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Defining Service Quality in an Outpatient Clinic with Complex Constituency

by

Swati Verma

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Industrial Engineering
Department of Industrial and Management Systems Engineering
College of Engineering
University of South Florida

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Keywords: service quality, outpatient, health care, patient perspective, continuous improvement

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DEDICATION

To my Parents and Parents-in-law for their untiring faith and belief. To my Husband for his constant patience and encouragement. To Dr. Kingsley Reeves and Seena Salyani for providing constant support.

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ABSTRACT

The 2001 Institute of Medicine's (I.O.M.) landmark report, Crossing the Quality Chasm: A New Health System for the 21st Century observes that, "[though] medical science and technology have advanced at a rapid pace,...the health care delivery system has floundered in its ability to provide consistently high-quality care" (I.O.M. 2001). The report recommended six quality aims for a twenty-first century health care system; one of them being patient-centered care. It explains patient-centered care as "providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions" (I.O.M. 2001). This research is aimed at directly addressing this I.O.M. recommendation and seeks to understand quality care in the context of the I.O.M. guideline which clearly states that to achieve quality "the patient is the source of control of interactions" with the provider system.

The objectives of this project are: (i) to gain a deeper and clearer understanding of the ways patients as customers of an outpatient clinic evaluate health care providers, and (ii) to determine if varying definitions of service quality exist with in a clinic containing a complex constituency. The project site chosen was the set of outpatient clinics at USF

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Health that makes for a complex site (e.g. eighty different specialties, outpatient surgical units, practicing and academic environment, multi-disciplinary teams at work involving multiple levels of health care professionals and complex inter-personal relationships) to carry out this research.

The formal hypothesis can be stated as follows:

H1: There exist identifiable differing classes of patients with varying perceptions of Service Quality in an outpatient setting.

The subsequent research questions that the research aims to address are that, given that differing patient classes can be identified, do they have an impact on the overall patient-perceived quality and how significant is the impact?

The project will contribute to a change in the approach at the clinic from a profession-centered to a patient-centered effort. It will raise the awareness among clinicians about how patients view quality care which can then be integrated into the system, institutionalized over time and thus help them improve their ability to provide quality care as preferred by patients. It will also serve to educate and empower the patients by increasing their participation and strengthening their role as partners with clinicians in a health care system. According to a review of the consumer health literature (Hibbard 2003), patients who collaborate with their health care providers and play an active role in

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their health care have improved health outcomes. It also enables future work in metric identification to promote continuous improvement in care provision.

Though the research was conducted at a specific outpatient setting, it will have wider applicability as it can be a model worth emulating more broadly. The study also contributes to the academic literature that clearly indicates that there is a recognized need for more research on the delivery of outpatient care (Hammons 2003). Additionally, the study can be applicable and useful in other environments with complex constituencies (e.g. university classrooms, public transportation and travel industry).

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CHAPTER 1

INTRODUCTION

1.1 The Health Care Industry

From an economic perspective, health care services are one of the largest and fastest growing industries in the United States. Yet, the last quarter of the 20th century has been called an "era of Brownian motion in health care" (I.O.M. 2001). A study of I.O.M. reports over the years (2000, 2001, and 2004) reveals that the American health care sector, which is valued at $1.6 trillion, is suffering from crises deeply related to quality along with safety, cost and access. The concept of quality patient care is vital to the health care sector and needs increased attention. In fact, improving health care quality is the focal point of health care reform efforts today and has taken "center stage away from cost and access in the US public debate about health care in the past several years" (Chassin 2002).

Conventionally, the health care environment has been perceived as either inpatient or outpatient. Inpatient care requires the patient to stay at the medical center during the course of treatment as opposed to outpatient care, where the patients are not needed to stay overnight. It should be noted that in medical terminology, the terms outpatient and ambulatory care are often used interchangeably. Ambulatory care is an integral part of the health care system in United States and also currently the fastest growing component of

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health services delivery in terms of both volumes and revenues. As evidence, the National Hospital Ambulatory Medical Care Survey for 2004 reported an estimated 85 million visits to outpatient hospital clinics in the United States in that year, about 29.5 visits per 100 persons.

There has been a growing shift from inpatient to outpatient delivery; procedures that once were performed only on an inpatient basis are being increasingly performed in a variety of outpatient settings. Advancements in medical technology and the development of noninvasive or minimally invasive surgical and non-surgical procedures have contributed to growth in outpatient ambulatory surgical care (Bernstein 2001). This is clearly indicated by the Outpatient Surgery Trends report that claims the growth of outpatient surgeries to be explosive, from an estimated 400,000 surgeries in 1984 to 8.3 million in 2000. Today, 65% of all surgical procedures do not involve a hospital stay (Lapetina 2002). Also, the managed care plans like Medicare and a few Health Maintenance Organizations (HMOs) have evolved their reimbursement policies over years to limit the inpatient hospital stay durations, thereby encouraging the use of outpatient facilities as an economically practical alternative over inpatient ones.

This growing trend towards outpatient care demands a consistent, effective, high-quality patient experience in the outpatient environment. Ironically, though there has been a recognized need for more research on the delivery of outpatient care (Hammons 2003), limited information is available on the efforts to promote quality in outpatient settings (Palmer 1988). Several issues related to the quality of patient care persist in outpatient

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settings despite the continuing shift to outpatient care. In contrast, inpatient settings have received a fair share of attention in regards to quality improvement. Literature also suggests that there has been a very limited and slow involvement of engineering tools and technologies to aid the improvement of the outpatient health systems in delivering quality patient care. This stands in stark contrast to the manufacturing sector and also some of the service industries like aviation and telecommunications. One of the primary reasons for this could be the fact that health care is very different from the manufacturing sector and in health care, it is important to consider how patients feel about the processes and service they receive at a health care center.

The foremost concern regarding quality care is the confusion that prevails in the literature and in practice regarding how quality is defined in a health care setting. The labor-intensive nature of health care and latest advances in health care technologies and clinical management of specific conditions has increased the complexity involved in defining and delivering clear and consistent quality in health care (Nicholls 2000). The conflicting expectations of the myriad stake holders only add to the confusion. There is an overwhelming consensus throughout literature that in health care, there is a lack of common definition of quality due to diverse professional groupings and inherent characteristics of health care services (Kogan 1991). Another dimension that makes quality an equivocal and ill-defined concept in health care is the problem that lies in the fact that quality is not a single, homogeneous variable but rather a complex construct incorporating values, beliefs, and attitudes of individuals involved in a health care interaction (Gunther 2002).

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The Quality Chasm report by I.O.M. espoused patient-centered care as one of the most effective views of health care quality. It reiterates "the urgent need for more concentrated, rigorous, and critical attention to the role of the consumer/patient in influencing the organization and behavior of the health care system" (I.O.M. 2001). The recent trend towards the individualization of care, in which the patient is an active participant in decision-making (Waghorn 1999) is gaining currency. This core tenet of the report forms the basis of our research as we attempt to understand the patient perspective of care in an outpatient setting.

A glance through the existing body of research that has emerged advocating patients' perceptions regarding outpatient experience indicates that the focus has been on addressing issues like average consultation times, patient flow, etc., that can be easily measured while the qualitative aspects of service quality have been continually ignored. This is not to say that such efforts are misplaced but to lay emphasis on the possibility of missing out on certain aspects that might carry equal if not more importance in a patient's eye and contribute significantly towards the efficiency and effectiveness of the care delivery by providers, thereby being significant for a more comprehensive evaluation of quality care.

