questions.

Other than condensing questions into core factors, the principal component analysis also reduced the degree of skewness as well as increased the statistical power.

Joint association analysis/ regression analysis

After marginal association analysis, joint association analysis was further pursued. Twenty one independent variables belonging to five domains at pre-surgery time point were used in a logical way to construct a regression model. Basic demographic features, age and gender, were first put into the regression model, and always stayed in the regression model despite of the significance level. Secondly, personal features, such as education level, mother tongue, insurance type, procedure type, comorbidity, and region, were put into the regression model. Significance level for all variables was obtained from regression statistics. Those variables whose significance level was less than.25

would stay in the regression model. Those variables whose significance level was greater than .25 would not make it to the next round and were dropped from this modeling attempt. The next attempt would put the third domain, the function domain, along with the basic demographic domain, and those variables in the personal features domain whose significance level was less than .25 into the regression model. Domains of basic demographics, personal features, functional status, personality, and expectation antecedents were put into the regression modeling respectively. Therefore, in the final regression, all variables that stayed in the model were ones with a significance level of less than .25, except for age and gender variables.

At post-surgery time point, the effect of pre-surgery expectations was added into the regression model as well. The score from the pre-surgery expectation question alone was considered as the effect from pre-surgery and was added in the last attempt of the regression modeling.

Three different types of the regression model were explored in this study inquiry. They were multiple linear regression, ordinal logistic regression and binary logistic regression. After principal component factors were generated, they served as dependent variables in the multiple linear regression models.

When treating the anchor of six expectation questions as categorical, an ordinal logistic regression was implanted. Furthermore, when treating the anchor of six expectation questions as binary, where patient responses of 4 were coded as 1 and responses if 0,1, 2, or 3, were coded as 0, a binary logistic regression was employed.

Three different types of regression models in pre-surgery and post – surgery time points were constructed. Multiple linear regression models for principal component factors turned out to represent patient expectation mindsets beautifully. Ordinal logistic regression models for each expectation question were more fitting with the nature of responses. However, due to the skewness of the responses and the multi-co-linearity of the independent variables, these regression models often did not converge in the modeling process. Thus, a binary logistic regression was chosen to represent the joint association for each expectation question.

Study aims and research questions

The following are statistical analyses for each aim and research question.

Aim 1: To understand patient expectations of the outcomes of surgery in the Taiwanese population.

Research questions:

1a) What are patient expectations regarding the outcomes of surgery with a particular health care system? Descriptive statistics, histogram and skewness coefficient for six patient expectation questions were utilized.

1b) What is the relationship between selected patient factors and patient expectations? The relationship between gender, education level, insurance, procedure type and expectations was answered by the Mann-Whitney U test. Spearman correlation analysis was used for describing the relationships between age, comorbidity and expectations. For relationship between mother tongue, region and expectations, Krasucal-Wallis statistics were computed.

1c) What is the relationship between expectation antecedents and patient expectations? The relationship between direct experience and indirect experience and expectations was answered by the Mann Whitney U test. The relationship between general health beliefs and expectations was examined by Spearman correlation analysis.

1d) What is the relationship between functional status and patient expectations? Functional status was measured by the SF-36 physical and mental domains, and the WOMAC-pain, stiffness and function subscales.

The relationship between functional status and expectations was examined by Spearman correlation analysis.

1e) What are the predictors for patient expectations? Multiple regression analysis was employed to answer this question. Dependent variables are principal component factors; independent variables include patient factors, patient expectation antecedents, and functional status.

Aim 2: To understand patient expectations of the outcome of surgery at post-surgery time point in the Taiwanese population.

Research questions

2a) What are patient expectations post-surgery of a particular health care system? Descriptive statistics, histogram and skewness coefficient for six patient expectation questions were utilized.

2b) What is the relationship between selected patient factors and patient expectations post-surgery? The relationship between gender, education level, insurance, diagnosis and expectations was answered by the Mann-Whitney U test. Spearman correlation analysis was used for describing the relationships between age, comorbidity and expectations. For relationship between mother tongue, insurance type, region and expectations, Krasucal-Wallis statistics were computed.

2c) What is the relationship between expectation antecedents and patient expectations post-surgery? The relationship between direct experience and indirect experience and expectations will be answered by the Mann

Whitney U test. The relationship between general health beliefs and expectations was examined by Spearman correlation analysis

2d) What is the relationship between functional status post-surgery and patient expectations post-surgery? Functional status post-surgery was measured by the SF-36 physical and mental domains, and the WOMAC-pain, stiffness and function subscales. The relationships between functional status and expectations were examined by Spearman correlation analysis.

2e) What is the relationship between complications and patient expectations post-surgery? Complication variables are dichotomous. Mann-Whitney U test was used to answer this question.

2f) What is the relationship between outliers and adverse events and patient expectations post-surgery? All outcome variables are dichotomous. The relationships between outcome variables and expectations were answered by the Mann-Whitney U test.

2g) What are the predictors for patient expectations post-surgery? Multiple regression analysis was employed to answer this question. Dependent variables are principal component factors; independent variables include patient factors, patient expectation antecedents, and functional status.

Aim 3: To understand whether patient expectations change over time.

Research questions:

3a) What is the degree of change in patient expectations after surgery? Wilcoxon paired sample tests were computed to answer this question.

3b) What are the relationships between pre-surgery and post-surgery patient expectations? Spearman correlation was used to answer this question.

3c) Do patients change their expectations after surgery? The inspection of factor structure of expectation questions before and after surgery would be able to answer this question.

CHAPTER FOUR

RESULTS

Sample Structure

Basic demographics

Table 2 shows the demographic features of the sample population in this study. The pre-surgery sample population consisted of 250 orthopedic patients whose ages ranged from 26 to 90, with a mean age of 71. Seventy three percent of sample population was female. The post-surgery sample population revealed the same distribution.

Personal features

As can be seen in Table 2, two-thirds of the patients reported their mother tongue as Mandarin or Taiwanese; the languages were equally distributed, each being spoken by one third of the sample population. Forty percent of the sample population reported having graduated from elementary school, and twenty two percent revealed having no formal schooling. Every citizen in Taiwan is covered by National Health Insurance, however, almost forty percent of the sample reported having additional health insurance (see Table 3). Eighty percent of patients received a single total knee replacement surgery. Sixty

percent of patients were from the north region of Taiwan, while patients from middle and south regions of Taiwan are both under ten percent.

Table 2 Age, Gender, Mother Tongue, Education Level and Region

	Pre-Surgery (N=250)				Post-Surgery (N=170)			
Age	Mean	SD	Min	Max	Mean	SD	Min	Max
	71.59	9.60	26	90	70.66	9.58	26	90

		Pre-Surgery(N=250)		Post-Surgery(N=170)	
		Frequency	%	Frequency	%
Gender	Male	67	26.8	44	25.9
	Female	183	73.2	126	74.1
	total	250	100	170	100.0
Mother Tongue	Mandarin	84	33.6	63	37.1
	Taiwanese	90	36.0	56	32.9
	Mandarin +Taiwanese	57	22.8	44	25.9
	All the others	19	7.6	7	4.1
	total	250	100	170	100
Education Level	No Formal Schooling	56	22.4	42	24.7
	Elementary	100	40.0	65	38.2
	Junior High	37	14.8	22	12.9
	Senior High	31	12.4	23	13.5
	Community college and above	26	10.4	18	10.6
	total	250	100	170	100
Region	North	156	62.4	112	65.9
	Mid-North	40	16.0	26	15.3
	Middle	11	4.4	6	3.5
	South	13	5.2	8	4.7
	East	30	12.0	18	10.6
	total	250	100	170	100

Table 3 Insurance and Procedure Type

		Pre-Surgery(N=250)		Post-Surgery(N=170)	
		Frequency	%	Frequency	%
Insurance	Other than National Health Insurance, do you have an additional health insurance plan?				
	No	154	61.6	102	60
	Yes	96	38.4	68	40
	total	250	250	170	100
Procedure Type	Single Knee	205	82.0	136	80
	Bilateral Knee	45	18.0	34	20
	total	250	100	170	100

Table 4 shows the Charlson comorbidity score among the sample with a mean of 3.51, and a range from 1 to 8 at pre-surgery time point.

Table 4 Charlson Index of Comorbidity Score

	Pre-Surgery N=250				Post-Surgery N=170			
Charlson	Mean	SD	Min	Max	Mean	SD	Min	Max
	3.51	1.33	1	8	3.46	1.31	1	8

		Pre-Surgery(N=250)		Post-Surgery(N=170)	
		Frequency	%	Frequency	%
Charlson score	1	9	3.6	8	4.7
	2	46	18.3	28	16.5
	3	86	34.1	63	37.1
	4	52	20.6	36	21.2
	5	39	15.5	24	14.1
	6	12	4.8	7	4.1
	7	4	1.6	3	1.8
	8	2	0.8	1	.6
	total	250	100	170	100

Personality

Three investigator-developed short questions were asked of the sample population to best describe their personality type. Eighty six percent of the sample reported optimistic characteristics and considered themselves as having a general-oriented personality. Almost ninety percent of patients reported that being outgoing better portrayed their personality.

Table 5 Personality

		Pre-Surgery(N=250)		Post-Surgery(N=170)	
		Frequency	%	Frequency	%
Personality 1	Optimistic	210	86.1	147	89.1
	Pessimistic	34	13.9	18	10.9
	Missing	6		5	
		250	100.0		100
Personality 2	General-Oriented	162	86.1	109	66.5
	Detail-Oriented	82	13.9	55	33.5
	Missing	6		6	
		250	100.0	170	100
Personality 3	Outgoing	217	88.9	147	89.1
	Introspective	27	11.1	18	10.9
	Missing	6		5	
		250	100	170	100

Antecedents

Table 6 presents the expectation antecedents among the sample. One fifth of the sample reported they received a total knee replacement surgery previously, and around forty-five percent of the sample had been hospitalized at the TVGH before. Seventy percent of patients answered yes to “Have you heard

of any TKR surgery experience before?" and sixty percent of patients reported they had heard about hospitalization experience at the TVGH before.

Table 6 Antecedents

		Pre-Surgery(N=250)		Post-Surgery(N=170)	
		Frequency	%	Frequency	%
Have you received TKR surgery before?	NO	199	79.6	137	80.6
	YES	51	20.4	33	19.4
	total	250	100	170	100
Have you been hospitalized at TVGH before?	NO	141	56.4	97	57.1
	YES	109	43.6	73	42.9
	total	250	100	170	100
Have you heard of any TKR surgery experience before?	NO	63	25.3	49	29.0
	YES	186	74.7	120	71.0
	missing	1		1	
	total	250	100	170	100
Have you heard of any TVGH hospitalization experience before?	NO	97	38.8	67	39.4
	YES	153	61.2	103	60.6
	total	250	100.0	170	100

Functional status

Functional status was measured by SF-36 and WOMAC in this study. Table 7 presents the results regarding their health-related quality of life in eight different domains and in both physical and mental domains. Health-related quality of life in all domains was higher at the post-surgery time point. Knee functions in pain, stiffness and function domains were captured by WOMAC and are presented in Table 8 for both pre-surgery and post-surgery time points. The post-surgery scores revealed a lower score in three of the domains in WOMAC, which indicates better knee function post-operatively.

Table 7 SF-36 scores

	Pre-surgery (N=250)					Post-Surgery (N=170)				
	N	Mean	Std Dv	Min	Max	N	Mean	Std Dv	Min	Max
Physical Domain										
PF	249	33.97	19.43	0	90	159	44.311	17.52	0	88.9
RP	249	17.37	31.63	0	100	170	36.13	39.18	0	100
BP	249	39.41	20.76	0	100	170	71.42	19.13	22	95
GH	248	59.90	22.70	0	100	170	76.75	18.74	15	100
VT	249	65.80	22.11	5	100	170	83.07	16.08	30	100
Mental Domain										
SF	249	72.39	28.12	0	100	170	85.29	24.86	25	100
RE	245	55.10	46.24	0	100	170	88.23	30.21	0	100
MH	249	69.51	19.08	8	100	170	88.31	13.96	48	100
PCS	244	29.92	7.48	12.2	50.7	159	36.43	8.05	20.4	54.8
MCS	244	53.25	11.97	24.7	73.6	159	63.81	8.57	32.8	75.1

NOTE: **PF**: physical functioning; **RF**: role limitation due to physical health problems; **GH**: general health; **VT**: vitality; **SF**: social functioning; **RE**: role limitation die to emotional problems; **MH**: mental health; **PCS**: physical component subscale; **MCS**: mental component subscale.

Table 8 WOMAC scores

	Pre-surgery(N=250)					Post-Surgery (N=170)				
	N	Mean	Std Dv	Min	Max	N	Mean	Std Dv	Min	Max
Pain	249	26.33	7.52	8	50	170	13.77	4.60	8	30
Stiff	249	10.13	5.06	4	20	170	8.23	3.60	4	20
Function	230	85.86	22.05	63	160	168	51.70	14.66	22	88

Complications and system outcomes

Complications and system outcomes are presented in Table 9. Five cost outliers were found in the sample and no inpatient falls or medication errors were reported during the period of this study. Less than two percent of the sample had infection or deep vein thrombosis from the time of discharge from the hospital until the follow-up six weeks later. There were seven patients who were admitted to the emergency room for medical attention within 7 days after the total knee

replacement surgery. Two of them were experiencing gastro-intestinal problems and were admitted to general surgery units afterwards. Five of them were taken care of in the emergency room and discharged the same day. At the fourteen days readmission screening, there were four patients who revisited this hospital. One medical problem was taken care of in the emergency room and the patient was discharged the same day. The other three were admitted to the Gynecology or Colon-rectal surgery units. None of them were readmitted to orthopedic units.

Table 9 Complications & System Outcomes

		Pre-surgery (N=250)		Post-Surgery (N=170)	
		Frequency	%	Frequency	%
Outliers of Cost	No	245	98	167	98.2
	Yes	5	2.0	3	1.8
	total	250	100	170	100
Inpatient fall	No	250	100	170	100
	Yes	0		0	
	total	250	100	170	100
Medication error	No	250	100	170	100
	Yes	0		0	0
	total	250	100	170	100
Infection	No	238	98.8	161	98.2
	Yes	3	1.2	3	1.8
	Missing	9		6	
	total	250	100	170	100.0
Deep Vein Thrombosis	No	237	98.3	161	98.2
	Yes	4	1.7	3	1.8
	Missing	9		6	
	total	250	100	170	100.0
7 days Readmission	No	240	100	163	100
	Yes	0		0	
	Missing	10		7	
	total	250	100	170	100
14 days Readmission	No	239	100	162	100
	Yes	0			
	Missing	11		8	
	total	250	100	170	100

Sample Analysis

This study utilized a total sampling method. A total of 330 patients were eligible for study. A total of 281 patients were approached and 31 of them chose not to participate. Information on age and gender were obtained from the screen schedule. Table 10 illustrates the refusal distribution. Females tended to refuse to participate more than males. Compared with the overall sample distribution, younger females and older males were more likely to say no in response to the invitation to participate in the research.

Table 10 Refusal Analysis

	N	Mean	S.D	Min	Max
Male	6	79.33	7.89	70	90
Female	25	70.48	8.10	57	86
Total	31	72.19	8.69	57	90

In the sample population, seventy three percent were female, and twenty six percent were male. The ratio of female to male was three to one. Compared to the National Health Insurance data for total knee replacement surgery patients (Tien, 2007), the ratio for female to male was around 1:1. Also, compared to the inpatient satisfaction survey of 573 respondents from this study's medical center released in July, 2011, female patients constituted forty seven percent of the satisfaction survey population.

As for age, compared with National Health Insurance data, the mean age for patient's receiving total knee replacement surgery in Taiwan is 71 years old. This is consistent with the study sample.

Table 11 Age with Gender Distribution

Age	N	Mean	S.D	Min	Max
Male	67	72.63	11.32	41	88
Female	183	71.21	8.89	26	90
Total	250	71.59	9.60	26	90

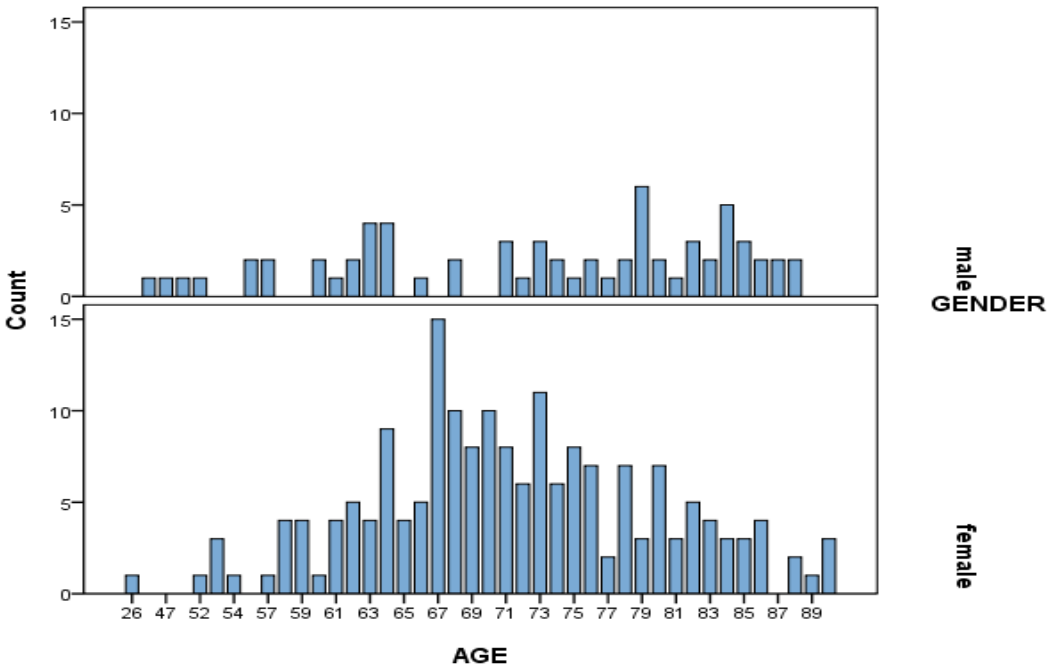


Figure 3 Age with Gender Distribution

Table 11 presents the age and gender distribution and this distribution can be visualized in Figure 3. Males have a mean age one year older than females. The female population has a narrower bell shaped distribution while the male distribution shows a wider uniform distribution.

In regards to educational background, the sample population reported sixty percent at the level of elementary graduate or no normal school, while ten percent of the sample is at community college or higher graduate. Given the mean age was 71 years old among the sample, it is reasonable that in the 1960s,

the majority of Taiwanese people were elementary graduate school graduates. Sixty percent of sample was from the north region of Taiwan. In the patient satisfaction survey of this hospital, seventy-six percent of the sample was from the northern region of Taiwan. This comparison revealed that total knee replacement surgery attracts more patients from other regions of Taiwan than this study hospital as a whole.

Unlike the health care insurance system in the United States, National Health Insurance (NHI) was instituted in 1995 and available for all Taiwanese citizens. NHI is a single-payer compulsory social insurance plan which centralizes the disbursement of health-care funds. Asking what kind of health insurance plan patients carry in the United States can serve as a reference for patients' social-economic status. In the Taiwanese population, the question was rephrased to "do you have additional health insurance plan other than National Health Insurance?" In the sample population, forty percent of the sample population answered yes to this question. Patients with additional health insurance can be recognized as having better social economic status and this may influence their expectations in some way.

The ratio for receiving single to bilateral knee replacement surgery was four to one. The frequency of Charlson Comorbidity Index score revealed that sixty two percent of patients were rated two to four. It is reminded that one element of the Charlson score is age. Charlson Comorbidity Index score is negative statistically correlated with expectations for providing care, at both pre-

and post-time points. The higher the Comorbidity score the lower the expectation for providing care.

Sample subjects at pre-surgery and post-surgery were examined in regards to their distribution on every independent variable. The distribution across basic demographic, personal features and expectation antecedents remained the same. Functional status at post-surgery time point reported better functioning status, which refers to a higher score on SF-36 and a lower score on WOMAC measure. The sample distribution on personality2, which refers to general-oriented vs. detail-oriented personality, reported differently at pre- and post-surgery time point (Table 5). Thirteen percent of the sample population at pre-surgery time point reported detail-oriented best describes their personality. While at post-surgery time point, thirty three percent of the sample population reported having a detail-oriented personality. Subjects with detail-oriented personality tended to drop out less frequently after they agreed to participate in the study.

Expectations before surgery

The patient expectation questionnaire was utilized in this study to understand the expectations among the sample population of the outcome of knee replacement surgery. Table 12 presents the results from the patient expectation questionnaire at pre-surgery time point. Expectations for all questions are generally high. Other than the question on providing care, over eighty percent of the respondents answered at the highest anchor on the scale. On the question of providing care for family and recreational activities, ten and eight percent of respondents reported not applicable, respectively. The response patterns for pain relief, improved ROM and return to ADL are similar. The results of the patient expectation questionnaire reveal a significant skewness.

Table 12 Patient Expectation Questionnaire, Pre-surgery

	Item Scores and Frequency (valid percent %)						
Items	NA	1	2	3	4	missing	skewness
Pain Relief	4 (1.6)	1(.4)	2 (.8)	12(4.8)	231(92.4)	0	-5.258
Improved ROM	7 (2.8)	1(.4)	3 (1.2)	16 (6.4)	222 (89.2)	1	-4.171
Return to ADL	2 (.8)	2 (.8)	4 (1.6)	14 (5.6)	228 (91.2)	0	-4.792
Providing Care	27 (10.8)	22 (8.8)	4 (1.6)	22 (8.8)	175 (70.0)	0	-1.434
Recreation	20 (8.1)	3 (1.2)	15 (6.0)	210 (84.7)	-	2	-2.570
Full Recovery	--	2 (.8)	1 (.4)	14 (5.6)	232 (93.2)	1	-5.336

Principal component analysis

Skewness coefficient in the responses of the patient expectations was examined and is presented at Table 12. Factor analysis utilizing the principal component analysis technique was utilized to condense questions, explore the underlying patterns and increase statistical power.

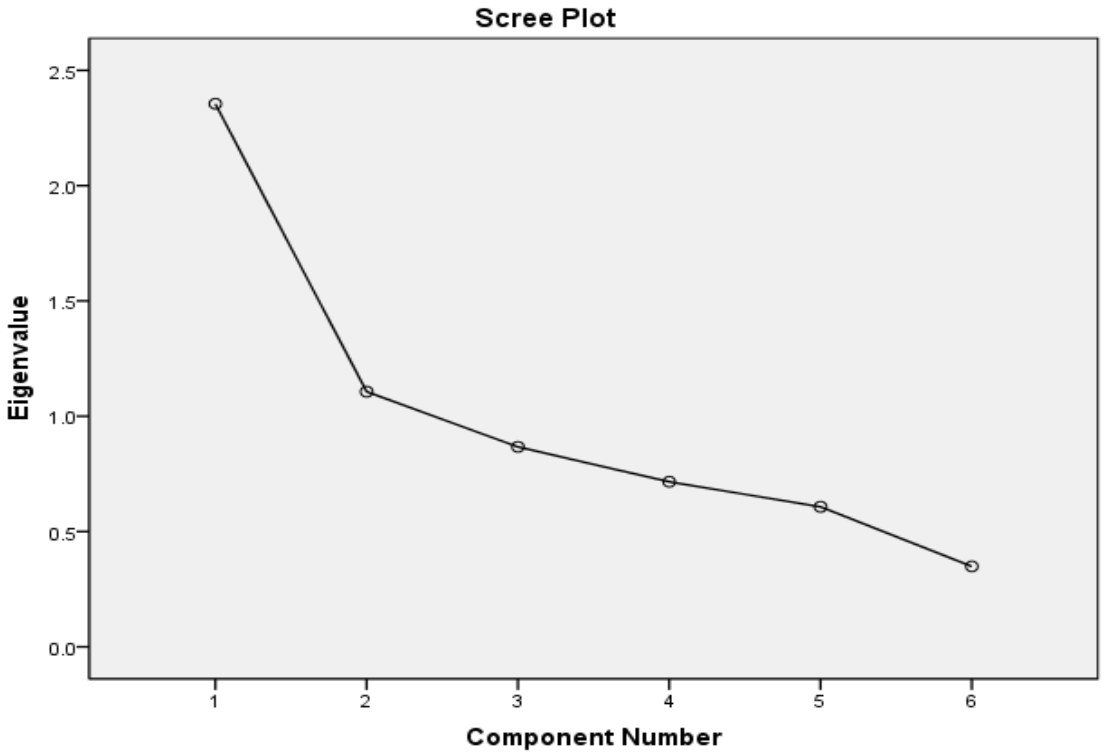


Figure 4 Pre-surgery Scree Plot

Six questions of the patient expectation questionnaire at pre-surgery time point were subjected to principal component analysis using SPSS version 19.0. Principal component analysis (PCA) revealed the presence of two components with eigenvalues exceeding 1, explaining 39.2 % and 18.44 % of the variance. A two-component solution explained a total of 57.68% of the variance.

An inspection of the component plot in rotated space indicated two clusters of expectation questions (see Figure 5). The expectation questions regarding pain relief, improved ROM, return to ADL, and full recovery clustered together on the component one axis and the major commonality of these four questions only focused on the function of the problematic knee and the patient him/herself. The expectation questions around recreation activities and ability to provide care for others were clustered together on the component two axis. The main idea of these latter two questions was about the use of the knee for interacting with others.

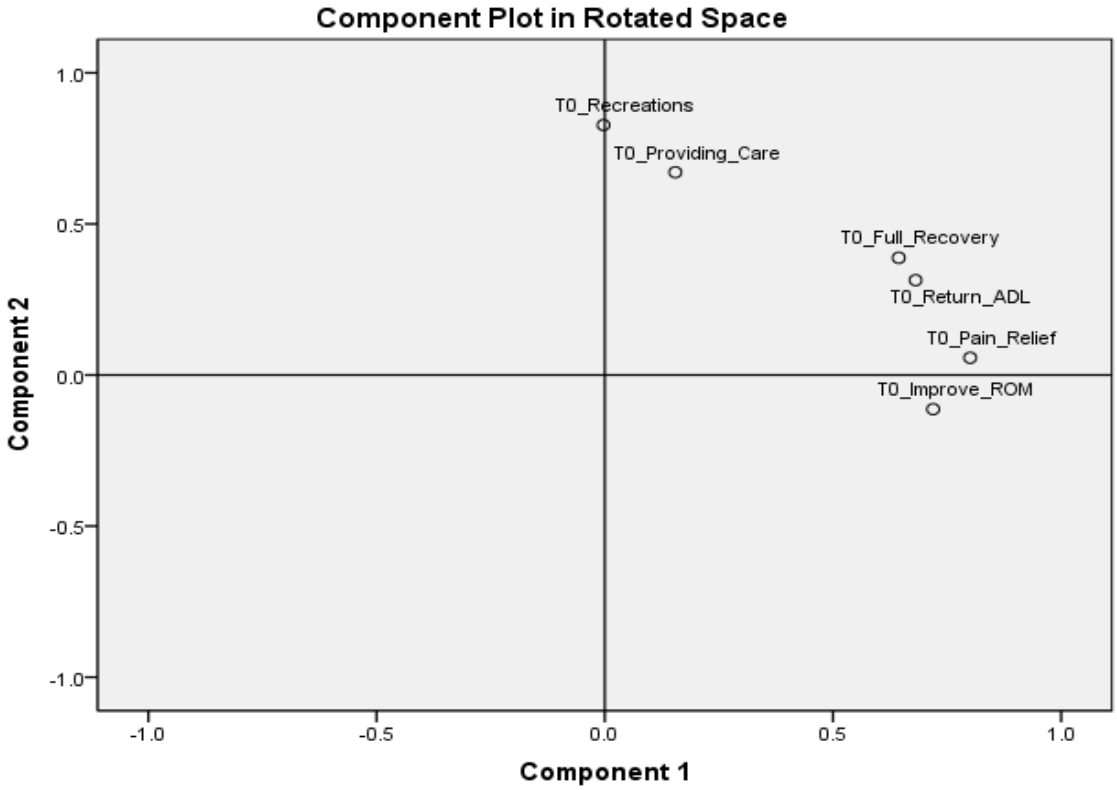


Figure 5 Pre-surgery Component Plot in Rotated Space

Furthermore, the component matrix in Table 13 was examined for patterns between questions. In component 1, all questions presented a positive loading score. In component 2, questions on pain relief, improved ROM, return to ADL presented a negative loading while the question on full recovery revealed a positive but approaching 0. Thus, it was confirmed that principal component one captured the expectations around knee function and principal component two captured expectations about interacting with others.

Table 13 Component Matrix for Expectation Questionnaire, Pre-surgery

Items	Component 1	Component2
T0-Pain Relief	.728	-.338
T0-Improve ROM	.574	-.448
T0-Return to ADL	.748	-.056
T0-Providing Care	.461	.512
T0-Recreation	.399	.725
T0-Full recovery	.751	.027

Principal component factors 1 and 2 were computed for every patient by using the sum of the score of each expectation question times the loading score of each question from the component matrix. Principal component factors 1 and 2 served as dependent variables for further exploration in subsequent analysis.

Individual Difference

Marginal association

After exploration of the sample and preliminary responses, individual differences were further investigated. Marginal associations between patient expectation questions and independent variables were examined. Given the skewness of patient expectations, non-parametric statistics were utilized to understand the marginal associations.

Expectation for pain relief, before surgery

Patient expectations for pain relief before surgery were examined for their potential associations with twenty one independent variables. Patient expectation for pain relief demonstrated statistical significance in personality 1 (optimistic vs. pessimistic), and in physical and mental quality of life components. A Mann-Whitney U test was conducted to evaluate the difference between optimistic and pessimistic personality on the expectation for pain relief before surgery. The result, shown in Table 14, indicates a statistical difference between personality where optimistic personality scored higher on the expectation for pain relief ($z=-2.359$, $p=.018$). Spearman correlation was done to understand the relationships between expectation for pain relief and physical and mental quality of life components. The results revealed statistically significant correlations in a different direction, where lower quality of life in the physical component correlated with higher expectations, and higher quality of life in the mental component correlated with high expectations at the pre-surgery time point (see Table 15).