The USF Health Outpatient setting makes for a complex and interesting site to carry out this research due to its unique position as an academic setting coupled with a multi-

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specialty clinical environment. The clinics house 80 different specialties with about 400 doctors and support staff employed there.

1.2 Objectives and Significance

The objectives of this project are to gain a deeper and clearer understanding of the ways patients as customers of an outpatient clinic evaluate health care providers and to determine if varying definitions of service quality exist within a clinic containing a complex constituency. The formal hypothesis can be stated as follows:

H1: There exist identifiable differing classes of patients with varying perceptions of Service Quality in an outpatient setting.

The subsequent research questions that the research aims to address are that, given that differing patient classes can be identified, do they have an impact on the overall patient-perceived quality and how significant is the impact?

The research will contribute to raise awareness among providers regarding how varying patient classes view the quality of care they receive and help them incorporate patients' perceptions into the quality-definition and quality-measurement process. It will help clinicians customize care to meet the patient requirements while keeping patient preferences and values at the core of care delivery. It also enables future work in metric identification and definition to promote continuous improvement and visibility in care provision.

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Allowing patients to play an active role in defining quality care and collaborating with providers will educate and empower them to participate in service delivery. Since individual preferences are not always concordant with those of their providers, patients need to be involved in decisions about their care if their needs and expectations are to be met (McNeil 1981). As Coulter notes, "perhaps the greatest difference between the envisioned future system and the present reality is the role of patients themselves" (Coulter 2000). In fact, research reveals that increasing patients' perceived control over their health may affect their health status positively (Rodin 1986).

1.3 Thesis Organization

This thesis is organized as follows. Chapter 2 identifies the most important studies related to quality in the health care sector. Chapter 3 explains the model and methodologies used for the study. It also describes the survey instrument used for the research and the data collection methods employed. Chapter 4 discusses the results and presents the model that emerges from the data analysis of the survey responses obtained. It also discusses the limitations faced by researchers and presents possible future research applications of this study.

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CHAPTER 2

LITERATURE REVIEW

The health care delivery system has changed tremendously in recent decades. Quality today is a "prevailing purpose rather than a desirable accessory" (R. Cullen 2000) and the concept of patient-driven quality care is gaining currency. But while there is a considerable body of scholarly work focusing on evaluation of health services from the perspective of providers and clinicians, the academic literature available on quality care as perceived and defined by patients is far less. Several important aspects of patients' perceptions of quality are still not explored and understood by providers and researchers. We still lack a fair idea of what is vital to patients as they assess quality of health care provided to them. In the following subsections, a brief summary of the quality in health care sector as addressed in literature has been presented.

The reviewed articles are classified in the following subsections based upon the two kinds of quality that exist in health care (technical vs. service), quality as viewed by different stake holders involved, models used in literature to assess service quality and the approaches used for the same.

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2.1 Technical Quality vs. Service Quality

Health care quality in literature has been addressed as either technical quality or service quality. Researchers define technical quality primarily on the basis of the technical accuracy of the medical diagnoses and procedures or the conformance to professional specifications while service quality refers to the manner in which the health care service is delivered to the patients (Lam 1997). Patients have always been in a dependent position as hospitals or other health care providers have specific technical proficiency (know-how) that can be better evaluated by practitioners, clinicians and medical experts. Most patients are believed to not possess the knowledge or skill necessary to evaluate the quality of diagnoses or the treatment plan. It is now established that most patients may never determine whether a diagnosis or prescription was optimal or not. A section of articles reviewed questioned the ability of patients to evaluate *clinical quality* (also called technical quality), with the conclusion that patients find it difficult to distinguish technical quality from service quality (Blumenthal 1996; Laine 1996; Oswald 1998). It must be noted here that terms service quality, *perceived quality* or *functional quality* are used interchangeably in health care literature. Also, terms technical quality and clinical quality mean the same in health care literature. Health care professionals have less regard for service quality while patients base their evaluation of quality on "interpersonal and environmental factors" (Lam 1997). Patients are most capable of evaluating the service quality aspects and frequently use them as surrogates for assessment of aspects they are unable to evaluate as credibly: the accuracy of diagnoses and efficacy of treatment plans which rather tend to be assumed by patients based on substantiating evidence (Rodie AR 1999). With substantiating evidence author means, for example, if a practice is a

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sanctioned provider for a patient's employer's medical plan and if the provider has the desired credentials on paper, the patient will use this substantiating evidence to infer that he/she receives high quality medical treatment (Rodie AR 1999).

While it is widely acknowledged that most patients are not qualified enough to judge technical quality, the fact that their assessment of service quality by several other dimensions that they value the most, can adversely affect the total quality experience for them, is vital in defining quality care more comprehensively and cannot be ignored. The literature demonstrates that while technical quality of providers in most cases is considered satisfactory by patients (Friedman 1986), it is service quality or experiences that add to shape up the patient's overall view of quality care that needs to be understood better and explored more intensively. Keeping this in mind, the aim of this research is to determine and focus on the aspects that patients are most capable of evaluating while they receive and consume care in an outpatient setting.

2.2 Extant Models

In a review of selected articles aimed at studying health care attributes, the most frequently quoted model was Donabedian's classic, industrially derived model that segments quality of health care into three categories: structure, process and outcome (Donabedian 1980). Structure largely deals with the physical facilities and environment in which the care is provided. Process refers to the methods (diagnostic and therapeutic) by which the care is provided. Outcome is defined as the consequence of the care provided to the patient. The model and the categorization it propagates has been widely

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used and cited but several attempts at modification of this model suggest that it does not always serve as the most useful framework for organizing the wide array of criteria to be used in judging health care quality (Sofaer 2005). The model views quality from a professional's perspective and several modifications imply that health care has found the model lacking to address quality as expected and valued from a patient's perspective.

Another oft-cited model used in health care is SERVQUAL model first introduced by Parasuraman et al. in 1985 and further developed by them in 1988 to measure service quality from the customer's perspective (Parasuraman 1985; Parasuraman 1988). The model has been borrowed from the business world and initially proposed ten determinants of service quality that are important to a customer while evaluating services. The ten dimensions of quality as initially proposed by the model were based on a series of focus group sessions and are listed as following: tangibles, reliability, responsiveness, competency, courtesy, communication, credibility, security, access, and understanding (Parasuraman 1985). They later reduced the ten dimensions to five for customers to evaluate service quality as tangibles- the appearance of the physical facilities and materials related to the service; reliability- the ability to perform the service accurately and dependably; responsiveness- the willingness to help customers and provide prompt service; assurance- the competence of the system and its security, credibility and courtesy; and empathy- the ease of access, approachability and effort taken to understand customers' requirements. The model works with 22 pairs of items that measure the perceived and expected levels of service in a given service industry. It uses a seven-point Likert-type scale for measuring patients' expectations of excellent service and their long-

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term experiences of service businesses with the aim of describing service quality at a given point in time (Hiidenhovi 2002). Though widely used, the model has been often criticized because though the collective findings by researchers provide support for the validity, reliability and predictive validity of the scale, the factor-loading patterns in the original five dimensions are inconsistent across these studies (Lam 1997). The weaknesses of the SERVQUAL model were later identified and addressed by Ward et al. in their model (Ward 2005).

It has been pointed out over years by researchers that SERVQUAL model may not present a comprehensive view of the dimensions of service quality in the health care environment as health care services tend to be more intensive in provider-consumer interactions, which are vastly different from the business world that the SERVQUAL model was developed for (Bowers 1994). Other related models proposed over time to capture patient's perception of quality have been various modifications of the SERVQUAL model. Researchers in the newer models have included some of the dimensions that are derived from the SERVQUAL model along with their own unique approaches to examine the health care service quality. For example, Bowers et al. added caring and patient outcomes to the five quality dimensions proposed by the SERVQUAL model after conducting a patient focus group interview (Bowers 1994).

Another such recent study was undertaken by Ward et al., who proposed an integrated view from previous research to examine the quality dimensions comprising the patient-perceived quality in the outpatient setting. Based upon the previous literature, they

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proposed four patient perceived health care quality dimensions: access- giving patients timely and affordable access to medical care including items such as appointment scheduling, telephone and Web system capabilities, information on test results, and cost and insurance issues; outcome- positively impacting patient health as function of the care given including items such as change in health status, and patient's perspective on the referral process; interaction and communications- giving patients the experience of constantly courteous and caring treatment from office workers, providers and other involved staff including items like courtesy of front desk staff and provider, general willingness to help, empathy and billing issues; and the final quality dimension tangibles- providing the patients with the physical facilities, equipment, personnel, and credentials they expect from a health care provider and includes items such as convenience, impression, and layout of facilities, availability of needed medical equipment and devices, as well as the credentials of provider and staff (Ward 2005).

2.3 Patient-Centered Assessment

Health care delivery involves myriad stake holders and that includes providers, payers, physicians, nurses, staff, and the patients themselves (also, patients' relatives). While earlier approaches towards care delivery were provider-driven, there is a rapidly growing shift towards patient-centered attitudes towards service delivery and patient-focused quality assessment efforts are gaining currency. In health care, services are consumed when they are produced and hence no matter how elusive or difficult it is, patient perception of service quality needs to be assessed in all health care organizations (Ford 1997). There have been consistent, if limited, efforts to study and examine patients'

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viewpoints and definitions of outpatient care quality. Most of these efforts however, are based on a general perspective that the needs of all patients are the same. They fail to acknowledge the variations in needs of patients across divergent specialties in a given outpatient setting and the influence of patient characteristics on their assessment of care. These approaches presume that the patients visiting an outpatient facility, irrespective of the kind of care they are seeking, have identical expectations from providers. Thus, it is questionable to what extent this generic approach is appropriate for explaining a patient's view and assessment of care and understanding what drives those perceptions. It is emphasized by some researchers that quality care assessments represent a complex mixture of need and expectations and experience of care (Wilkin D. 1992).

Over recent years, patient-centeredness in defining quality has been steadily gaining currency. But there has been considerable confusion in literature in published definitions of patient-centeredness. And researchers agree that the lack of a universally agreed definition of patient-centeredness has hampered conceptual and empirical developments (Mead 2000) . A comprehensive review of literature revealed very few studies that assess whether and how patient characteristics relate to perceptions of care quality. A meta-analysis was carried out by Hall and Dornan to examine the relation of patients' socio-demographic characteristics (age, ethnicity, sex, socioeconomic status, marital status and family size) to their satisfaction with medical care (Hall JA 1990). But patients' perceptions of care quality do not automatically equate to patient satisfaction (Attree 2000). Confusion prevails in literature regarding the relationship of a patient's perception of quality care and patient satisfaction. It is argued that service quality perceptions should

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be considered as long-term consumer attitudes, while patient satisfaction is referred to as short-term, service-encounter-specific judgments (Taylor 1994). While researchers agree that they are not the same concepts, some tend to think they are related and the nature or the direction of the relationship have not been established (Attree 2000), while others believe that they are separate and unique constructs (Westbrook 1991; Oliver 1993).

2.4 Approaches Used

Researchers have adopted different approaches to evaluate patients' view of quality that range from unstructured qualitative approaches (Appleton 1993; Fosbinder 1995; Kralik D. 1997) to grounded theory methodology (Strauss 1990; Morse 1996). The former approach depends on pre-determined, idealized criteria to be rated by patients using for example a five-point scale (strongly agree, agree, neither disagree nor agree, disagree, strongly disagree). The grounded theory applications are qualitative approaches which have used the description of patients' experiences of actual care using semi-structured, informal interviews using open-ended questions (Attree 2000). Literature also mentions clinimetric approach used in inpatient settings that seeks to evaluate quality care by allowing patients to describe the importance and scope of their own reactions and then grouping them into specific categories (Feinstein 1983; Sledge 1997).

A literature review published in 2005 (Sofaer 2005) regarding qualitative studies that report how patients define quality identified a limited number of small scale studies (eleven to be exact) in a general health care setting. The methods used were focus groups and patient interviews to determine patients' views. Literature also identifies a few

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studies using patient experience surveys and patient satisfaction surveys. The surveys most often cited in literature are Picker Surveys and CAHPS surveys. These surveys are rigorous and have been developed on the basis of research using patients themselves. Their validity and reliability have been established by prior research.

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CHAPTER 3

METHODOLOGY

3.1 General Outline of Methodology

Data on patient perceptions were obtained from a standardized survey of patients across divergent specialties at outpatient clinics associated with USF Health, a complex outpatient setting with 80 different specialties housed under it. We chose to leverage an existing instrument, a survey that contains questions relevant to our study. The specialties to source data from were chosen under the guidance of the health experts in order to obtain a sample set that includes patients across seemingly divergent specialties. Patients were chosen randomly from these representative specialties.

The quality model chosen for the study is the one proposed by Ward et al., who have proposed an integrated view from previous proposed models to examine the quality dimensions comprising patient perceived quality in an outpatient setting (Ward 2005). This model's four health care quality dimensions include the following: access- giving patients timely and affordable access to medical care; outcome- positively impacting patient health as a function of the care given; interaction and communications- giving patients the experience of constantly courteous and caring treatment from office workers, providers, and other involved staff; and tangibles- providing the patient with the physical

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facilities, equipment, personnel, and credentials they expect from a health care provider (Ward 2005).

The goal here is to determine if identifiable differing classes of patients with varying perceptions of service quality exist in an outpatient setting (refer to H1). We decided to use a two-pronged approach to the research problem. One way to approach the problem was to perform an exploratory factor analysis to let clusters of patients (if they exist) with varying needs emerge from the data collected through the survey. The idea was that exploratory analysis will help us to identify any patient-class latent in the original data-set, containing pre-determined classes, while the other approach was to focus on the contrasting groups of patients based upon known differences as in age, gender, patient visit status (established vs. new patient visit), etc.

One of the variables in the model is the overall patient-perceived quality while the other variables are the broad categories of quality dimensions as proposed by the chosen quality model. We use factor analysis to show us if patient classes are valid and if distinct groups can be formed depending on how similarly (or differently) they behave. We also attempted to trace out new, underlying factors which may be responsible for these groupings. A further analysis is also undertaken to determine whether and how differences in patient classes have an impact on the overall patient-perceived quality.