Table 14 Expectation for Pain Relief, Pre-surgery on Personality 1

Variables	N	Z value	P value	Mean Rank Optimistic N=210	Mean Rank Pessimistic N=34
Personality 1	243	-2.359	.018	124.44	110.50

Table 15 Expectation for Pain Relief, Pre-surgery, on Quality of Life

Variables	N	r	p
T0-SF-PCS	244	-.162	.011
T0-SF-MCS	244	.169	.008

Expectation for improving ROM, before surgery

Patient expectation for improving ROM before surgery was examined for associations on twenty one independent variables. Patient expectations for improved ROM demonstrated statistical significance in personality 3 (outgoing vs. introspective), and physical quality of life components. A Mann-Whitney U test was conducted to evaluate the difference between outgoing and introspective personality on the expectation for improving ROM before surgery. As can be seen in Table 16, the results indicate a statistical difference where outgoing personality scored higher on the expectation for improving ROM. Spearman correlation was done to understand the relationships between expectations for improving ROM on physical quality of life components. The results revealed a statistically significant correlation, between expectation for improving ROM and quality of life physical component. The lower physical quality of life component correlated with higher expectation on improving ROM at the pre-surgery time point.

Table 16 Expectation for Improving ROM, Pre-surgery, on Personality 3

Variables N=243	Z value	P value	Mean Rank Outgoing N=216	Mean Rank Introspective N=27
Personality 3	-2.835	.005	124.38	102.94

Table 17 Expectation for Improving ROM, Pre-surgery, on Quality of Life Physical Component

Variables	N	r	P
T0-SF-PCS	243	-.157	.014

Expectation for return to ADL, before surgery

Patient expectation for return to ADL before surgery was examined for association on twenty one independent variables. Patient expectation for return to ADL demonstrated statistical significance on personality 1 (optimistic vs. pessimistic), and quality of life mental components. A Mann-Whitney U test was conducted to evaluate the difference between optimistic and pessimistic personality on the expectation for return to ADL before surgery. The result is shown in Table 18, indicating a statistical difference where optimistic personality scored higher on the expectation for return to ADL. Patients who have not heard of TVGH hospitalization experiences before scored higher on the expectation question. Spearman correlation was done to understand the relationships between expectation for return to ADL and quality of life mental components. The results revealed a statistically significant correlation where higher quality of life on mental component correlated with higher expectation on return to ADL at pre-surgery time point.

Table 18 Expectation for Return to ADL, Pre-surgery, on Personality1 and Heard of TVGH Experience

Variables	Z value	P value	Mean Rank	Mean Rank
Personality 1 (N=244)	-2.115	.034	Optimistic N=210 124.33	Pessimistic N=34 111.21
Heard of TVGH experience before (N=250)	-2.540	.011	NO N=97 132.66	YES N=153 120.96

Table 19 Expectation for Return to ADL, Pre-surgery, on Quality of Life Mental Component

Variables	N	r	P
T0-SF-MCS	244	.145	.024

Expectation for providing care, pre-surgery

Patient expectation for providing care before surgery was examined for association on twenty one independent variables. Patient expectation for providing care demonstrated statistical significance on heard of TKR experience before, age, comorbidity, and quality of life mental components. A Mann-Whitney U test was conducted to evaluate the difference between heard of TKR experience or not on the expectation for providing care before surgery. The result is shown in Table 20, indicating a statistical difference between patients who have or have not heard of TKR experiences before. People who have heard of TKR experiences reported lower expectation score on questions for providing care at pre-surgery time point.

A Spearman correlation was done to understand the relationships between expectation for providing care and age, comorbidity, quality of life

physical components. As shown in Table 21, higher age (*r*=.168, *p*=.008), and lower comorbidity score (r=-.167, *p*=.008) showed a statistically significant correlation with higher expectation of providing care at the pre-surgery time point. Furthermore, lower physical quality of life status (*r*=-.153, *p*=.017) statistically correlated with higher expectation on providing care at the pre-surgery time point.

Table 20 Expectation for Providing Care, Pre-surgery, on Heard of TKR Before

Variables N=249	Z value	P value	Mean Rank NO N=63	Mean Rank YES N=186
Heard TKR Before	-2.247	.025	139.21	120.19

Table 21 Expectation for Providing Care, Pre-surgery, on Age, Comorbidity and Quality of Life Physical Component

Variables	N	r	P
Age	250	.168	.008
Comorbidity	250	-.167	.008
T0-SF-PCS	244	-.153	.017

Expectation for recreation, before surgery

Patient expectations for recreation before surgery were examined for association on twenty one independent variables. Patient expectation for recreation demonstrated statistical significance on quality of life physical components. A Spearman correlation was done to understand the relationships between expectation for recreation and quality of life physical components. As shown in Table 22, lower physical quality of life status statistically correlated with higher expectation for recreation (r=-.1657, p=.014) at pre-surgery time point.

Table 22 Expectation for Recreations, Pre-surgery, on Quality of Life Physical Component

Variables	N	r	P
T0-SF-PCS	242	-.157	.014

Expectation for full recovery, pre-surgery

Patient expectation for full recovery before surgery was examined for association on twenty one independent variables. Patient expectation for recreation was statistically significant on quality of life physical components. A Spearman correlation was done to understand the relationships between expectation for full recovery and quality of life physical components. As shown in Table 23, the lower physical quality of life status statistically correlated with higher expectation on full recovery (r=-.155, p=.016) at pre-surgery time point.

Table 23 Expectation for Full Recovery, Pre-surgery, on Quality of Life Physical Component

Variables	N	r	p
T0-SF-PCS	243	-.155	.016

Multivariate Linear Regressions

Multivariate linear regression models were constructed to explore the relationships between principle component factors and independent variables.

PCF1

Multivariate linear regression analysis was used to explore the relationship between principle component factor 1 (PCF1) and independent variables. Seven independent variables were included in the final model: age, gender, education level, T0-SF-PCS, personality 2 (general-oriented vs. detailed-oriented), heard about TKR experience before, and general health belief. The full model was statistically significant (p=.000) and explained 13.3% of the variance. As shown in Table 24, five variables made statistically significant contributions to the model (education, T0-SF-PCS, personality2, heard about TKR before, and T0-SF-GH), and T0-SF-PCS is the strongest predictor. Lower physical aspect quality of life and higher health belief predicts the higher expectation on knee function. General-oriented personality and never heard of TKR experience before predicts higher expectation on knee function. Having graduated from junior high school compared to having no formal schooling predicts higher expectation on knee function.

Table 24 PCF1 Multiple Linear Regression Model

PCF1	BETA	S.E.	p	95.0% CI	
				Lower	Upper
Age	-.018	.010	.076	-.039	.002
Gender	.008	.235	.974	-.454	.469
Education			.044		
Community college and above	.366	.372	.327	-.365	1.097
Senior high	-.402	.349	.250	-1.087	.283
Junior high	.675	.329	.041	.029	1.322
Elementary school	.199	.257	.440	-.306	.703
No formal schooling	0		----		
T0-SF-PCS	-.069	.014	.000	-.097	-.041
Personality 2	-.468	.202	.021	-.865	.070
Heard of TKR Before	-.509	.219	.021	-.939	-.078
T0-SF-GH	.011	.004	.021	.002	.020

R square= .169; Adjusted R Square=.133

PCF2

Multivariate linear regression analysis was used to explore the relationship between PCF2 and independent variables. Nine independent variables are included in the final model: age, gender, education level, T0-SF-PCS, personality 2 (general-oriented vs. detailed-oriented), personality 3 (outgoing vs. introspective), heard about TKR experience before, heard about TVGH before and general health belief. The full model was statistically significant (p=.012) and explained 5.5% of the variance. As shown in Table 25, three variables made statistically significant contributions to the model (age, T0-SF-PCS and

personality 2), and age is the strongest predictor. Younger age and lower physical aspect quality of life predicts the higher expectation on interaction with others. General-oriented personality predicts higher expectation on interaction with others.

Table 25 PCF2 Multiple Linear Regression Model

PCF2	BETA	S.E.	p	95.0% CI	
				Lower	Upper
Age	-.018	.007	.013	-.033	-.004
Gender	-.060	.166	.719	-.387	.267
Education			.055		
Community college and above	.335	.263	.202	-.180	.851
Senior high	-.428	.249	.086	-.916	.060
Junior high	.142	.232	.540	-.312	.597
Elementary school	-.143	.182	.432	-.500	.214
No formal schooling	0		--		
T0-SF-PCS	-.022	.010	.031	-.042	-.002
Personality 2	-.350	.151	.021	-.647	-.054
Personality 3	.394	.227	.082	-.051	.839
Heard of TKR Before	-.257	.177	.146	-.605	.090
Heard of TVGH Before	.272	.160	.090	-.042	.586
T0-SF-GH	.004	.003	.192	-.002	.011

R square=. 103; Adjusted R Square=.055

Binary Logistic Regression

Binary logistic regression models were constructed for each expectation question to understand joint associations.

Expectation for pain relief, pre-surgery

This model contained six independent variables (age, gender, T0-SF-PCS, WOMAC-pain, personality 1, and T0-SF-GH). The full model was statistically significant (X^2=15.85, p=.015), indicating that the model was able to distinguish between respondents who reported and did not report the highest score on expectations. The model as a whole explained between 6.5 % (Cox and Snell R square) and 15.6 % (Nagelkerke R square) of the variance. Three variables (T0-SF-PCS, personality1 and T0-SF-GH) made statistically significant contributions to the model. The odds ratio for these three predictors ranged from .28 to 1.02.

Table 26 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Pain Relief, Pre-surgery

Expec101	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.005	.030	.881	.995	.938	1.056
Gender	-.231	.633	.715	.794	.229	2.745
T0-SF-PCS	-.088	.041	.029	.915	.845	.991
T0-WOMAC-pain	.051	.041	.216	1.052	.971	1.140
Personality 1	-1.272	.603	.035	.280	.086	.914
T0-SF-GH	.028	.013	.027	1.029	1.003	1.055

Cox and Snell R square=.065; Nagelkerke R square=.156

Expectation for improving ROM, pre-surgery

This model contained nine independent variables (age, gender, region, T0-SF-PCS, personality 3, have TKR before, have TVGH before, heard TKR before, and T0-SF-GH). The full model was statistically significant (X^2=32.35, p=.001), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 12.8 % (Cox and Snell R square) and 26.1 % (Nagelkerke R square) of the variance. Four variables (T0-SF-PCS, personality 3, have TKR before, heard of TKR before) made statistically significant contributions to the model. The odds ratio for these four predictors ranged from .17 to 1.01.

Table 27 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Improving ROM, Pre- surgery

EXPEC102	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	.010	.028	.713	1.010	.957	1.066
Gender	.619	.538	.249	1.858	.648	5.329
Region						
East	-1.510	.614	.014	.221	.066	.736
South	.243	1.161	.834	1.275	.131	12.412
Mid	1.015	1.278	.427	2.759	.225	33.793
Mid-North	-.268	.729	.713	.765	.183	3.189
North	--					
T0-SF-PCS	-.118	.038	.002	.888	.825	.957
Personality 3	-1.442	.605	.017	.236	.072	.773
Have TKR Before	-1.255	.626	.045	.285	.084	.973
Have TVGH Before	.848	.572	.138	2.334	.761	7.162
Heard of TKR Before	-1.752	.821	.033	.174	.035	.867
T0-SF-GH	.016	.012	.182	1.016	.993	1.040

Cox and Snell R square=.128; Nagelkerke R square=.261

Expectation for return to ADL, pre-surgery

This model contained six independent variables (age, gender, T0-WOMAC-function, personality 1, have TVGH before and T0-SF-GH). The full model was statistically significant (X^2=20.12, p=.003), indicating that the model was able to distinguish between respondents who responded and did not respond highest score on expectation. The model as a whole explained between 8.6 % (Cox and Snell R square) and 20.1 % (Nagelkerke R square) of the variance. Two variables (personality 1 and have TVGH before) made statistically significant contributions to the model. The odds ratio for these two predictors ranged from .20 to .23.

Table 28 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Return to ADL, Pre-surgery

EXPEC103	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.042	.031	.180	.959	.902	1.020
Gender	.849	.569	.135	2.338	.767	7.127
T0-WOMAC-function	.022	.013	.097	1.022	.996	1.049
Personality 1	-1.430	.649	.027	.239	.067	.853
Have TGVH Before	-1.608	.687	.019	.200	.052	.770
T0-SF-GH	.022	.012	.057	1.023	.999	1.046

Cox and Snell R square=.086; Nagelkerke R square=.201

Expectation for providing care, pre-surgery

This model contained seven independent variables (age, gender, T0-SF-PCS, personality 2, have TKR before, heard of TKR before and heard of TVGH before). The full model was statistically significant (X^2=28.71, p=.000), indicating that the model was able to distinguish between respondents who responded and did not respond as highest score on expectation. The model as a whole explained between 11.4 % (Cox and Snell R square) and 16.3 % (Nagelkerke R square) of the variance. Four variables (age, T0-SF-PCS, personality 2, and heard of TKR before) made statistically significant contributions to the model. The odds ratio for these four predictors ranged from .24 to .96.

Table 29 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Providing Care, Pre-surgery

EXPEC104	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.038	.018	.037	.963	.929	.998
Gender	-.180	.363	.621	.835	.410	1.703
T0-SF-PCS	-.064	.022	.003	.938	.899	.979
Personality 2	-.785	.330	.017	.456	.239	.870
Have TKR before	-.530	.381	.163	.588	.279	1.241
Heard of TKR Before	-1.396	.465	.003	.248	.100	.616
Heard of TVGH Before	.487	.370	.188	1.627	.789	3.358

Cox and Snell R square=.114; Nagelkerke R square=.163

Expectation for recreations, pre-surgery

This model contained five independent variables (age, gender, T0-SF-PCS, personality 2, and T0-SF-GH). The full model was statistically significant (X^2=16.25, p=.006), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 6.6 % (Cox and Snell R square) and 11.4 % (Nagelkerke R square) of the variance. Two variables (T0-SF-PCS, and T0-SF-GH) made statistically significant contributions to the model. The odds ratio for these four predictors ranged from .91 to 1.01.

Table 30 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Recreations, Pre-surgery

EXPEC105	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.022	.021	.294	.978	.938	1.020
Gender	-.203	.417	.627	1.225	.541	2.772
T0-SF-PCS	-.088	.028	.002	.915	.866	.967
Personality 2	.726	.389	.062	.484	.226	1.036
T0-SF-GH	.018	.010	.016	1.018	.999	1.037

Cox and Snell R square=.066; Nagelkerke R square=.114

Expectation for full recovery, Pre-surgery

This model contained six independent variables (age, gender, T0-SF-PCS, T0-WOMAC-pain, T0-WOMAC-function, and T0-SF-GH). The full model was statistically significant (X^2=22.54, p=.001), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 9.6 % (Cox and Snell R square) and 23.8 % (Nagelkerke R square) of the variance. Three variables (T0-SF-PCS, T0-WOMAC-pain, and T0-SF-GH) made statistically significant contributions to the model. The odds ratio for these three predictors ranged from .85 to 1.04.