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3.2 Data Collection

Around 10,000 patients were provided with surveys across six major specialties from the outpatient clinics at USF Health from June 2007 to September 2007. The specialties selected were: Cardiology, Pediatrics, Outpatient Surgery, Obstetrics and Gynecology, Family Medicine, and Ophthalmology. The specialties selected with the consultation of medical experts are six of the busiest and largest specialties at USF Health. In the beginning of the thesis, we provided the information that the outpatient setting at USF Health houses eighty different specialties. The six major specialties covered here for research purposes include most of the sub-specialties too. For example, under Pediatrics, sub-specialties like General Pediatrics, Infectious Disease, and Pulmonary Medicine were included. Similarly, under the main specialty of Surgery, sub-specialties like Cardiovascular Surgery, General Surgery, Orthopedic Surgery, Plastic and Reconstructive Surgery, Urology, and Vascular Surgery were included.

A survey instrument developed by the Leadership Institute Project Team at USF Health was used to capture the patients' responses with respect to quality dimensions including access to services, facility, interactions and communication with staff and provider (physician), and a final question related to patients' overall ratings of quality they received that day. The survey was developed in consultation with faculty and upper level management, all medical experts in their own right, at USF Health. The survey was pilot-tested in two uniquely different sites (Family Medicine and Surgery at two different campuses of USF Health) in December 2006 to establish its validity. The reliability of the survey was established and is discussed later in the thesis.

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Surveys were handed out to patients on-site at the time of their visit to the clinic. The surveys were included in the patients' files by the front desk staff and were handed over to them by the physicians they came to see. To make the procedure fool-proof, when the patients saw the front desk staff before their departure, the front desk staff reminded them about filling out the survey. This mode of implementation was employed for four reasons. First, it sends out a strong message from the provider's point of view about the concern to improve the service quality when the physician requests the patients to rate the service received by them. Second, the reminder by the front desk ensures that forms are filled out by the patients, provided they are willing to, before they leave the premises of the clinic. Third, the patients were expected to fill out the surveys after the fact, at the conclusion of their visit, and not while waiting for the physician. Finally, it is believed that this may have helped to reduce the response bias (if any) with patients. This point is explained further in the latter sections of the thesis.

Every survey carried the unique patient visit number filled out by the front desk staff as the patients arrived. This unique visit number would link the patient responses to the demographic details of the patients stored in electronic patient-records database. This was done to ensure the privacy of patients at clinics and to save them from entering the demographic details while they may be in a hurry to leave the clinic after service. The specially marked on-site drop boxes were placed in conspicuous places in clinics in order to make the patients aware of the survey-process and increase their interest in the process to achieve better response rates. The survey was pilot-tested, revised, and finally

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conducted from June 2007 onwards. The front desk staff at each specialty was trained to administer the survey and clinic managers were trained to guide the staff in administering the surveys. The reason and significance of the survey were conveyed to patients before they were invited to complete them. Each survey carried nine questions based upon the quality dimensions proposed by Ward, like access, facility, interactions and communication, and overall quality to be rated by patients on a ten-point Likert-scale with end points of "strongly agree" and "strongly disagree". These surveys were scanned electronically to avoid any tampering or human error while recording patient responses. Responses were finally integrated with demographic details of patients available through electronic patient-records database.

3.3 Response Rate and Response Bias

Surveys were administered for approximately a month in each of the six chosen specialties. Approximately 10,000 patients received the survey in all of which 1,726 valid patient responses were received. Response rates varied across the specialties. While Ophthalmology saw the maximum response rate amongst all specialties at 47.6%, Cardiology was the one with the minimum response rate of 2.7%. The overall response rate at USF Health for our study stood at 17.9%. The variation in response rates could have been dependent upon the size and nature of the specialty, the involvement of the physicians and the front desk staff, and/or the willingness of the patients to answer the survey. One possible explanation for the high response rates in certain clinics vs. others could be the higher and more dedicated involvement of the clinic managers or other administrative staff in overseeing the implementation of surveys. Another point that came

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to light was that physicians will be less inclined to request a survey from the patients that they have a belief received lesser service quality on their visits. This may lead to the response bias creeping in the process, as irate patients may not receive surveys. Also, certain physicians expressed resentment at handing out surveys themselves as they did not think it was a part of their job. The response bias was tried to be minimized by asking the front desk staff to remind the patients to fill out the survey before they check out, but that again is dependent on the level of the involvement of the front desk staff.

3.4 Demographics

The demographic details provided by the patient-records database were gender, race, age, and established vs. new patients for the clinics. Of the total respondents, 23% were males while 77% were females. The large percentage of female respondents can be attributed to the inclusion of Obstetrics and Gynecology. Race was another demographic data that patient-records could provide data on. The survey set contained responses from patients belonging to the following races: Asian or Pacific Islander, Black, White, White Hispanic and Others/Unknown. Respondents primarily declined to disclose the racial/ethnicity information. Around 69% of all the patients surveyed were categorized as Unknown. About 24% were White, 6% Black, 1% White Hispanic and a miniscule percentage was Asian or Pacific Islander. The patients surveyed were from all age-groups ranging from below 18 to 95 yrs of age. To handle the data, we divided patients into following age-groups: A1 (<18), A2 (18-25), A3 (26-35), A4 (36-45), A5 (46-55), A6 (56-65), A7 (66-75), A8 (76- 85), A9 (>86). The largest set of responses was from the age-group A3 (18%), followed by A4 (16%). Most of the respondents were primarily females from the

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age-groups 26-35. 72.5% of the valid patient responses were from established patients vs. 27.5% of them from new ones. Table 1 captures the demographic details of the respondents surveyed. Graphs based on demographics can be viewed in the Appendix section of the thesis under Appendix A.

3.5 Survey Reliability and Validity

In this section we address the reliability of the survey used for the research, that is to say, we determine the answer to the question, "Is the survey measuring things consistently?" Mathematically, reliability is defined as the proportion of variability in the responses to the survey that is the result of differences in the respondents. That is, answers to a reliable survey will differ because respondents have different opinions, not because the survey is confusing or has multiple interpretations. There are a number of ways to determine the reliability of a survey. Some of the commonly used methods to measure the reliability are: test-retest, split-halves, and internal consistency.

We decided to go with the internal consistency approach that considers the inter-item correlation to provide an estimate of reliability. It was employed because this approach avoids the inherent weaknesses associated with the test-retest and split-halves approaches. A common measure of internal consistency is Cronbach's alpha. The computation of Cronbach's alpha is based on the number of items on the survey (k) and the ratio of the average inter-item covariance to the average item variance.

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It can be computed as following:

$$\alpha = \frac{N \cdot \bar{r}}{(1 + (N - 1) \cdot \bar{r})}$$

where N is the number of components (items) and $\bar{r}$ is the average of all (Pearson) correlation coefficients between the components.

Table 1: Patient Demographics

Demographics		Respondents	Percentage
Gender	Male	382	23%
	Female	1284	77%
Race	Asian or Pacific Islander	6	0.4%
	Black	96	5.8%
	White	397	23.8%
	White Hispanic	13	0.8%
	Unknown	1154	69.2%
Age	<18	216	13%
	18-25	197	12%
	26-35	287	18%
	36-45	251	16%
	46-55	205	12%
	56-65	217	13%
	66-75	156	9%
	76-85	102	6%
	>86	22	1%

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It generally increases when the correlations between the items increase and a reliability coefficient of .70 or higher is considered "acceptable" in most research situations. We performed the internal consistency test in SPSS and obtained the results as shown by the Reliability Statistics Table below (Table 2). This establishes a high overall consistency of the survey instrument used for the research.

Table 2: Reliability Statistics

Construct	N of Items	Cronbach's Alpha
Scheduling	2	0.818
Interactions and Communication	2	0.801
Wait Times	2	0.810

3.6 Data Analysis

The goal here is to determine if identifiable classes of patients with varying perceptions of service quality exist in an outpatient setting (hypothesis H1). Exploratory factor analysis is performed to let the clusters of patients (if they exist) with varying perceptions of service quality emerge from the responses collected through surveys. This analysis also helped us identify any patient-class latent in the original data-set, containing pre-determined classes. Exploratory factor analysis was used to show us if valid patient classes can be formed depending on how similarly (or differently) they perceive service quality. The next step was to develop various logistic regression models to determine the relationships (if any exist) among these classes of patients and the demographic variables

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available to us. The idea was to look for any statistically significant relationship that emerges and then confirm it using confirmatory factor analysis. We also performed a logistic regression in SPSS to predict the impact of the factors explored in the factor analysis on the patient's perception of overall quality that is assessed by question 9 in the survey used. The dependent variable in the model is the overall patient-perceived quality while the independent variables are the broad categories of quality dimensions as proposed by the chosen quality model.

3.7 Factor Analysis

The traditional statistical method used by researchers to attempt to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables is factor analysis. It is often used in data reduction to identify a small number of factors that explain most of the variance that is observed in a much larger number of manifest variables. It requires a large sample size as it is based on the correlation matrix of the variables involved, and correlations usually need a large sample size before they stabilize. There are many different methods that can be used to conduct a factor analysis (such as principal components analysis, principal axis factor, maximum likelihood, generalized least squares, un-weighted least squares). There are also many different types of rotations that can be done after the initial extraction of factors, including orthogonal rotations, such as varimax and equimax, which impose the restriction that the factors cannot be correlated (or are orthogonal to each other).

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The method used for our analysis is one of the most common forms of factor analysis: principal components analysis. This method is appropriate for creating a typology of variables or reducing attribute space. It seeks a linear combination of variables such that the maximum variance is extracted from the variables. It then removes this variance and seeks a second linear combination which explains the maximum proportion of the remaining variance, and so on. This yields factors which are also sometimes called components. Factor loadings, also called component loadings in case of principal components analysis, are the correlation coefficients between the variables and factors. The squared factor loading is the percent of variance in that variable explained by the factor. To get the percent of variance in all the variables accounted for by each factor, the sum of the squared factor loadings is obtained for that factor and divided by the number of variables. Communality is the *squared multiple correlation* for the variable as dependent using the factors as predictors. The communality measures the percent of variance in a given variable explained by all the factors jointly and may be interpreted as the *reliability of the indicator*. Low communalities across the set of variables indicate the variables are little related to each other. If the communality exceeds 1.0, there is a spurious solution, which may reflect too small a sample or the researcher has too many or too few factors. Communality for a variable is computed as the sum of squared factor loadings for that variable. For principal components analysis, the initial communality will be 1.0 for all variables and all of the variance in the variables will be explained by all of the factors, which will be as many as there are variables. The "extracted" communality is the percent of variance in a given variable explained by the factors which are extracted, which will usually be fewer than all the possible factors, resulting in coefficients less than

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one. Communality does not change when rotation is carried out. While factor analysis is widely used for data reduction, it suffers the disadvantage that the interpretations are intuitive and hence can lead to more than one interpretation of the same data factored the same way.

3.8 Factor Analysis Results

Factor analysis was conducted on correlations (as opposed to covariances) and hence the large sample size (more than 1,700 survey responses) was a perfect fit. SPSS' factor analysis (Extraction Method: principal components analysis using listwise deletion of incomplete cases, Rotation Method: Varimax with Kaiser Normalization) was employed for responses obtained from questions 1 to 4 and questions 6 to 8. Question 1 asked patients to rate if health personnel helped amply in scheduling their clinic visit. Question 2 asked patients to rate if the information provided to them before the visit was appropriate. Based on Ward's model these questions cover the quality dimension access. Question 3 aimed at patients rating the cleanliness and orderliness of the facilities and according to Ward's model belongs to the quality dimension tangibles. Question 4 asked patients to rate the clinic staff for their friendliness and professionalism. Question 6 addresses quality dimension access as it looks at the waiting times patients spent from checking-in to seeing the doctor. Questions 7 and 8 fall under Ward's quality dimension called interactions and communication as providers ask patients to rate if their doctor spent enough time discussing the problem and explaining treatment options (question 7) and if they were treated with respect during their visits (question 8).

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There has been a conflict among researchers regarding the use of principal components analysis for the ordinal data. While several authors claim that only continuous data can be used for the principal components analysis, several others reject the claim and use it for Likert-scale data. Ward (Ward 2005) et al. have used the approach in their research studies and so have several other authors.

From Table 3 we note that all the seven variables (questions 1 to 4 and questions 6 to 8) are well represented in the common factor space as expressed by their extracted communalities. As noted earlier, low communalities across the set of variables indicate that the variables are little related to each other. Our output does not show any particularly low value.

Table 3: Communalities

	Initial	Extraction
Scheduling1	1.000	.737
Scheduling2	1.000	.731
Facility	1.000	.686
Staff I n C	1.000	.649
Waiting Times	1.000	.997
Provider I n C – 1	1.000	.867
Provider I n C – 2	1.000	.879

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The purpose of the exploratory factor analysis was to see if any latent factors emerge from the manifest variables. From Table 4 (Rotated Component Matrix), we note that three distinct factors (components) have been extracted and these are the factors we were seeking to discover the patterns, if any, in the relationship among variables. Questions 1 to 4 (Scheduling1, Scheduling2, Facility, and Staff Interaction and Communication) load on to Component 1. Questions 7 and 8 (Provider Interaction and Communication 1 and 2) load on to Component 2 and question 6 (Waiting Time) loads on to Component 3. The loadings on these three factors are good as seen in Table 4. This table contains the rotated factor loadings, which are the correlations between the variable and the factor. Since the correlations can have possible values ranging from -1 to +1, we decided to use a format subcommand in SPSS to not print any of the correlations that are 0.3 or less as they are not meaningful when other factor loadings are good. This makes the output easier to read by removing the clutter of low correlations. The higher the loading of a given quality dimension to a factor, the greater is its contribution to the pattern. No quality dimension overlapped between two factors. Though the factor loadings are good, we have to note that the eigenvalues for two of the factors (Component 2 and Component 3) are less than one. This is evident in Table 5 and the Scree Plot (Figure 1), both obtained in SPSS. Table 5 shows one major factor, one moderate factor and one minor factor. This can be possibly explained by the fact that survey contained a limited number of questions as variables to load on to the factors; hence Component 2 has two variables and Component 3 has only one variable associated with it. The numbers of questions in the survey were limited to 9, including the question on overall quality to discourage the patients from avoiding to answer a longer, more time-consuming survey as well as to prevent them

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from filling out unrealistic answers due to possible fatigue. Hence it was thought to keep the survey one-page long to increase the response rate and the quality of the responses. In future, however, a few more questions can be added to avoid a similar situation. The factor analysis supports our hypothesis that there exist varying classes of patients who perceive service quality differently.

Table 4: Rotated Component Matrix

	Component		
	1	2	3
Scheduling1	.811		
Scheduling2	.804		
Facility	.783		
Staff I n C	.716	.350	
Waiting Times			.935
Provider I n C - 1		.864	
Provider I n C - 2		.883	

As we look at the three extracted factors, we deduce that from the time the patients decide to use the services of a health care center until they have been seen by physicians, different classes of patients look at the service they received differently and in three phases of their visits.