Table 31 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Full Recovery, Pre-surgery

EXPEC106	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.041	.036	.248	.960	.895	1.029
Gender	.496	.608	.415	1.641	.498	5.408
T0-SF-PCS	-.153	.050	.002	.858	.778	.946
T0-WOMAC-pain	-.116	.052	.026	.891	.805	.986
T0-WOMAC-function	.033	.019	.082	1.034	.996	1.073
T0-SF-GH	.040	.015	.008	1.041	1.011	1.072

Cox and Snell R square=.096; Nagelkerke R square=.238

Expectation after Surgery

Table 30 presents the results on patient expectations post-surgery. Expectations among all questions are generally high. Ninety percent of responses reported the highest score on expectation questions for pain relief, improving ROM and return to ADL at post surgery time point. On the question of providing care, at the post-surgery time point, 28.2 % of responses reported 1. Compared to the pre-surgery time point, only 8.8 % responses reported 1. The response pattern on pain relief, improved ROM and return to ADL are similar. The responses on expectation questions for full recovery are uniform, where 98.2 % reported 4 at post-surgery time point. Other than the expectation question on providing care, the remaining five expectation questions at post-surgery time point also revealed a significant skewness.

Table 32 Patient Expectation Questionnaire, Post-surgery

	Item Scores and Frequency						
Items	NA	1	2	3	4	Missing	Skewness
T1-Pain Relief	8(4.7)	0	1(.6)	1(.6)	160(94.1)	48	-4.119
T1-Improve ROM	7(2.8)	0	0	1(.6)	162(95.3)	48	-4.601
T1-Return to ADL	6(2.4)	0	0	2(.8)	162(95.3)	48	-4.938
T1-Providing Care	27(15.9)	48(28.2)	0	3(1.8)	92(54.1)	48	-.337
T1-Recreation	3(1.8)	2(1.2)	3(1.8)	162(95.3)	--	48	-5.344
T1-Full recovery	--	0	0	3(1.2)	167(98.2)	48	-7.392

Principal component analysis

Skewness in the response to the patient expectation questionnaire was presented. Factor analysis utilizing principal component analysis technique was carried out to condense questions, explore the underlying patterns and increase statistical power.

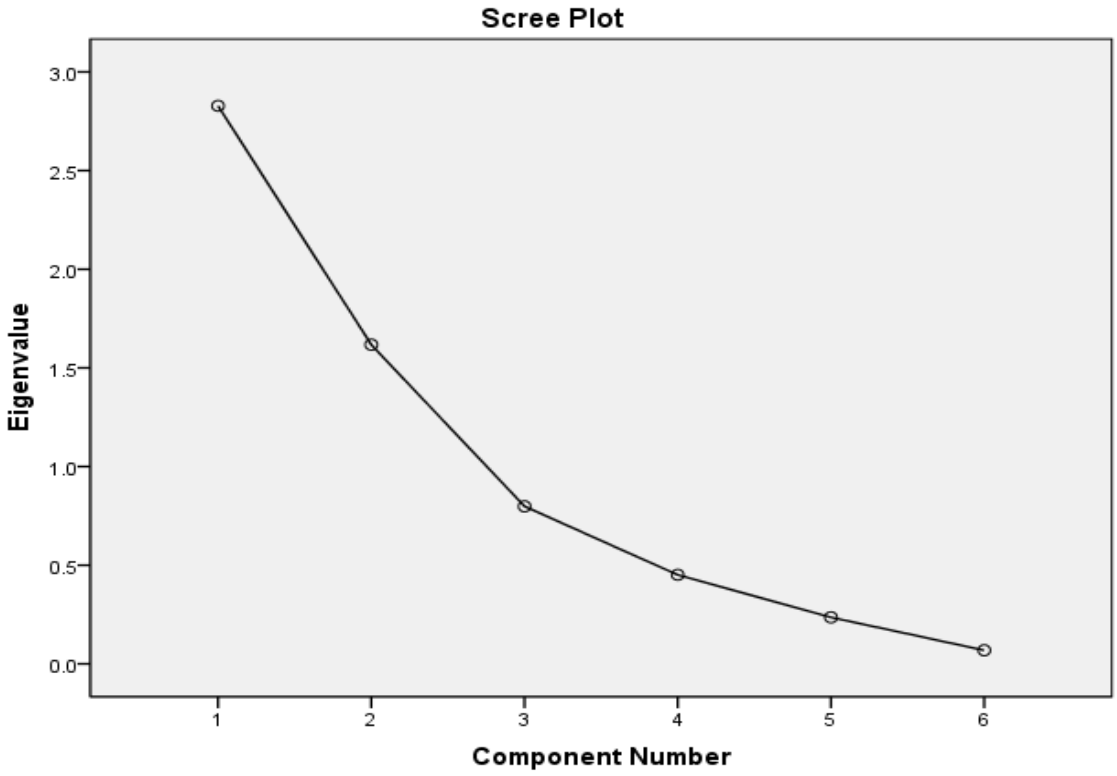


Figure 6 Post-surgery Scree Plot

Six questions on the patient expectation questionnaire at the post-surgery time point were subjected to principal component analysis using SPSS version 19.0. Principal component analysis (PCA) revealed the presence of two components with eigenvalues exceeding 1, explaining 47.13 % and 26.96 % of the variance. A two-component solution explained a total of 74.09% of the variance.

An inspection of the component plot in rotated space revealed two clusters of expectation questions. The expectation questions regarding pain relief, improve ROM, and return to ADL clustered together in component one axis; the major commonality of these four questions focuses on the function of the dysfunctional knee. The expectation questions around recreation activities and whether the repaired knee will be fully functional were clustered together in the component two axis. The question regarding expectation around providing care was located in the middle of both axes. The main theme of the component two axis was what patients would be able to do or perform in the future after knee replacement surgery occurred.

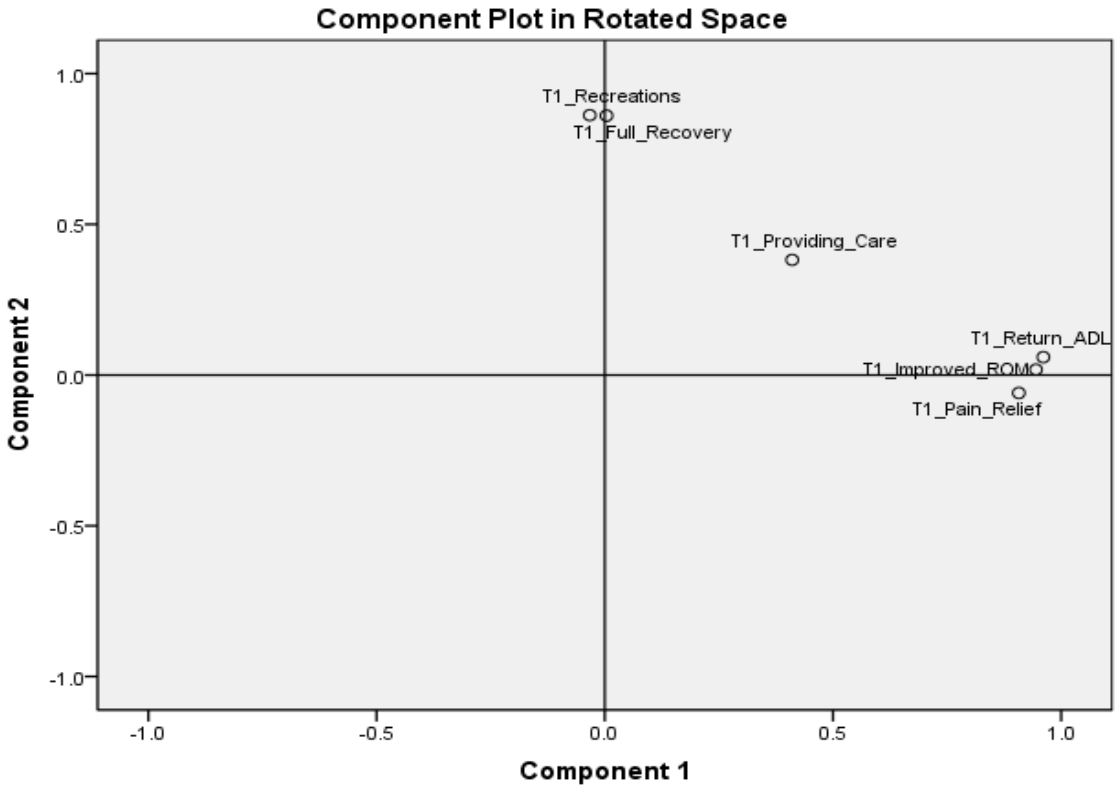


Figure 7 Post-surgery Component Plot in Rotated Space

The component matrix table (Table 33) was examined for patterns between questions. On component 1, all questions presented a positive loading score while the questions on recreations and full recovery were obviously lower than the others. On the component 2, questions on pain relief, improved ROM, return to ADL presented a negative loading. Questions on recreations and full recovery, on the other hand, demonstrated a higher loading score on component two. Thus, it was confirmed that at post-surgery time point, principal component factor 1 leans toward to the expectation about knee function and principal component factor 2 were referring to expectation on future events.

Table 33 Component Matrix for Expectation Questionnaire, Post-surgery

Items	Component 1	Component2
T1-Pain Relief	.892	-.174
T1-Improve ROM	.939	-.102
T1-Return to ADL	.961	-.063
T1-Providing Care	.456	.327
T1-Recreation	.077	.859
T1-Full recovery	.113	.853

Principal component factor 3 and 4 were computed later on for every patient by using the sum of the score of each expectation question times loading score of each question from the component matrix. Principal component factor 3 and 4 served as dependent variables for further exploration.

Individual Difference

Marginal association

Marginal associations between patient expectation questions at post-surgery time point and independent variables were examined. Given the skewness on patient expectations, non-parametric statistics were utilized to understand the marginal associations.

Expectation for pain relief, post-surgery

Patient expectation for pain relief post-surgery was examined for association with independent variables. Patient expectation for pain relief was statistically significant on quality of life physical components. Spearman correlation was done to understand the relationships between expectations for pain relief on quality of life physical components. The results revealed statistically significant correlations, where lower quality of life on physical component correlated with higher expectation at post-surgery time (Table 34).

Table 34 Expectation for Pain Relief, Post-surgery, on Quality of Life Physical Component

Variables	N	r	P
T1-SF-PCS	159	-.224	.005

Expectation for Improving ROM, Post-surgery

Patient expectations for improving ROM after surgery were examined for their associations with independent variables. Patient expectation for improving ROM demonstrated statistical significance on procedure type (single vs. bilateral type) and region. A Mann-Whitney U test was conducted to evaluate the

difference between single and bilateral TKR on the expectation for improving ROM after surgery. The result, shown in Table 35, indicates a statistical difference where single TKR scored higher on the expectation for improving ROM at the post-surgery time point. A Kruscal-Wallis test was employed to understand the relationship between expectation for improving ROM and region. Patients from the southern region scored the lowest on the expectation for improving ROM at post-surgery time point.

Table 35 Expectation for Improving ROM, Post-surgery, on Procedure Type

Variables N=170	Z value	P value	Mean Rank Single N=136	Mean Rank Bilateral N=34
Procedure Type	-2.188	.029	87.01	79.44

Table 36 Expectation for Improving ROM, Post-surgery, on Region

Variables	N	Chi square	df	P value
Region	170	10.981	4	.027

	N	Mean Rank
North	112	86.48
Mid-North	26	89.50
Mid	6	89.50
South	8	68.13
East	18	80.00
Total	170	

Expectation for Return to ADL, Post-surgery

Patient expectation for return to ADL at the post-surgery time point was examined for associations with independent variables. Patient expectation for return to ADL demonstrated statistical significance on procedure type (single vs.

bilateral type). A Mann-Whitney U test was conducted to evaluate the difference between single and bilateral TKR on the expectation for return to ADL after surgery. The result, shown in Table 37, indicates a statistical difference (*Z*=-2.209, *p*=.027) where single TKR scored higher on the expectation for return to ADL at post-surgery time point.

Table 37 Expectation for Return to ADL, Post-surgery, on Procedure Type

Variables N=170	Z value	P value	Mean Rank Single N=136	Mean Rank Bilateral N=34
Procedure Type	-2.209	.027	87.01	79.44

Expectation for Providing Care, Post-surgery

Patient expectation for providing care after surgery was examined for any association with independent variables. Patient expectation for providing care demonstrated statistical significance on insurance, age, comorbidity, T1-SF-PCS, and T1-WOMAC-stiff. A Mann-Whitney U test was conducted to evaluate the difference between “have additional insurance other than national health insurance or not” on the expectation for providing care after surgery. The result, shown in Table 38, indicates a statistical difference where patients with additional health insurance other than national health insurance reported higher expectation for providing care at after surgery time point. Patients who reported better physical quality of life reported higher expectation on providing care. Also, younger patients, with less comorbidity and minor stiffness post-surgery reported higher expectation on providing care at the post-surgery time point (Table 39).

Table 38 Expectation for Providing Care, Post-surgery, on Insurance

Variables N=170	Z value	P value	Mean Rank NO N=102	Mean Rank YES N=68
Insurance	-4.101	.000	74.09	102.62

Table 39 Expectation for Providing Care, Post-surgery, on Correlated Variables

Variables	N	r	P
Age	170	-.421	.000
Comorbidity	170	-.354	.000
T1-SF-PCS	170	.174	.028
T1-WOMAC-stiff	170	-.188	.014

Expectation for Recreation, After Surgery

Patient expectation for recreation after surgery was examined for any association with independent variables. Patient expectation for recreation demonstrated statistical significance on comorbidity, T1-SF-GH, T1-WOMAC-stiff, T1-WOMAC-function, personality 3, have TKR before and have TVGH before. Mann-Whitney U tests were conducted, and the results are presented in Table 41. Patients with outgoing personality, never heard of knee replacement surgery, or TVGH hospitalization experience reported higher expectation on recreations at after surgery time point. Spearman correlations were computed to understand the relationships between variables. As seen in Table 40, lower comorbidity scores, milder stiffness and better function of the repaired knee are associated with higher expectation for recreation after surgery.

Table 40 Expectation for Recreations, Post-surgery, on Correlated Variables

Variables	N	r	P
Comorbidity	170	-.183	.017
T1-SF-GH	170	.199	.009
T1-WOMAC-stiff	170	-.217	.004
T1-WOMAC-function	168	-.169	.028

Table 41 Expectation for Recreations, Post-surgery, on Personality and Antecedents

Variables	Z value	P value	Mean Rank	Mean Rank
Personality 3 (N=165)	-2.430	.015	Outgoing (N=147) 84.18	Introspective(N=18) 73.39
Have TKR before (N=170)	-2.233	.026	No (N=137) 87.02	Yes (N=33) 79.20
Have TVGH before (N=170)	-2.621	.009	No (N=97) 88.65	Yes(N=73) 81.32

Expectation for Full Recovery, Post-surgery

Patient expectation for full recovery after surgery was examined for any association with independent variables. Patient expectation for full recovery demonstrated statistical significance on age, personality 2, personality 3, have TKR experience and have TVGH hospitalization experience before. Mann-Whitney U tests were conducted, and the results are presented in Table 42. Patients with general-oriented personality, outgoing personality, never heard of knee replacement surgery and TVGH hospitalization experience reported higher

expectation on full recovery after surgery time point. Spearman correlation showed that older the patients reported lower the expectation on full recovery at post-surgery time point.

Table 42 Expectation for Full Recovery, Post-surgery, on Personality and Antecedents

Variables	Z value	P value	Mean Rank	Mean Rank
Personality 2 (N=164)	-2.453	.014	General -Oriented (N=109)	Detail-Oriented (N=55)
			84.00	79.53
Personality3 (N=165)	-3.117	.002	Outgoing(N=147)	Introspective(N=18)
			83.94	75.33
Have TKR before (N=170)	-2.082	.037	No (N=137)	Yes (N=33)
			86.38	81.85
Have TVGH before (N=170)	-2.005	.045	No (N=97)	Yes (N=73)
			87.00	83.51

Table 43 Expectation for Full Recovery, Post-surgery, on Age

Variables	N	r	P
Age	170	-.190	.013

Multivariate Linear Regressions

Multivariate linear regression models were constructed to explore the relationships between principle component factors and independent variables.

PCF3

Multivariate linear regression analysis was used to explore the relationship between principle component factor 3(PCF3) and independent variables. Six independent variables are included in the final model: age, gender, insurance, procedure type, region, and T1-SF-PCS. The full model was statistically significant (p=.000) and explained 18.0% of the variance. As shown in Table 44, five variables made statistically significant contributions to the model (age, insurance, procedure type, region, and T1-SF-PCS), and procedure type is the strongest predictor. Lower physical aspect quality of life at post-surgery and younger age predicts the higher expectation on knee function at post-surgery time point. Living in the south region compared to the north region predicts lower expectation on knee function at post-surgery time point.

Table 44 PCF3 Multiple Linear Regression Model

PCF3	BETA	S.E.	p	95.0% CI	
				Lower	Upper
Age	-.053	.020	.011	-.094	-.012
Gender	-.154	.411	.708	-.960	.652
Insurance	.804	.396	.043	.027	1.581
Procedure	-1.663	.465	.000	-2.574	-.751
Region			.005		
East	-.804	.573	.161	-1.929	.321
South	-2.968	.885	.001	-4.703	-1.233
Mid	.166	.943	.860	-1.683	2.015
Mid-North	.517	.533	.333	-.529	1.562
North	0		--		
T1-SF-PCS	-.055	.022	.016	3.978	-.010

R square= .227; Adjusted R square= .180

PCF4

Multivariate linear regression analysis was used to explore the relationship between principle component factor 4(PCF4) and independent variables. Seven independent variables were included in the final model: age, gender, mother tongue, comorbidity, T1-SF-PCS, T1-WOMAC-stiff, and T1-WOMAC-function). The full model was statistically significant (p=.000) and explained 21.0% of the variance. As shown in Table 45, four variables made statistically significant contributions to the model (age, mother tongue, T1-SF-PCS, and T1-WOMAC-function), and T1-WOMAC-function is the strongest predictor. Higher physical

aspect quality of life at post-surgery time point predicts higher expectation on future events at post-surgery time point. Younger age and better knee function at post-surgery predicts the higher expectation on future events at post-surgery time point. Patients with Taiwanese mother tongue, comparing with Mandarin mother tongue, predict higher expectation for future events at post-surgery time point.

Table 45 PCF4 Multiple Linear Regression Model

PCF4	BETA	S.E.	p	95.0% CI	
				Lower	Upper
Age	-.019	.007	.014	-.035	-.004
Gender	.004	.131	.973	-.252	.261
Mother Tongue			.045		
All the others	-.361	.319	.258	-.988	.265
Mandrain+Taiwanese	.236	.142	.097	-.043	.514
Taiwanese	.291	.141	.039	.014	.568
Mandarin	0		--		
Comorbidity	-.107	.059	.071	-.223	.009
T1-SF-PCS	.016	.007	.042	.001	.031
T1-WOMAC-stiff	.026	.013	.055	-.001	.053
T1-WOMAC-function	-.050	.016	.003	-.083	-.017

R square= .256; Adjusted R Square= .210

Binary Logistic Regression

Binary logistic regression models were constructed for each expectation question to examine joint associations.

Expectation for Pain Relief, Post-surgery

The model contained six independent variables (age, gender, procedure type, T1-SF-PCS, T1-SF-GH and pre-surgery expectation on pain relief score). The full model was statistical significant (X^2=25.89, p=.000), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 15.0 % (Cox and Snell R square) and 40.1 % (Nagelkerke R square) of the variance. Four variables (age, procedure type, T1-SF-PCS, and pre-surgery expectation on pain relief score) made statistically significant contributions to the model. The odds ratio for these three predictors ranged from .90 to 2.50.

Table 46 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Pain Relief, Post-surgery

Expec201	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.103	.046	.027	.902	.824	.998
Gender	-1.235	1.113	.267	.291	.033	2.579
Procedure Type	-3.093	1.087	.004	.045	.005	.382
T1-SF-PCS	-.240	.088	.007	.786	.661	.935
T1-SF-GH	.064	.033	.052	1.066	.999	1.137
T0-Pain-Relief	.919	.399	.021	2.508	1.146	5.486

Cox and Snell R square=.150; Nagelkerke R square=.401

Expectation for Improving ROM, Post-Surgery

The model contained five independent variables (age, gender, education level, T1-SF-GH and pre-surgery expectation on improving ROM score). The full model was statistically significant (X^2=17.87, p=.022), indicating that the model was able to distinguish between respondents who did and did not report highest score on expectation. The model as a whole explained between 10.0 % (Cox and Snell R square) and 31.7 % (Nagelkerke R square) of the variance. One variable (pre-surgery expectation on improving ROM score) made a statistically significant contribution to the model.

Table 47 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Improving ROM, Post-surgery

EXPEC202	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.041	.055	.456	.960	.861	1.069
Gender	-2.42	1.533	.114	.089	.004	1.790
Education						
Community college and above	-1.61	1.375	.239	.198	.013	4.655
Senior high	18.71	7392	.998	1.342	.000	
Junior high	20.23	9520	.998	6.130	.000	
Elementary school	-.251	.913	.784	.778	.130	2.936
No formal schooling	--					
T1-SF-GH	-.092	.049	.060	.029	.829	1.004
T0-Improve-ROM	1.11	.512	.029	.039	1.118	8.315

Cox and Snell R square=.100; Nagelkerke R square=.317

Expectation for Return to ADL, Post-surgery

The model contained four independent variables (age, gender, procedure type, and T1-SF-PCS). The full model was statistically significant (X^2=11.74, p=.019), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 7.8 % (Cox and Snell R square) and 23.7 % (Nagelkerke R square) of the variance. One variable (procedure type) made a statistically significant contribution to the model.

Table 48 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Return to ADL, Post-surgery

EXPEC203	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.097	.051	.058	.907	.820	1.003
Gender	-.324	.889	.719	.724	.124	4.216
Procedure Type	-2.126	.818	.009	.119	.024	.593
T1-SF-PCS	-.100	.053	.061	.905	.815	1.005

Cox and Snell R square=.078; Nagelkerke R square=.237

Expectation for Providing Care, Post-surgery

The model contained seven independent variables (age, gender, insurance, procedure type, T1-WOMAC-pain, T1-WOMAC-stiff, and pre-surgery expectation on providing care score). The full model was statistically significant (X^2=62.66, p=.000), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 30.9 % (Cox and Snell R square) and 41.3 % (Nagelkerke R square) of the variance. Four variables (age, insurance, procedure type, T1-WOMAC-pain, T1-WOMAC-stiff, and pre-surgery expectation on providing care score) made statistically significant contributions to the model. The odds ratio for these three predictors ranged from .335 to 2.52.

Table 49 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Providing Care, Post-surgery

EXPEC204	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.123	.030	.000	.884	.835	.937
Gender	-.155	.466	.740	.857	.344	2.134
Insurance	.926	.413	.025	2.525	.176	.889
Procedure Type	-1.093	.499	.028	.335	.126	.891
T1-WOMAC-pain	.090	.045	.045	1.094	1.002	1.195
T1-WOMAC-stiff	-.170	.060	.004	.844	.751	.948
T0-Providing Care	.315	.139	.024	1.370	1.042	1.800

Cox and Snell R square=.309; Nagelkerke R square=.413

Expectation for Recreation, Post-surgery

The model contained six independent variables (age, gender, mother tongue, comorbidity, T1-WOMAC-stiff, personality 1, personality 2, and pre-surgery expectation for recreations score). The full model was statistically significant (X^2=22.831, p=.007), indicating that the model was able to distinguish between respondents who reported and did not report highest score on expectation. The model as a whole explained between 14.6 % (Cox and Snell R square) and 45.0 % (Nagelkerke R square) of the variance. Two variables (comorbidity, and T1-WOMAC-stiff) made statistically significant contributions to the model. Odds ratio for these three predictors were ranged from .35 to .62.

Table 50 Logistic Regression Predicting Likelihood of Reporting Highest Score on Expectation for Recreations, Post-surgery

EXPEC205	BETA	S.E.	p	Odds Ratio	95.0% CI	
					Lower	Upper
Age	-.020	.076	.789	.980	.844	1.137
Gender	-.440	1.125	.696	.644	.071	5.838
Mother Tongue						
All the others	-2.391	1.550	.123	.092	.004	
Madrain +Taiwanese	-.931	1.490	.532	.394	.021	
Taiwanese	2.587	1.376	.060	13.288	.896	197.177
Mandarin	--					7.305
Comorbidity	-1.048	.523	.045	.350	.126	1.907
T1-WOMAC-stiff	-.471	.183	.010	.624	.436	.894
Personality 2	-1.886	1.025	.066	.152	.020	1.132
T0-Recreations	.690	.384	.073	1.993	.939	4.231

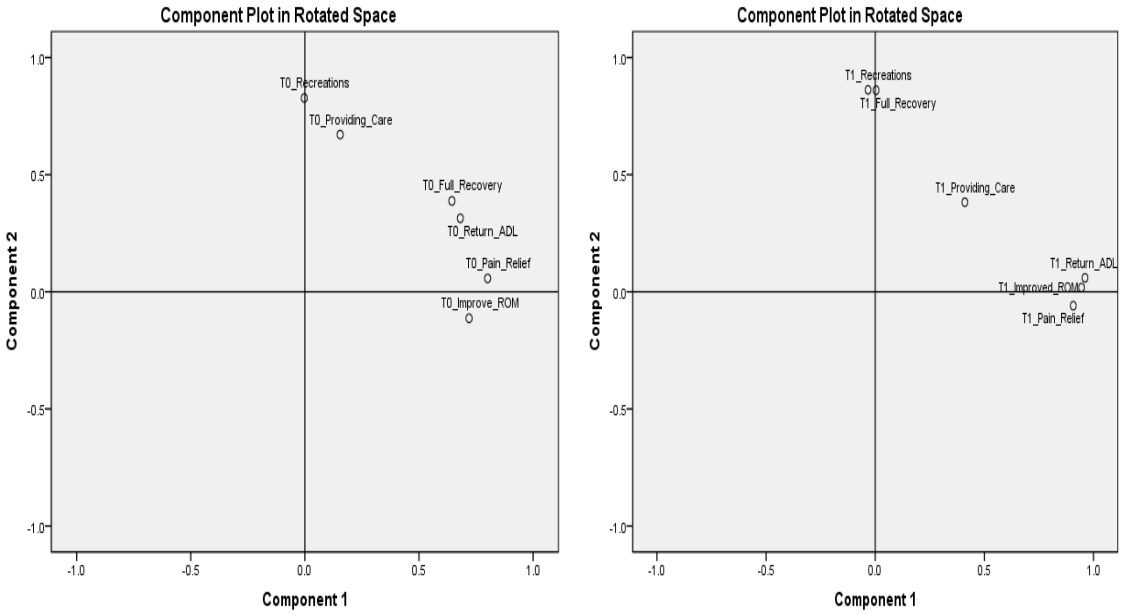
Cox and Snell R square=.146; Nagelkerke R square=.450

Expectation for Full Recovery, Post-surgery

A binary logistic regression model was constructed on the expectation for the full recovery question at the post-surgery time point. Due to the skewness of the responses and the multi-co-linearity of the independent variables, this regression model cannot converge.

Expectation Changes over Time

In order to answer the question whether expectation changes over time, the component plot in rotated space for expectations at pre-surgery and post-surgery time points was inspected. Spearman correlations were computed to understand the relationships for expectations at pre-surgery and post-surgery time points. Finally, a Wilcoxon paired sample test was utilized to understand if there were any statistical differences in the distribution of expectations at pre-surgery and post-surgery time points.



Pre-surgery Expectations

Post-surgery Expectations

Figure 8 Comparison of Expectation Component Plots for Pre- and Post-surgery

Component plots in rotated space for pre-surgery and post-surgery are presented in Figure 8. Expectations for pain relief, improving ROM, and return to

ADL were clustered on component one around the horizontal axis in both pre- and post-surgery time points. The expectation on recreations was located on component two, the vertical axis in both time points. The expectation on providing care, on the other hand, was located near component two at pre-surgery time point and moved to the middle of component one and two at post-surgery time point. The expectation on full recovery was clustered together with pain relief, improving ROM and return to ADL at the pre-surgery time point, and shifted to component two axis clustering with recreations at post-surgery time point.

Spearman correlations were computed to understand the correlation on expectation questions at pre-and post-surgery time points. The results are listed in Table 51. Pre- and post-surgery expectations on pain relief and providing care showed a statistically significant correlation with positive direction.

Table 51 Spearman Correlation between Pre- and Post-surgery Expectations

	T0_Pain Relief	T0_Improving ROM	T0_Return to ADL	T0_Providing Care	T0_Recrea sion	T0_Full Recovery
T1_Pain Relief	.170*	.022	-.066	.012	-.038	-.052
T1_Improved ROM	-.053	.041	.061	-.137	-.026	-.046
T1_Return to ADL	-.053	-.067	-.058	-.080	-.095	-.046
T1_Providing Care	.074	.118	.043	.281**	.186*	.134
T1_Recreations	-.053	-.067	-.058	.108	.141	-.046
T1_Full recovery	-.032	-.040	-.035	.109	.074	-.028

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

A Wilcoxon paired sample test showed that a statistically significant change in patients' expectation on providing care (Z=-4.372, *p*=.000) and recreations (z=3.362, *p*=.001) occurred before and after total knee replacement surgery. The 25th percentile score for T0 and T1 at expectation on providing care is 3 and 1; indeed, patient expectation on providing care decreased after surgery. The rankings in Table 51 also show that on the expectation for providing care, 61 patients had a higher expectation at pre-surgery time point and 25 patients had a higher expectation at post-surgery time point. On the item of patient expectation for recreations, the rankings reveal that 6 patients had a higher expectation at the pre-surgery time point and 25 patients had a higher expectation at the post-surgery time point.