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The first set of patients gives priority to what we call Environment, which includes how easily they could schedule an appointment, the appropriateness of the information provided to them before the visit, cleanliness and orderliness of the facility, and friendliness of the front desk staff.

Table 5: Total Variance Explained

Component	Initial Eigen values						Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.036	57.659	57.659	4.036	57.659	57.659	2.667	38.096	38.096
2	.861	12.300	69.960	.861	12.300	69.960	1.838	26.255	64.351
3	.650	9.286	79.246	.650	9.286	79.246	1.043	14.895	79.246
4	.504	7.198	86.444						
5	.415	5.923	92.367						
6	.289	4.124	96.491						
7	.246	3.509	100.000						

The second cluster of patients gives importance to the physician/health care practitioner's attitude towards patients that includes if the doctor treated a patient with respect, and spent enough time discussing his/her problem and explaining treatment options. The third group of patients gives the highest priority to waiting times they spent from checking-in

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at the front desk to seeing the doctor. These three factors collectively explain 79% of cumulative variance in the data as shown in Table 5.

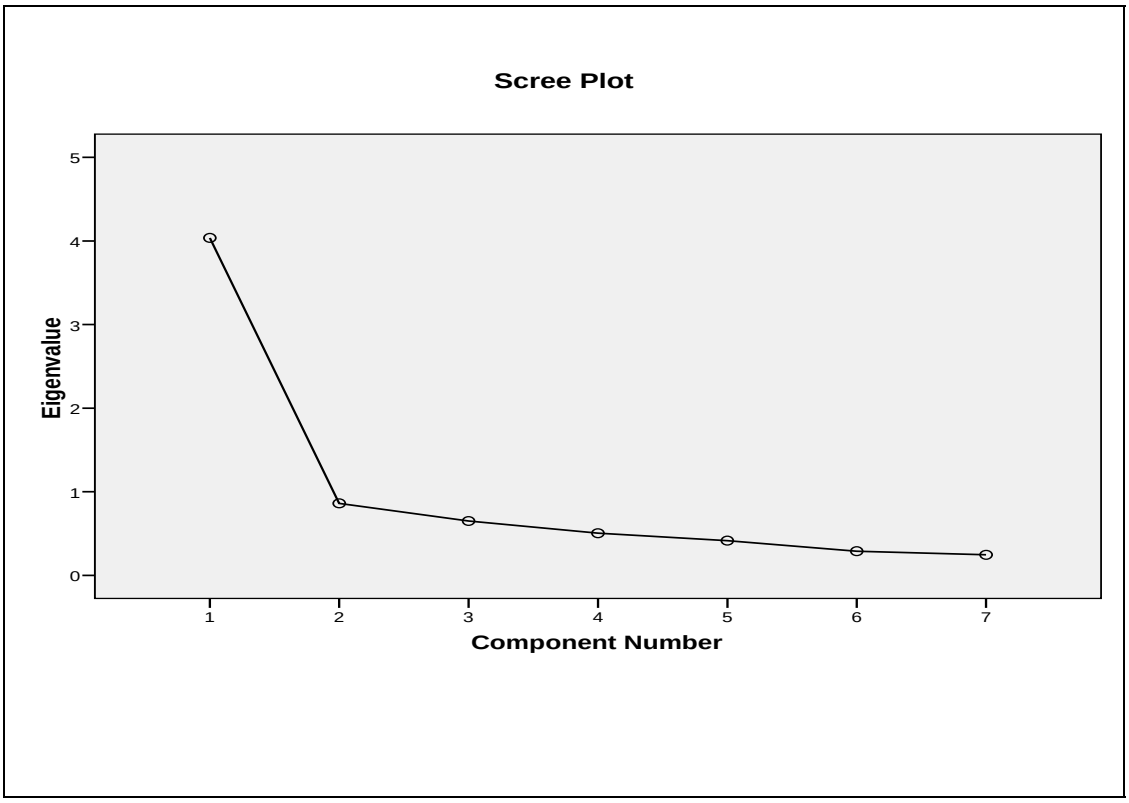

Figure 1: Scree Plot

3.9 Exploring the Factors

Based on the three extracted components, we conducted a few regression tests to see if any statistically significant pattern emerges between the factors and the patient characteristics (age, gender, race, visit status, specialty patient visited) available to us. For example, a certain group of patients that belonged to Component 3 gave priority to the waiting times and we attempted to determine statistically what patient characteristics (if any) impacted this time-sensitive group the most. For this purpose we used logistic

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regression models that may explain the association. The models are discussed in detail in further sections in this chapter.

Logistic regression is a regression model used for dichotomous dependent variables, that is to say it is appropriate when the responses take on only two possible values representing success/failure (0/1). We used binary (or binomial) logistic regression, as our dependent variable was dichotomous while the independent variables were not of any particular type.

A linear regression method models the relationship between a dependent variable *Y*, independent variables X_i, i = 1,....., p, and an error term ε, that is a random variable that represents the error in predicting Y from X. The model can be written as

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p + \varepsilon$$

where β_0 is the intercept (that represents the value of Y when X = 0), the β_is are the respective parameters of independent variables (regression coefficients) , and p is the number of parameters to be estimated in the linear regression. When trying to predict the probability that a case will be classified into one as opposed to the other of the two categories of the dichotomous dependent variable, we run into a problem. The problem being that the probability can take only take values between zero and one, but the predicted values may be less than zero or greater than one. A step towards solving this problem is to replace the probability that Y=1 with the odds that Y = 1 where odds that Y =1, expressed as odds(Y=1), is the ratio of the probability that Y =1 to the probability that $Y \neq 1$. Odds can be expressed as follows: Odds = P / (1-P), where P = the probability that Y=1. Though probabilities and odds are equivalent, working with odds have the

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advantage that odds can take on any positive value; therefore, they do not have any ceiling restrictions. A further transformation of odds eliminates the floor restrictions by producing a variable, the logit or logodds that varies, in principle, from negative infinity to positive infinity. The natural logarithm of the odds i.e., ln {P/ (1-P)} is called the logit of Y, written as logit (Y). If we use logit (Y) as our dependent variable, we no longer have the earlier problem that the estimated probability may exceed the maximum or minimum possible values of probability. The equation for the relationship between the dependent variable and the independent variable now becomes,

$$\text{logit}(Y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots \beta_p X_p$$

It is important to note here that the probability, the odds, and the logit are three different ways to express exactly the same thing and that logistic regression is almost similar to the linear regression with the added advantage, though, that logit transformation of odds allows to limit the dependent variable to be a 0/1 response.

We conducted few regression studies in SPSS to determine if any statistically significant pattern emerges between the factors and the patient characteristics (age, gender, race, visit status, specialty patient visited) available to us.

We hypothesize that age, gender and nature of specialty are the major predictors of time-sensitive groups. To that effect, we estimated a regression equation in which the variable question 6 that rated waiting times was the dependent variable and age-groupss, gender, and specialty functioned as independent variables. Results of the logit model are

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presented in Table 6. The output did not reveal any statistically significant predictor of waiting times.