Table 52 Wilcoxon Paired Sample Test for Pre- and Post-surgery Expectations

	T0 vs. T1 Pain Relief	T0 vs. T1 Improved ROM	T0 vs. T1 Return to ADL	T0 vs. T1 Providing Care	T0 vs. T1 Recreations	T0 vs. T1 Full Recovery
Z	-1.423	-.171	-.287	-4.372	-3.362	-1.387
Sig.	.155	.864	.774	.000	.001	.166

Table 53 Mean Rank for Wilcoxon Paired Sample Test

		N	Mean Rank	Sum of Ranks
T1-T0 Pain Relief	Negative Rank	8	11.88	95.00
	Positive Rank	8	5.13	41.00
	Ties	154		
	Total	170		
T1-T0 Improved ROM	Negative Rank	7	14.36	100.50
	Positive Rank	13	8.42	109.50
	Ties	149		
	Total	169		
T1-T0 Return to ADL	Negative Rank	8	12.75	102.00
	Positive Rank	11	8.00	88.00
	Ties	151		
	Total	170		
T1-T0 Providing Care	Negative Rank	61	46.92	2862.00
	Positive Rank	25	35.16	879.00
	Ties	84		
	Total	170		
T1-T0 Recreations	Negative Rank	6	13.42	80.50
	Positive Rank	25	16.62	415.00
	Ties	137		
	Total	168		
T1-T0 Full Recovery	Negative Rank	3	5.00	15.00
	Positive Rank	7	5.71	40.00
	Ties	159		
	Total	169		

Summary

A total of 250 patients were interviewed before surgery and 170 patients were followed after surgery with a mean age of 71 and standard deviation of 9.5. Six questions representing six domains of expectation on knee replacement surgery outcomes were investigated. Expectations on all domains were skewed toward high in general on both time points. Factor analysis via principal

component analysis was performed to condense the six questions and reduce the skewness.

Principal component analysis revealed the presence of two factors with eigenvalues exceeding 1 on both time points, and explaining a total of 57% and 74% of variance respectively. An inspection of the component plot in rotated space was made to understand the underlying mindsets of patient expectations. Principal component factors were later on computed for each patient by summing up the score of each expectation question times loading score of each question from the component matrix. Multiple linear regression models were established for principal component factors and patient factors, expectation antecedents and functional status. Before surgery, PCF 1 (principal component factor one), explaining 13% of variance, portrayed patient expectation focusing majorly on knee function, where education level, quality of life physical aspect, personality, heard of surgery experience before and general health belief were significant predictors. PCF 2, explaining 5% of variance, described patient expectation which leaned toward interaction with others.

After surgery, PCF 3, explaining 18% of variance, presented patient expectation emphasis on knee function, where age, procedure type, insurance, region, and quality of life physical aspect were significant predictors. PCF 4, explaining 21% of variance, described patient expectation concerning recovery and future events, where age, mother tongue, quality of life physical aspect, WOMAC-function were significant predictors.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This study investigated patient expectations around the outcomes of total knee replacement surgery among the Taiwanese population. The first goal was to explore patient expectations before and after surgery. This was exploratory in nature. The relationships among patient factors, expectation antecedents, and functional status and patient expectations were examined. The second goal of this study was to investigate the change of patient expectation after surgery occurred.

Although research on patient expectations for care is still in the early stages of development, this study has provided a number of important insights. A number of significant relationships were found in this research. Some are consistent with findings in the literature while other findings provide insights not previously reported in the literature.

In this chapter, findings of this study will be discussed. The limitations of this study will be described. Recommendations for practice and future studies will be presented as well.

Discussion

High Expectation in General

The most notable finding from this study is that those in the sample hold high expectations for outcomes of total knee replacement surgery in general. As can be seen in Table 10 and Table 30, other than the question of providing care, at pre-surgery time point, around eighty five to ninety percent of responses were answered at the highest anchor of the questions. This is more skewed at the post-surgery time point. Other than the question of providing care, ninety to ninety five percent of patients reported the highest expectation on the outcome of total knee replacement surgery. The first three questions—expectation on pain relief, improved ROM, and return to ADL also presented identical patterns with each other. The question on providing care demonstrated a more balanced distribution.

In a Canadian research study utilizing the same expectation measure (Razmjou, et al., 2009), a cohort of 236 TKR patients was investigated with 154 women, 82 men, and a mean age of 67 with standard deviation of 9.98. Table 53 illustrated the results among the Canadian population at pre-surgery time point. While expectations are also high in general in the Canadian study, they are not as skewed as in the Taiwanese population.

It is possible that the nature of expectations for total knee replacement surgery is high. As such, the results from different populations reveal the same distribution. However, the degree of skewness is more severe in the Taiwanese population than in the Canadian population. Given that the study hospital is a

leading medical center in Taiwan, sixty five percent of the sample population is under the care of one particular attending physician. This procedure attracted more patients from other regions of Taiwan than did the hospital as a whole. It is possible that patients came to this hospital because of the reputation of this particular surgeon. Given this, it may not be surprising to observe this high level of expectation.

The cultural context may be another point for consideration. Taiwan in general is a culturally homogenous place. Although there is some minor discrepancy in daily life habits between northern and southern regions, values and beliefs in general are primarily the same across Taiwan. On the other hand, the Canadian study took place in Toronto, which is a culturally diverse urban city. This characteristic may provide better variance among the sample population.

Moreover, when it comes to medical attention or health related problems, given Taiwan is a relative small island and the accessibility to any health care facility is good, it is very common for the general public to look for the best available hospital or physician for resolving particular medical problems even if they have to travel to another region of Taiwan.

Finally, measurement is always an issue when quantifying the human cognitive aspect. It is possible that the measure may not be sensitive enough to provide good variance for patient expectations on the outcomes of total knee replacement surgery. For example, asking the patient to rank order their expectations might provide more insight into the magnitude of expectations.

Table 54 Frequency of Expectations on Canadian Population

	Item Scores and Frequency (valid percent %)					
Items	NA	1	2	3	4	missing
Pain Relief	2(1)	0(2)	1(0)	23(10)	186(79)	24(10)
Improve ROM	5(2)	5(1)	2(1)	40(17)	159(67)	25(11)
Return to ADL	7(3)	2(5)	4(2)	40(17)	159(67)	24(10)
Providing Care	48(20)	12(5)	9(4)	46(20)	97(41)	24(10)
Recreations	44(19)	13(5)	71(30)	84(36)	0	24(10)
Full recovery	--	8(3)	0	97(41)	103(44)	28(12)

Note: From Razmjou, et al(2009). Relationship between preoperative patient characteristics and expectations in candidates for total knee arthroplasty. Physiotherapy Canada, (61), 38-45.

Underlying Expectation Mindsets

Expectations at both time points were skewed toward high in general. Factor analysis via principal component analysis was performed to condense the six questions and reduce the skewness. Principal component analysis revealed the presence of two factors with eigenvalues exceeding 1 on both time points, and explaining a total of 57% and 74% of variance respectively.

Principal component factors were later computed for each patient by summing up the score of each expectation question times loading score of each question from the component matrix. Multiple linear regression models were established for principal component factors and patient factors, expectation antecedents and functional status. Before surgery, PCF 1 (principal component

factor one), explaining 13% of variance, portrayed patient expectation focusing majorly on knee function. PCF 2 explained 5% of variance, described patient expectation which leaned toward interaction with others.

After surgery, PCF 3, explaining 18% of variance, presented patient expectation emphasis on knee function, where age, procedure type, insurance, region, and quality of life physical aspect were significant predictors. PCF 4, explaining 21% of variance, described patient expectation concerning recovery, while age, mother tongue, quality of life physical aspect, WOMAC-function were significant predictors.

Before surgery, the first extracted component explained 39.24% of the variance and the PCF 1 regression model explained 13% of the variance. After surgery, the first extracted component explained 47.13% of the variance and the PCF 3 regression model explained 18% of the variance.

It is exciting to conclude that there are always two layers of patient expectation mindsets on the outcomes of total knee replacement surgery among the Taiwanese population. The first and fundamental expectation mindset is always on the problematic knee. The second one, on the other hand, varied. At the pre-surgery stage, patients expressed expectation in regards to interacting with others. At the post-surgery period, patients reflected expectations regarding future events.

This finding reveals that patient expectations on the outcome of total knee replacement surgery is not an unitary concept; there are layers in it. The analogy would be Maslow's hierarchy of needs. The fundamental needs for human

beings are physiological and safety needs. When the fundamental needs are fulfilled, human beings search for higher needs, like love, belongings, esteem and eventually, self-actualization. It is intuitive and validated by the study's findings that the fundamental layer of the patient expectation for outcome of total knee replacement surgery is on the operated knee. This basic need and longing for the best outcome from total knee replacement surgery is strong, solid and constant.

The second layer of the patient expectation mindset demonstrates the influence of knee joints on a human life and also the nature of total knee replacement surgery. The importance of mobilization to a human being is to maintain sufficient resources to survive and then to bond and interact with others. The nature of total knee replacement surgery is to increase the quality of life, not to rescue life. These characteristics reflect on the second layer of the patient expectation mindset on the outcome of total knee replacement surgery. Before surgery, patients are longing for increasing the ability to interact with others, and after after the total knee replacement surgery, a better future life is what they expect.

Therefore, it is important for all clinicians to bear in mind that interventions and healthcare regarding the operated knee will attract patients' immediate attention. Only healthcare interventions which cover both first and second layer of patient expectations for the outcome of knee replacement surgery will fulfill patients' ultimate needs.

The Change of Expectation over Time

Finding out whether patient expectations change over time was another major goal in this study. In Saban & Penckofer's work at 2007, it was pointed out that patient 's expectation regarding the results of spine surgery may change over time (Saban & Penckofer, 2007). However, change in the degree or change in context was not mentioned in the literature. No studies in the literature addressed this phenomenon.

From the underlying mindset sense, the basic and fundamental layer of patient expectation remained the same as time went by. But the second layer of patient expectation changes over time. From the patient expectation question sense, based on the inspection of expectation question component plots in rotated space, questions on pain relief, improved ROM, return ADL and recreation remained on the same axes. Questions on pain relief, improved ROM, return ADL located at axis component one at both time points and questions on recreations cluster? on axis two. Questions on providing care and full recovery shifted. Providing care question shifted from axis two to the middle of axis one and two. Question on full recovery shifted from the middle of axis one and two to axis two. A Wilcoxon paired sample test revealed the distribution of questions on providing care and recreation were significantly different at pre- and post-surgery time points. It is concluded that the content of patient expectation indeed changes over time.

In the patient satisfaction literature, whether the degree of satisfaction level changes over time was investigated. In the study of satisfaction predictors,

the degree of patient satisfaction for a general walk-in clinic were measured at immediate, two weeks, and three months after visit, and results were 52 %, 59% and 63 % respectively as excellent in the satisfaction survey (J.L. Jackson, Chamberlin, & Kroenke, 2001). The degree of satisfaction changes over time. Whether the degree of patient expectation changes was not answered in this study, but it may be that the degree of expectation changes over time just as satisfaction does.

Basic Demographics and Personal Features

The results of this study revealed that age, education level, mother tongue, insurance type and region are significant predictors for expectations for outcomes of knee replacement surgery among the Taiwanese population. At pre-surgery time point, there are significant differences at expectations for knee replacement surgery between patients with education level at no formal school and junior high graduate. The junior high school graduate patients reported higher expectations. At post-surgery time point, age was a significant predictor for expectation on the outcomes of knee replacement surgery. The younger the age, the higher the expectation. This result echoed the expectation study done on Hallus Valgus patient population (Tai, et al., 2008), where the younger the age, the higher the expectation on the outcomes of Hallus Valgus surgery.

In the post-surgery period, patients who have additional health insurance reported higher expectation than those who did not. Patients who live in the south region of Taiwan reported lower expectation than those who live in northern Taiwan.

Compared with a patient expectation study on health care process among the United States population, the work of Redman, Lynn and Chang at 2009 (Redman, Lynn, & Chang, 2009) reported that the older the age, the higher the expectation for the “empathic caring” aspect of care. Patients with college degrees demonstrated the highest expectation for “comprehensive understanding of patient” aspect of care. Patients with private insurance reported higher expectations toward health care outcomes. It is thus concluded that age, education level and insurance play a role in patient expectations across different populations.

One interesting finding is that region showed up to be a significant predictor for patient expectation on knee function at post-surgery time point. Patients located in the south region of Taiwan reported lower expectation than patients from north region. Only five percent of participants were from the south region and these five percent demonstrated lower expectation to reach a significant level. The reason for this finding is not clear, but more information is needed to explore the regional difference.

Functional Status

Research around knee or hip replacement surgery reported that expectations on surgery outcomes were related to functional status (Lingard, et al., 2006; Mahomed, et al., 2002; Venkataramanan, et al., 2006). This study revealed that physical aspect of quality of life measured by SF-36 was a significant and strong predictor for expectation on outcome of knee replacement surgery at both pre-and post-surgery time points. It is notable that at both pre-

and post-surgery time points, physical aspect of quality of life is negatively associated with expectation factor focusing on the operated knee. The worse the physical quality of life, the higher the expectation for knee recovery from surgery. At post-surgery time point, on the other hand, the factor focusing on the future event is positively associated with expectation. The higher the physical aspect of quality of life, the higher the expectation. This result indicates that patients who recovered well from total knee replacement surgery longed for a better future life.

Antecedents

From the psychology literature, there are three different types of expectation antecedents: personal experience, communications and other belief (Fazio & Zanna, 1981; Jessop, 1982; Kinder & Sears, 1985). In Kravitz's theory (Kravitz, 1996a; Kravitz & Callahan, 2000) perceived vulnerably to illness, past experiences with the health care system and acquired knowledge influence and shape patient expectations. The findings of this study differed from Kravitz's theory at pre-surgery time point. At pre-surgery time point, instead of past personal experience as presented in Kravitz's model, a patient's general health assessment and heard of knee replacement surgery before are two significant predictors for patient expectations on the outcome of total knee replacement surgery. However, these two predictors did not come out at regression analysis at post-surgery time point. One possible reason is that at post-surgery time point, patients have already experienced their own knee replacement surgery and have formed their own expectations. General health assessment and ever heard of TKR experiences is no longer critical when forming expectations for the next

potential total knee replacement surgery. On the other hand, the physical recovery condition at post-surgery was one major concern for patients at that time, therefore, the physical aspect quality of life was stronger predictor for patient expectations at post-surgery time point.

Personality

This study's findings explored how the psychological aspect of human plays a role when forming patient expectations on the outcome of total knee replacement surgery. The psychological aspect was never included in the expectation research. Three short questions were asked to describe patients' personality. At pre-surgery time point, general-oriented or detailed-oriented personality is a significant predictor for patient expectation focusing on knee aspect. Patients with general-oriented personality had a higher expectation on the outcome of knee function at pre-surgery time point. At post-surgery time point, personality did not emerge as a significant predictor across factors. Those significant predictors at post-surgery time points are demographic and personal features and functional status. Both expectation antecedents and personality did not converge as significant predictors.

It is still very exciting to learn that the simple short personality question is able to capture patient characteristics and that the psychological aspect of humans indeed plays a role in predicting patient expectations. However, well-developed personality measures are needed for future expectation studies to better understand the influence of personality on expectations.