Table 6: Variables in Equation 1

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	SPECIALTY			27.367	5	.000	
	SPECIALTY(1)	-.408	.596	.469	1	.494	.665
	SPECIALTY(2)	-.853	.481	3.147	1	.076	.426
	SPECIALTY(3)	.360	.328	1.205	1	.272	1.433
	SPECIALTY(4)	-.146	.329	.197	1	.657	.864
	SPECIALTY(5)	.024	.360	.005	1	.946	1.025
	Constant	.659	.318	4.297	1	.038	1.933

Similarly we tried to determine if any of patient characteristics are major predictors of the group that gives the priority to the practitioner's attitude towards patients. The dependent variable chosen in this case were the average scores of question 7 and question 8 from the survey that rate the quality dimension – interactions and communication of providers. The independent variables were age, gender, specialty, and visit status (established vs. new). The visit status was included to see if the frequency of interaction with the provider has an impact on the way patients perceive the interactions. Results of the logit model are presented in Table 7. Yet again, the output did not reveal any statistically significant predictor of the group that gives the priority to the practitioner's disposition towards patients and we had to reject the hypothesis.

Next regression model that we tried was to determine if time-sensitive groups of patients are sensitive to any day in the week or the arrival time of the day. The logit model was created in SPSS and the output obtained is shown in Table 8. We noticed that two of the

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time-periods before 2 PM were statistically significant, though the impacts are not very large.

Table 7: Variables in Equation 2

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	SPECIALTY			7.782	3	.051	
	SPECIALTY(1)	-1.175	.783	2.252	1	.133	.309
	SPECIALTY(2)	-.633	.537	1.390	1	.238	.531
	SPECIALTY(3)	.184	.621	.088	1	.767	1.202
	AGE	.009	.005	3.637	1	.057	1.009
	GENDER(1)	.336	.194	2.985	1	.084	1.399
	Established vs. New(1)	-.073	.212	.118	1	.731	.930
	Constant	1.629	.594	7.527	1	.006	5.100

Table 8: Variables in Equation 3

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	Day			7.305	4	.121	
	Monday	.100	.172	.338	1	.561	1.105
	Tuesday	-.233	.169	1.904	1	.168	.792
	Wednesday	-.262	.179	2.129	1	.144	.770
	Thursday	-.186	.177	1.101	1	.294	.830
	Arrival Times			17.940	2	.000	
	7 AM-10:59 AM	.558	.133	17.557	1	.000	1.746
	11 AM-1:59 PM	.425	.142	8.934	1	.003	1.530
	Constant	.484	.162	8.942	1	.003	1.623

The research could not detect any statistically significant patterns and in general, relations were extremely small or not shown at all. This leads us to conclude that the patient variables used are not the major predictors of a patient's view of quality.

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3.10 Overall Quality

We estimated a regression equation in which the patient's view of overall quality was the dependent variable and the questions based upon scheduling, facility, interactions and communication of staff, and provider were independent variables. The questions in the survey are related to the quality dimensions as proposed by Ward model. Binary logistic regression method was employed in SPSS because the dependent variable (overall quality) is a binary/dichotomous response variable, the outcome being excellent or poor perception of quality (1/0). Results of the logit model are presented in Table 9. The results show that the independent variables like physicians giving respect to patients, physicians taking time out to understand the problems of patients, waiting times, staff friendliness and professionalism and the information patients received before the visit are significant for patients to rate overall quality they received at the clinic. The output also revealed that the strongest predictor of patients' perception of overall quality was the way practitioners treated them even when other variables were statistically controlled. As patients increase their rating of practitioners (physicians) dealing with them with respect (as expressed by Provider2 variable in Table 9) by one unit, the odds are that their overall perception of the service quality increases by a factor of 8, when other variables are controlled. The way practitioners treat the patients has the most impact on patients' perception of overall quality. Other significant predictors of overall quality were the waiting times for patients to see the doctor from the time of check-in and the friendliness of front desk staff. This revelation should be of prime importance to the health care providers as it indicates that patients view overall quality primarily based upon how responsive, respectful and communicative the practitioners are to them as they receive

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support from the staff and behind-the-scene systems that come into play while maximizing service quality for the patients.

In a linear regression model, the coefficient of determination, R^2, summarizes the proportion of variance in the dependent variable associated with the predictor (independent) variables, with larger R^2 values indicating that more of the variation is explained by the model, to a maximum of one. The regression model used here accounted for 63.6% of the variation in overall quality scores.

Table 9: Variables in Equation 4

Step 5(e)	Scheduling 2	.908	.254	12.753	1	.000	2.480
	Staff	1.144	.256	20.011	1	.000	3.141
	Waiting Times	1.326	.263	25.327	1	.000	3.765
	Provider1	1.332	.294	20.513	1	.000	3.788
	Provider2	2.090	.308	45.971	1	.000	8.087
	Constant	-2.394	.242	98.149	1	.000	.091

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CHAPTER 4

DISCUSSION AND CONCLUSION

The fundamental question that inspired this research effort was: Are there differing classes of patients that exist in a given outpatient setting that view service quality differently? An outpatient setting was chosen over an inpatient setting for the research purpose for two reasons. First, service quality is identified by literature as more vital to an outpatient setting. Second, most of the research efforts in relation to the health care quality have been concentrated in the inpatient environment and literature identifies the strong need to look at quality in an outpatient setting. This study identifies the call in health care literature for further research efforts in outpatient care delivery considering the growing shift from inpatient to outpatient delivery in recent times.

The results of the survey conducted at six major outpatient specialties at USF Health and subsequent data analyses reveal that there exist three classes of patients who view service quality differently. These three classes of patients divide the process of care delivery into three phases while expecting excellent service quality from the health care centers. One class of patients gives prime importance to the help they received in scheduling their appointment for the visit, the friendliness of the staff and the environment at the clinic. The second cluster of patients gives importance to the physician/health care practitioner's attitude towards patients, if the doctor treated the patient with respect, and spent enough

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time discussing his/her problem and explaining treatment options. The third group of patients gives the highest priority to waiting times they spent from checking-in at the front desk to seeing the doctor. These three factors collectively explain 79% of cumulative variance in the data.

Our next effort was to determine if based upon these factors any significant patterns emerge across the age, gender, specialty, visit status of patients, etc. For example, are there any specific time-sensitive groups amongst the patients surveyed? The research could not detect any statistically significant patterns and in general, relations were extremely small or not shown at all. This leads us to conclude that the patient variables used are not the major predictors of patients' views of quality.

In terms of overall quality, this research establishes that the way practitioners treat the patients has the most impact on patients' perceptions of overall quality, followed by waiting times for patients to see the doctor from the time of check-in, and friendliness of front desk staff. This revelation should be of prime importance to the health care providers as it indicates that patients view overall quality primarily based upon how responsive, respectful and communicative the practitioners are to them as they receive support from the staff, and behind-the-scene systems that come into play while maximizing service quality for the patients.

Future research is needed to expand the results of this thesis. Patient socio-demographics most often studied and easily collected are age and sex. We intended to study it beyond

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those patient-background variables and include race, visit status (established vs. new patients), economic status, social class, the kind of care patients were seeking (acute vs. chronic), etc., but were partially limited by the information patients were willing to provide (for example, though race was one of our socio-demographic variables, about 70% of respondents refused to provide information regarding the race they belong to) and also by the electronic patient-records database that could not provide us the details we were looking for. Future researchers will do well to expand the survey's ability to capture more socio-demographic details of the patients surveyed. Inclusion of more patient-background variables in future studies will give better results to determine patients' perception of quality. Doing this will enable health care providers to develop a better understanding of the patient characteristics and the role they play in a patient's perception of care quality.