Limitations

This is a study done at a single medical center. The majority of the sample population is under the care of a single attending physician. These homogeneous characteristics may influence the ability to generalize the study results. Also, the gender distribution on sample population was different from national data. This over representation of females should be kept in mind when interpreting the study result. Although it is a total sampling method, the sample size between pre- and post-surgery is still unbalanced. The unbalanced sample size must be taken into account when interpreting results. Moreover, the measurement for the central concept of expectation is newly developed and has only been tested on the Canadian population. More validation of the psychometrics and testing on different populations are needed. Although the skewness of expectation responses may be unavoidable, due to the nature of the concept and the sample, the skewness of the responses still needs to be kept in mind when interpreting study results.

A clinically validated personality measurement is needed for better understanding the relationship between personality and expectation. However, the average age of knee replacement surgery patient is seventy one and is an elementary school graduate. The patient's reading level and the length of the questionnaire should be taken into account when choosing an instrument for further studies.

Conclusions

Patient expectations for outcomes of total knee replacement surgery were high in general among the Taiwanese population. Two layers of patient expectations were extracted at both pre-and post-surgery time points. The first layer of patient expectation extracted is related to the operated knee, and this is consistent at both pre-and post- surgery time point. The second layer of patient expectation extracted, on the other hand, is different at pre-surgery and post-surgery period. At pre-surgery time point, the second layer of patient expectation is related to interaction with others. At post-surgery period, the second layer of patient expectation is associated the future events.

The study findings reveal that patient expectation does change over time. From the underlying mindset sense, the basic and fundamental layer of patient expectation mindset remained the same as time goes by. But the second layer of patient expectation changes overtime.

From the patient expectation question sense, based on the inspection of expectation question component plots in rotated space, questions on providing care and full recovery shifted as time goes by. A Wilcoxon paired sample test revealed the distribution of questions on providing care and recreation were significantly different at pre- and post-surgery time points. It is concluded that the content of patient expectation indeed changes over time.

Basic demographic and personal features, functional status, expectation antecedents and personality are predictors for patient expectations. For basic demographic and personal features, at pre-surgery period, junior high school graduate patients predicted higher expectations than those patients with no formal schooling. At post-surgery time point, younger patients with additional health insurance plan, and living in the north region, compared to the south, predicted higher expectations on the outcome of total knee replacement surgery.

Physical functional status is a strong predictor for the patient expectation on the operated knee at pre-and post-surgery time point. Lower physical function predicted higher expectation on the outcome of knee replacement surgery.

For expectation antecedents, higher score on patient's general health assessment and heard of knee replacement surgery before are two significant predictors for patient expectations on the outcome of total knee replacement surgery. For personality, patients with general-oriented personality predicted higher expectation on the outcome of knee function at pre-surgery time point. At post-surgery time point, expectation antecedents and personality did not emerge as significant predictors.

Recommendations

The results of this study provide a foundation in regards to understanding patient expectations for outcomes of total knee replacement surgery among the Taiwanese population. Patient expectations among the Taiwanese population are high in general. Future studies are recommended to be carried out at different levels of hospitals. This approach helps to understand the influences from the medical institution as well as the health care provider. Patients from different levels of medical institutions may provide a larger variance in responding to expectation questions.

Future studies should aim to explore patient expectation from different aspects. Instead of measuring the degree of expectation, measuring the rank of expectation, or measuring the expectation that can be achieved within a certain period of time may provide deeper understanding around this phenomenon.

This study employed a pre-and post-test study design. If the time point for study measurement can be extended, the longitudinal analysis will provide more information for how the expectation changes over time.

Clearly, the study's results point out that personality indeed plays a role in influencing expectation phenomenon. Implementing a personality measure in any future expectation study is critical. The selection of a personality measure that fits in a clinical situation will be key for successful implementation.

Total knee replacement surgery is an elective surgery and is done to increase patients' quality of life. The sample population has a clear goal in mind when they step into hospital. And this goal is most likely to be achieved when they walk out of the hospital. It would be very informative to do a patient expectation study on a patient population that is undergoing a different sort of procedure, or has a different type of disease.

Finally, it is important for clinicians to bear in mind that the fundamental patient expectation is around the operated knee. Providing adequate care is able to fulfill patient's basic needs. However, only by designing health care interventions for the second layer of expectation mindsets are we able to fulfill patients' ultimate needs.

APPENDICIES

Appendix A Patient Factors

1. Age: What was the year of your birth? _____

2. Gender: ☐ Male; ☐Female

3. Education level: ☐No Formal School, ☐Elementary School, ☐Junior high, ☐Senior high, ☐Community college, ☐University, ☐Graduate School

4. Mother Tongue: ☐Mandarin; ☐Taiwanese; ☐Mandarin + Taiwanese; ☐ Others.

5. Insurance type: Other than national health insurance, do you carry other health care insurance plan?

   ☐No;

   ☐Yes, please specify_____

6. Zip code: _____

   If you cannot recall your zip code at this moment, please write done the address of your current household, the zip code can be identified accordingly.

   Address: _____

7. Which of the following options best describe your personality?

☐Optimistic ☐Pessimistic

8. Which of the following options best describe your personality?

☐General-Oriented ☐Detail-Oriented

9. Which of the following options best describe your personality?

☐Outgoing ☐Introspective

Appendix B Patient Expectation Antecedents

1. Do you have any personal experience regarding total knee replace surgery?

   ☐No;

   ☐Yes, please specify: year_____, procedure:_____

2. Do you have any personal experience regarding hospitalization in Taipei Veterans General Hospital?

   ☐No;

   ☐Yes, please specify: year_____, procedure:_____

3. Have you heard from any other's experience regarding total knee replacement surgery?

   ☐No;

   ☐Yes, please specify: who_____, procedure:_____

4. Have you heard from any other's experience regarding hospitalization experience in Taipei Veterans General Hospital?

   ☐No;

   ☐Yes, please specify: who_____, procedure:_____

Appendix C Patient Expectation Questionnaire

1 Do you expect your surgery to help with pain relief?

0 not applicable, I do not have pain
1 no, I do not expect surgery to help with my pain
2 yes, but just a little
3 yes, somewhat
4 yes, a lot

2 Do you expect your surgery to increase your pain-free range of motion?

0 not applicable, I do not have restricted range
1 no, I do not expect surgery to increase my pain-free range of motion
2 yes, but just a little
3 yes, somewhat
4yes, a lot

3 Do you expect your surgery to improve your ability to carry out the normal activities of daily living?

0 not applicable, I do not have problems with activities of daily living
1 no, I do not expect surgery to improve my ability to carry out the normal daily activities
2 yes, but just a little
3 yes, somewhat
4yes, a lot

4 Do you expect your surgery to improve your ability to care for others?

0 not applicable, I do not have problem interacting and taking care for others
1 no, I do not expect surgery to improve your ability to care for others
2 yes, but just a little
3 yes, somewhat
4yes, a lot

5 Do you expect that following your surgery you will be able to participate in the leisure, sports, or recreational activities you did before your problem started?

0 not applicable (did not do sports or recreational activities before)
1 no, I do not expect surgery to improve my participation in sports/ recreational activities
2 yes, but not as much as before
3 yes, as much as before

6 Do you expect that following your surgery that area operated upon will be back to the way it was before you began having problems there?

1 no, I do not expect the area operated upon to be back to the way it was before I had problems there
2 no, but a little improved
3 no, but somewhat improved
4yes, completely

Note: From Razmjou, H., Finkelstein, J. A., Yee, A., Holtby, R., Vidmar, M., & Ford, M. (2009). Relationship between preoperative patient characteristics and expectations in candidates for total knee arthroplasty. *Physiotherapy Canada, 61*(1), 38-45.

Appendix D Complications

1. Infection

   ☐No; ☐Yes

2. Deep vein thrombosis

   ☐No; ☐Yes

3. 7 days readmission

   ☐No; ☐Yes

4. 14 days readmission

   ☐No; ☐Yes

Appendix E Outliers & Adverse Events

1. Outliers for medical cost

   ☐No; ☐Yes

2. Inpatient fall

   ☐No; ☐Yes

3. Medication error

   ☐No; ☐Yes

REFERENCES

Aharony, L., & Strasser, S. (1993). Patient satisfaction: What do we know about and what we still need to explore. *Medical Care Review, 50*(1), 49-79.

Anderson, R. T., Barbara, A. M., Weisman, C., Scholle, S. H., & Binko, J. (2001). A qualitative analysis of women's satisfaction with primary care from a panel of focus groups in the national centers of excellence in women's health. *Jounral of Women's Health and Gender Based Medicine, 10*, 637-647.

Attree, M. (2001). Patients' and relatives' experiences and perspectives of 'Good 'and 'Not so Good' quality of care. *Jounral of Advanced Nursing, 33*, 456-466.

Bell, R. A., Kravitz, R. L., Thom, D., Krupat, E., & Azari, R. (2002). Unmet Expectations for Care and the Patient-physician Relationship. *Journal of General Internal Medicine, 17*(11), 817-824.

Bellamy, N., Buchanan, W. W., Goldsmith, C. H., & Stitt, L. W. (1988). Validation study of WOMAC: a health status insturment for measuring clinically important patinet relevant outcomes to antirheumatic drug therapy in patinets with osteoarthritisof the hip or knee. *Journal of Rheumatology*, 1833-1840.

Bertakis, K. D., Helms, L. J., Clallahan, E. J., Azari, R., & Robbins, J. A. (1995). The influence of gender on phycisian practice style. *Medical Care, 33*, 407-416.

Bombardier, C., Melfi, C. A., Paul, J., Green, R., Hawker, G. A., Wright, J. G., et al. (1995). Comparision of a generic and a disease-specific meausre of pain and physical function after knee replacement surgery. *Medical Care, 33*(4 suppl), AS131-144.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of cross-cultural psychology, 1*(3), 185-216.

Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.), *Field Method in cross-cultural research* (pp. 137-164). Beverly Hills: Sage.

Brown, C. R. (2007). Where are the patients in the quality of health care? *Internaional jounral for Quality in Health Care, 19*(3), 125-126.

Bruner, J. S. (1957). On perceptual readiness. *Psychological Review, 64*, 123-152.

Campbell, S. M., Roland, M. O., & Buetow, S. A. (2000). Defining quality of care. *Social Science & Medicine, 51*, 1611-1625.

Charlson, M. E., Pompei, P., Ales, K. L., & MacKenzie, C. R. (1987). A new model of classifying prognostic comorbidity in longitudinal studies: development and validation. *Jounral of Chronic Disease, 40*(5), 373-383.

Dawn, A. G., & Lee, P. P. (2004). Patient expectations for medical and surgical care: A review of the literature and applications to ophthalmology. *Survey of Ophthalmology, 49*(5), 513-524.
Dennett, D. C. (1991). *Consciousness explained*. Boston: Little Brown.
Ditto, P. H., & Hilton, J. L. (1990). Expectancy processes in the health care interaction sequence. *Journal of Social Issues, 46*(2), 97-124.
Donabedian, A. (1980). *Explorations in Quality Assessment and Monitoring. Volume: I: The Definition of Quality and Approaches to Its Assessment*. Chicago: Health Administration Press.
Donabedian, A. (1988). The quality of care: how can it be assessed? *Jounral of the American Medical Association, 260*(12), 1743-1748.
Donabedian, A. (2003). *An Introductory to Quality Assurance in Health Care*. New York: Oxford University Press.
Escobar, A., Quintana, J. M., Bilbao, A., Arostegui, I., Lafuente, I., & Vidaurreta, I. (2007). Responsiveness and clinically important differences for the WOMAC and SF-36 after total knee replacement. *Osteoarthr Cartilage, 15*, 273-280.
Etter, J. F., & Perneger, T. V. (1997). Analysis of non-response bias in a mailed health survey. *Jounral of Clinical Epidemioloy, 50*, 1123-1128.
Fazio, R. H., & Zanna, M. P. (1981). Direct expereince and attitude-behavior consistency. In L. Berkowitz (Ed.), *Advances in experimental social psyhology* (Vol. 14, pp. 161-202). San Diego, CA: Academic Press.
Flood, A. B., Lorence, D., Ding, J., McPherson, K., & Black, N. (1993). The role of expectations in patinets' reports of post-operative outcomes and improvement following therapy. *Medical Care, 31*(11), 1043-1056.
Froehlich, G. W., & Welch, G. (1996). Meeting walk-in Patients' Expectations for testing :Effects on satisfaction. *Jounral of General Internal Medicine, 1996*(11), 470-474.
Gerteis, M., Edgman-Levitan, S., Daley, J., & Delbanco, T. (1993). *Through the patient's eyes: Understanding and promoting patient-centered care*. San Francisco: Jossey-Bass.
Groot, V., Beckerman, H., Lankhorst, G. J., & Bouter, L. M. (2003). How to measure comorbidity: a critical review of available methods. *Jounral of Clinical Epidemioloy, 56*(3), 221-229.
Hall, J. A., Irish, J. T., Roter, D. L., Ehrlich, C. M., & Miller, L. H. (1994). Satisfaction, gender, and communication in medical visits. *Medical Care, 32*, 1216-1231.
Hamm, R. M., Hicks, R. J., & Bemben, D. A. (1996). Antibiotics and respiraotry infictions: are patinets more satisfied when expecations are met? *Jounral of Family Practice, 43*, 56-62.
Henn, R. F., Tashjian, R. Z., Kang, L., & Green, A. (2007). Patients' preoperative expectations predict the outcome of rotator cuff repair. *Journal of Bone and Joint Surgery-American Volume, 89A*(9), 1913-1919.
Heyman, B. (1995). *Researching User Perspectives on Community Health Care*. London: Chapman & Hall.

Hickson, G. B., Clayton, E. W., Entman, S. S., Miller, C. S., Githens, P. B., & Whetten-Goldstein, K. (1994). Obstericians' prior malpractice experience and patients' satisfaction with care. *JAMA, 272*(1583-1587).

Higgins, E. T., & Bargh, J. A. (1987). Social cognition and social perception. *Annual Review of Psychology, 38*, 369-425.

Hooper, R., Rona, R. J., French, C., Jones, M., & Wessely, S. (2005). Unmet expectations in primary care and the agreement between doctor and patient: A questionnaire study. *Health Expectations: An International Journal of Public Participation in Health Care & Health Policy, 8*(1), 26-33.

Hoyer, W. D., & MacInnis, D. J. (2007). *Consumer Behavior* (forth edition ed.). Boston, MA: Houghton Mifflin.

Hudak, P. L., Hogg-Johnson, S., Bombardier, C., McKeever, P. D., & Wright, J. G. (2004). Testing a new theory of patient satisfaction with treatment outcome. *Medical Care, 42*(8), 726-739.

Infante, F. A., Proudfoot, J. G., David, G. P., Bubner, T. K., & Holton, C. H. (2004). How people vith chronic illnesses view their care in general practive: a qualitative study. *Medical Journal of Australia, 181*, 70-73.

Jackson, J. L., Chamberlin, J., & Kroenke, K. (2001). Predictors of patient satisfaction. *Social Science & Medicine, 52*(4), 609-620.

Jackson, J. L., & Kroenke, K. (2001). The effect of unmet expectations among adults presenting with physical symptoms. *Annals of Internal Medicine, 134*(9), 889-897.

Jennings, B. M., Heiner, S. L., & Loan, L. A. (2005). What really matters to healthcare consumers. *JONA, 35*(4), 173-180.

Jessop, D. J. (1982). Topic variation in levels of agreement between parents and adolescents. *Public Opinion Quarterly, 46*, 538-559.

Joos, S. K., Hickam, D. H., & Borders, L. M. (1993). Patients' desires and satisfaction in general medicine clinics. *Public Health Reports, 108*(6), 751-759.

Kinder, D. R., & Sears, D. O. (1985). Public opinion and political action. In G. Lindzey & E. Aronson (Eds.), *The handbook of social psychology* (thrid ed., Vol. two). New Yotk: Random House.

Kosinski, M., Keller, S. D., Ware, J. E. J., Hatoum, H. T., & Kong, S. X. (1999). The SF-36 Health Survey as a generic outcome measure in clinical trials of patients with osteoarthritis and rheumatoid arthritis: relative validity of scales in relation to clinical measures of arthritis severity. *Medical Care, 37*, MS23-39.

Kravitz, R. L. (1996a). Patients' expectations for medical care: an expanded formulation based on review of the literature. [Review]. *Medical Care Research & Review, 53*(1), 3-27.

Kravitz, R. L. (1996b). Patients' expectations for medical care: an expanded formulation basedon reivew of the literature. *Medical Care Research & Review, 53*(1), 3-27.

Kravitz, R. L. (2001). Measuring patients' expectations and requests. *Annals of Internal Medicine, 134*(9 Pt 2), 881-888.

Kravitz, R. L., & Callahan, E. J. (2000). Patients' perceptions of omitted examinations and tests: A qualitative analysis. [Research Support, Non-U.S. Gov't]. *Journal of General Internal Medicine, 15*(1), 38-45.

Kravitz, R. L., Callahan, E. J., Azari, R., Antonius, D., & Lewis, C. E. (1997). Assessing patients' expectations in ambulatory medical practice. Does the measurement approach make a difference? [Clinical Trial. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]. *Journal of general internal medicine, 12*(1), 67-72.

Kravitz, R. L., Callahan, E. J., Paterniti, D., Antonius, D., Dunham, M., & Lewis, C. E. (1996). Prevalence and sources of patients' unmet expectations for care.[see comment]. [Research Support, Non-U.S. Gov't]. *Annals of Internal Medicine, 125*(9), 730-737.

Kravitz, R. L., Cope, D. W., Bhrany, V., & Leake, B. (1994). Internal medicine patients' expectations for care during office visits. [Research Support, Non-U.S. Gov't]. *Journal of General Internal Medicine, 9*(2), 75-81.

Laing, A. (2002). Meeting patinet expecations: healthcare professionals and service re-engineering. *Health Services Management Research, 15*(3), 165-172.

Larrabee, J. H., & Bolden, L. V. (2001). Defining patinet-perceived quality of nursing care. *Jounral of Nursing Care Quately, 16*, 34-60.

Lee, S. Y. (2007). *Qulaity gaps analysis for the service of Chinese Medicine.* Chinese Medicine University, Taichung.

Levinson, W., Roter, D. L., Mulloly, J. P., Dull, V. T., & Frankel, R. M. (1997). Physician-patient communication. The relationship with malpractice claims among primary care physicians and surgeons. *JAMA, 277*, 553-559.

Lewin, K., Dembo, T., Festinger, L., & Sears, P. S. (1944). Levels of aspiration. In J. M. Hunt (Ed.), *Personality and the behavior disorders* (pp. 333-378). New York: Roland PRess.

Lingard, E. A., Sledge, C. B., & Learmonth, I. D. (2006). Patient expectations regarding total knee arthroplasty: differences among the United States, United Kingdom, and Australia. *Journal of Bone & Joint Surgery, American Volume, 88A*(6), 1201-1207.

Lochman, J. E. (1983). Factors related to patinets' satisfaction with their medical care. *Jounral of Community Health, 1983*(9), 91-109.

Lutz, G. K., Butzlaff, M. E., Atlas, S. J., Keller, R. B., Singer, D. E., & Deyo, R. A. (1999). The relation between expectations and outcomes in surgery for sciatica. *Jounral of General Internal Medicine, 14*, 740-744.

Macfarlane, J., Holmes, W., Macfarlane, R., & Britten, N. (1997). Influence of patients' expectations on antibiotic management of acute lower respiratory tract illness in general practice: questionnaire study. *British Medical Journal, 315*(7117), 1211-1214.

Maciejewski, M., Kawiecki, J., & Rockwood, T. (1997). Satisfaction. In R. K. Kane (Ed.), *Understanding health care outcome research* (pp. 67-89). Aspen: Gaithersburg.

Mahomed, N. N., Liang, M. H., Cook, E. F., Daltroy, L. H., Fortin, P. R., Fossel, A. H., et al. (2002). The importance of patient expectations in predicting

functional outcomes after total joint arthroplasty. *Journal of Rheumatology, 29*(6), 1273-1279.

Mancuso, C., Altchek, D. W., Craig, E. V., Jones, E. C., Robbins, L., & Warren, R. F. (2002). Patients' expectations of shoulders surgery *Jounral of Shoulder and Elbow Surgery, 11*(6), 541-549.

Mancuso, C., Sculco, T. P., Wickiewicz, T. L., Jones, E. C., Robbins, L., & Warren, R. F. (2001). Patient's expecations of knee surgery. *Jounral of Bone and Joint Surgical America, 83A*, 1005-1012.

Mangione-Smith, R., McGlynn, E. A., Elliott, M. N., Krogstad, P., & Brook, R. (1999). The relationship between perceived parental expectations and pediatrician antimicrobial prescribing behavior. *Pediatircs, 103*(4), 711-718.

McCance, T. V., McKeena, H. P., & Boore, R. P. (1997). Caring: dealing with a concept. *International Journal of Nursing Studies, 34*, 241-248.

McCarthy, S. C., Lyons, A. C., Weinman, J., Talbot, R., & Purnell, D. (2003). Do expectations influence recovery from oral surgery? An illness representation approach. *Psychology & Health, 18*(1), 109-126.

McHorney, C. A., Ware, J. E. J., Lee, J. F. R., & Sherbourne, C. D. (1994). The MOS 36-Item Short-Form Health Survey (SF-36): III. Tests od data quality , scaling assumptions, and reliability across diverse patinet groups. *Medical Care, 32*(1), 40-66.

McHorney, C. A., Ware, J. E. J., & Raczek, A. E. (1993). The MOS 36-Item Short-Form Health Survey (SF-36):II. Psychometric and clinical tests of validity in measuring physical and nemtal health consturcts. *Medical Care, 31*(3), 247-263.

Merton, R. K. (1948). The self-fulfilling prophecy. *Antioch Review, 8*, 193-210.

Myers, S. S., Phillips, R. S., Davis, R. B., Cherkin, D. C., Legedza, A., Kaptchuk, T. J., et al. (2006, Apr 27-29). *Patient expectations as predictors of outcome in patients with acute low back pain.* Paper presented at the 29th Annual Meeting of the Society-of-General-Internal-Medicine, Los Angeles, CA.

Ngo-Metzger, Q., Massagli, M. P., Clarridge, B. R., Manocchia, M., & Davis, R. B. (2003). Longuistic and cultural barriers to care: perspectives of Chinesen and Vitnamese immigrants. *Jounral of General Internal Medicine, 18*, 44-52.

Nobel, L. M., Douglas, B. C., & Newman, S. P. (2001). What do patinets expect of psychiatric services? A systematic and critical review of empirical studies. *Social Science & Medicine, 52*(7), 985-998.

O'Malley, K. J., Roddey, T. S., Gartsman, G. M., & Cook, K. F. (2004). Outcome expecatancies, functional outcomes, and expectancy fultillment for patinets with shoulder problems. *Medical Care Research & Review, 42*(2), 139-146.

Olson, J. M., Roese, N. J., Zanna, M. P., Higgins, E. T., & Kruglanski, A. W. (1996). Expectancies *Social psychology: Handbook of basic principles.* (pp. 211-238). New York, NY US: Guilford Press.

Pager, C. K. (2004). Expectations and outcomes in cataract surgery. *Archives of Ophthalmology, 122*(12), 1788-1792.

Perneger, T. V., Chamot, E., & Bovier, P. A. (2005). Nonresponse Bias in a survey of patinet perceptions of hospital care. *Medical Care, 43*(4), 374-380.

Radwain, L. (2000). Oncology patinets' perceptions of quality nursing care. *Research in Nursing and Health, 23*, 179-190.

Razmjou, H., Finkelstein, J. A., Yee, A., Holtby, R., Vidmar, M., & Ford, M. (2009). Relationship between preoperative patient characteristics and expectations in candidates for total knee arthroplasty. *Physiotherapy Canada, 61*(1), 38-45.

Redman, R. W., & Lynn, M. R. (2005). Assessment of patient expectations for care. *Research & Theory for Nursing Practice, 19*(3), 275-285.

Redman, R. W., Lynn, M. R., & Chang, I. (2009). *The development of Patient Expectation for Care Survey*.Unpublished manuscript.

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom*. New York: Rinehart & Winston.

Ross, C. K., Forommelt, G., Hazelwood, L., & Chang, R. W. (1987). The role of expectations in patinets satisfaction with medical care. *Jounral of Health Care Marketing, 7*(4), 16-26.

Ross, C. K., Steward, C. A., & Sinacore, J. M. (1995). A comparative study of seven measures of patinet satisfaction. *Medical Care, 33*(4), 392-406.

Rubin, H. R. (1990). Can patinets evaluate the quality of hospital care? *Medical care Review, 1990*(47), 267-325.

Rust, R., Inman, J., Jia, J., & Zahorik, A. (1999). What you don't know about customer-perceived quality: The role of customer expecation distriction. *Marketing Science, 18*(1), 77-92.

Saban, K. L., & Penckofer, S. M. (2007). Patient expecations of quality of life following lumbar spinal surgery. *jounral of Neuroscience Nursing, 39*(3), 180-189.

Sabourin, S., Laferriere, N., Sicuro, F., Coallier, J., Cournoyer, L., & Gendreau, P. (1989). Social desirability, psychological distress, and consumer satisfaction with mental health treatment. *Jounral of Counseling Psychology, 36*(3), 352-356.

Schroder, A., Ahlstrom, G., & Wilde-Larsson, B. (2006). Patinets' perceptions of the concept of the quality of care in the psychiatric setting: a phenomenographic study. *Jounral of Clinical Nursing, 15*(1), 93-102.

Schroder, A., Larsson, B. W., & Ahlstrom, G. (2007). Quality in psychiatric care: an instrument evaluating patinets' expectations and expereinces. *Internaional Jounral of Health Care Quality Assurance, 20*(2), 141-160.

Sherbourne, C. D., Hays, R. D., Ordway, L., DiMatteo, M. R., & Kravitz, R. (1992). Antecedents of adherehce to medical recommendations: results from the Medical Outcomes Study. *Jounral of Behavioral Medicine, 15*(447-468).

Sitzia, J. (1999). How valid and reliable are patinet satisfaction data? An analysis of 195 studies. *International Journal of Quality Health Care, 11*, 319-328.

Spear, J. (2003). A new measure of consumer expectations, perceptions and satisfaction for patients and carers of older people with mental health problems. *Australasian Psychiatry, 11*(3), 330-333.

Stichler, J. F., & M.E., W. (2000). Through the eye of the beholder: multiple perspectives on quality in women's health care. *Quality Management in Health Care, 8*, 1-13.

Symon, Z., Daignault, S., Symon, R., Dunn, R. L., Sanda, M. G., & Sandler, H. M. (2003, May 31-Jun 03). *Measuring patients' expectations regarding health-related quality-of-life outcomes associated with prostate cancer surgery or radiotherapy.* Paper presented at the 39th Annual Meeting of the American-Society-of-Clinical-Oncology, Chicago, Il.

Tai, C. C., Ridgeway, S., Ramachandran, M., Ng, V. A., Devic, N., & Singh, D. (2008). Patient expectations for hallux valgus surgery. *Journal of orthopaedic surgery, 16*(1), 91-95.

Tien, W. C. (2007). *The trens of prevalence and medical resource utilization of total hip and total knee replacement.* Kaohsiung Medical University, Kaoshiung.

Tipperman, R. (2008). Education, managing patient expectations necessary before and after surgery. *Ocular Surgery News, 26*(9), 55-55.

Uhlmann, R. F., Inui, T., & Carter, W. B. (1984). Patient request and expecations: Definitions and clinical applcations. *Medical Care, 22*(7), 681-685.

VandenBos, G. R. (Ed.) (2007) APA Dictionary of Psychology. Washiionton, DC: American Psychological Association.

Venkataramanan, V., Gignac, M. A., Mahomed, N. N., & Davis, A. M. (2006). Expectations of recovery from revision knee replacement. *Arthritis & Rheumatism-Arthritis Care & Research, 55*(2), 314-321.

Wang, W.-L., Lee, H.-L., & Fetzer, S. (2006). Challenges and strategies of instrument translation. *Western Journal of Nursing Research, 28*(3), 310-321.

Ware, J. E. J. (1997). *Effect of acquiescent response set on patient satisfaction ratings*. Washington, DC: Department of Heallth, Education, and Welfare.

Ware, J. E. J., Keller, S. D., Gandek, B., Brazier, J. E., & Sullivan, M. (1995). Evaluating translations of health status questionnaires. Methods from the IQOLA project. International Quality of Life Assessment. *Internaional Jounral of Technology Assessment Health Care, 11*(3), 525-551.

Ware, J. E. J., & Sherbourne, C. D. (1992). The MOS 36-Item Short-From Health Survey (SF-36). I. Conceptual framkework and item selection. *Medical Care, 30*(6), 473-483.

Ware, J. E. J., Snow, K. K., & Kosinski, M. (1993). *SF-36 Health Survey Manual and Interpretaion Guide*. Boston, MA: New England Medical Center, The Health Institute.

Webb, C. (1996). Caring, curing, coping: Towards an integrated model. *Jounral of Advanced Nursing, 23*, 960-968.

Webb, S., & Lloyd, M. (1994). Prescribing and referral in general practice: a study of patients' expecations and doctors' actions. *British Jounral of General Practice, 44*, 165-169.

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.
Wensing, M., & Elwyn, G. (2003). Methods for incorporating patinets' views in health care. *BMJ, 326*, 877-879.
Williams, B. (1994). Patient satisfaction: A valid concept? *Social Science & Medicine, 38*(4), 509-516.
Williams, B., Coyle, J., & Healy, D. (1998). The meaning of patient satisfaction: An explanation of high reported levels. . *Social Science & Medicine, 47*(9), 1351-1359.
Wyszewianski, L. (2009). Basic concepts of health care quality. In S. B. Ranson, M. S. Joshi & D. B. Nash (Eds.), *The healthcare quality book* (pp. 25-42). Chicago: Health Adminstration Press.
Yee, A., Adjei, N., Do, J., Ford, M., & Finkelstein, J. (2008). Do patient expectations of spinal surgery relate to functional outcome? *Clinical Orthopaedics & Related Research, 466*(5), 1154-1161.