Yet another limitation of this study was the response biases in the patients that may have crept in the process. While every attempt was made during the course of administering the survey to minimize the response bias by letting physicians hand out the survey themselves and then front desk staff reminding the patients to fill out surveys before they check out, we still believe that there were scopes for response bias to creep in. For example, physicians will be less inclined to request a survey from the patients that they believe received lesser service quality on their visit. Hence, irate patients may not have received surveys. The response bias was minimized by asking the front desk staff to remind the patients to fill out the survey before they check out, but that again is dependent on the level of the involvement of the front desk staff. Also, it is possible that

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chronically ill patients were not informed about the survey and hence were the non-participants. This piece of information could not be captured by the survey or the electronic patient-records database.

This research can be used as a platform for future work on establishing quality metrics in an outpatient care setting. For example, it can pave the way for further research in assessing the usefulness of RFID in an ambulatory healthcare setting to capture real-time data and promote continuous improvement in care provision. In the course of our research, we noticed that the variable waiting times had the highest standard deviation and variance amongst all the variables rated through the survey and also the highest zero ratings. These can be more effectively and accurately captured by the use of RFID. Through surveys, it is difficult to establish which phase of visit the patient spent most time waiting or how much time did the physician spend with the patient. A regular collection of real-time data through RFID can provide meaningful information that could serve as a useful tool for improving quality on a continuous basis. This will also allow service recovery in a remarkably shorter period of time.

This research can also be extended to other environments with complex constituencies like, university classrooms, public transportation and travel industry. For example, providers in travel industry can maximize the service quality they offer by studying the customer characteristics and the role these characteristics may play in customers' view of quality.

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APPENDICES

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Appendix A

Demographic Charts

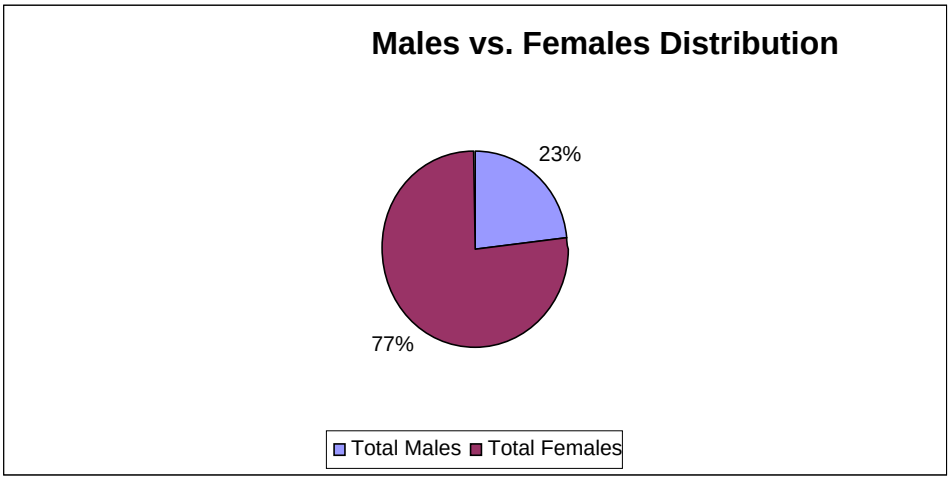

Figure 2: Males vs. Females Distribution

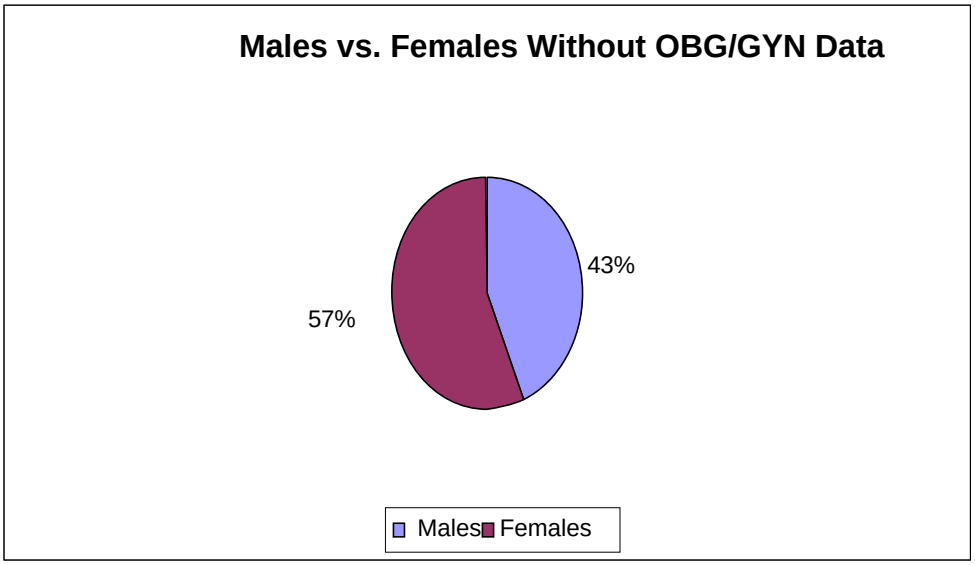

Figure 3: Males vs. Females Without OBG/GYN Data

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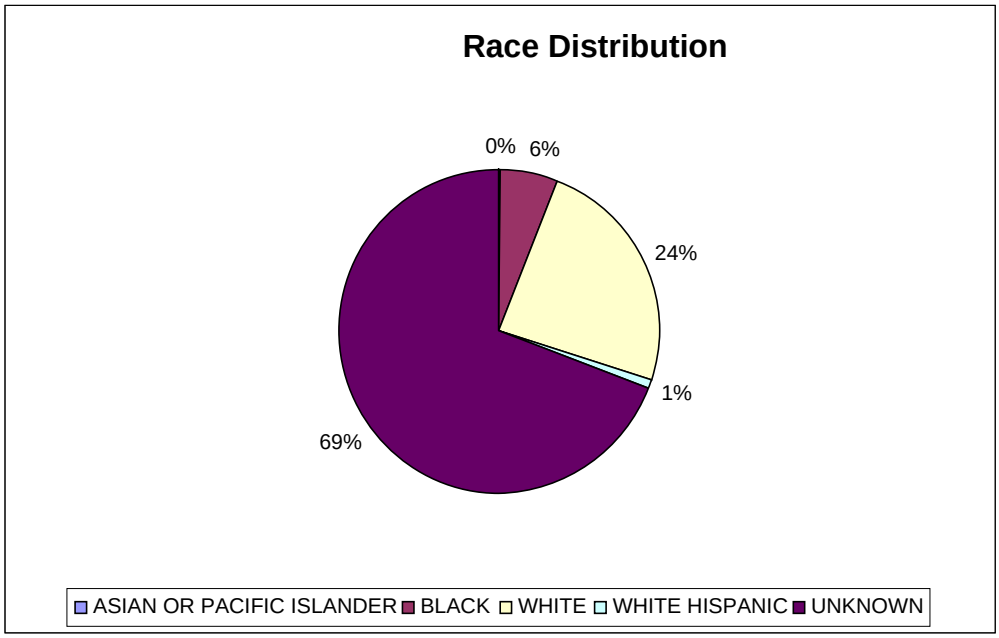

Figure 4: Race Distribution

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