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### Influence of Process Parameters on Health Outcome

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# **Influence of Process Parameters on Health Outcome**

By

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A THESIS

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Science

Major: Industrial and Management System Engineering

Under the supervision of Professor Ram Bishu

Lincoln, Nebraska

August, 2011

**Influence of Process Parameters on Health Outcome**

Vijaya Krishna Musunuru, M.S.

University of Nebraska, 2011

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In the recent years, healthcare organizations have realized that quality in providing service is critical for their survival in this competitive world. This increased attention to service quality has forced many health care providers to reevaluate their systems to stay in business. The main purpose of this study is to test the hypothesis “Process Quality predicts the Product quality (patient satisfaction) in the healthcare domain”. The objective of this study was three- fold. The first objective is to analyze historical data both on patient satisfaction and on provider attributes to yield process parameters for a particular area in a hospital. The second objective is to demonstrate and validate the concept that Process quality predicts product quality in health care domains. The third objective is to use a survey tool which yields significant process parameters and demonstrating the method to improve them using lean six sigma methodologies.

Three data sets consisting of responses to patient, employee and physician questionnaires were taken. The ANOVA and Regression Analysis were performed on raw data to enumerate the relation between final outcome measures and their respective attributes. The Regression Analysis was repeated using the combined quantitative composites derived from each of the 3 data sets independently via dimension reduction by factor analysis. The analyses identified several potential key dimensions that were used to develop a generic survey for the patients, physicians and nurses. A preliminary analysis was done to validate the model by partnering with a health care facility.

The ANOVA performed on the generic survey data have shown that the category of the respondent as the most important variable. The multiple regression analysis on the raw data and attributes has shown that the hospital security and adequate medication provided by the providers is significantly affecting the dependent variable: Recommending hospital to others. Moreover from the linear regression analysis, the variables 'treating each other with courtesy and respect', 'feel safe & secure' 'flexibility in scheduling work hours' and 'balancing of family life and work' had the highest coefficients which are at 0.001 level. It concludes that dimensions also contribute the most to the variation in health outcomes.

## ACKNOWLEDGMENTS

I would like to express my sincere gratitude to all individuals who supported and guided me at every stage throughout my graduate schooling here at University of Nebraska-Lincoln.

Foremost, I am deeply indebted to my advisor Dr. Ram R. Bishu for his continuous support during my M.S study and research, for his patience, motivation, enthusiasm, and immense knowledge in the subject. His guidance helped me all the time during my research. I could not have imagined having a better mentor for my M.S. The stage I have grown today is fully attributed to my supervisor without whom I might have encountered many troubles in pursuing my M.S. and of course I believe this thesis is incomplete without his name.

Besides my advisor, I would like to thank the rest of my thesis committee: Dr. K.P. Rajurkar and Dr. M. Susan Hallbeck, for their invaluable time, thoughtful and critical reading of this thesis.

I would like to take this opportunity to personally thank Dr.Greg Balfany and Micky Mary for their indebted help in collecting the data.

I also personally thank my roomies and friends: Vineeth Reddy Yeddula, Srinivas Polisetty, Gowtham Maranani, Krishna Swamy Nallamreddy, Bharat Annapareddy, Rama Krishna Thummalapalli, Ravi Choragudi, Vedvyas Kamarajugadda, Vetrivel Gnaneswaran. They all made my stay very pleasant in Lincoln during my M.S. They have been wonderful to me and I cannot forget the fun we had at every instance.

This thesis is meaningless without mentioning my parents, Ramadevi & Sambasiva Rao Musunuru, and my brother, Hemanth Vijay Musunuru. Without these people's love, affection and support I do not think I would have reached this stage of my life.

## Table of Contents

<b>List of Figures</b> .....	iii
<b>List of Tables</b> .....	iv
<b>Chapter 1 Introduction</b> .....	1
1.1 Challenge of Health Care .....	1
1.2 Scope of Thesis .....	2
1.3 Chapter Details.....	2
<b>Chapter 2 Literature Review</b> .....	3
2.1 Quality.....	3
2.2 Service Quality.....	4
2.3 Product Quality .....	5
2.4 Health Care Quality .....	7
2.4.1 Metrics to Measure Health Care Quality .....	8
2.5 Problems in Health Care Quality .....	9
2.6 Process Quality Predicts Product Quality .....	11
2.7 Process Improvement Methods.....	12
<b>Chapter 3 Rationale of the Research</b> .....	17
3.1 Summary .....	17
3.2 Our Postulation .....	18
3.3 Objectives .....	19
<b>Chapter 4 Research Methodology</b> .....	20
4.1 Overview .....	20
4.2 Historical Data Analysis for Process Parameters .....	20
4.3 Development of Method to Prove Model .....	21
4.4 To Validate Hypothesis .....	21
4.5 Use of Six Sigma Methodologies for Process Improvement in Health Care .....	22

<b>Chapter 5 Results</b> .....	24
5.1 Historical Data Analysis .....	24
5.1.1 Descriptive Analysis of Questionnaires .....	25
5.1.2 Regression Analysis .....	39
5.1.3 Factor Analysis on Datasets .....	46
5.2 Model Development .....	49
5.2.1 Regression Analysis on Combined Raw Database .....	50
5.2.2 Regression Analysis on Factor Scores .....	51
5.2.3 Comparison of R-Squares .....	52
5.2.4 Significant Process Parameters from Historical data Analysis .....	53
5.3 Development of Generic Survey .....	54
5.4 Validation of Model .....	55
5.4.1 Descriptive Analysis .....	55
5.4.2 Regression Analysis using raw data .....	62
5.4.3 Regression Analysis using attributes .....	64
<b>Chapter 6 Conclusions</b> .....	66
6.1 Summary of Results .....	66
6.2 Overall Discussion .....	67
6.3 Conclusions/Recommendations .....	69
6.3 Research Limitations .....	70
6.4 Future Research .....	70
<b>References</b> .....	71
<b>Appendix 1</b> .....	74
<b>Appendix 2</b> .....	90



## List of Figures

Figure 5-1 Plot of Language Effects on Question 1 .....	27
Figure 5-2 Plot of Language Effects on Question 9 .....	28
Figure 5-3 Plot of Language Effects on Question 4 .....	28
Figure 5-4 Plot of Highest grade of school completed Effects on Question 9.....	29
Figure 5-5 Plot of Highest grade of school completed Effects on Question 33 .....	30
Figure 5-6 Plot of Highest grade of school completed Effects on Question 37 .....	30
Figure 5-7 Plot of Management Responsibilities Effect on Question 15582 .....	33
Figure 5-8 Plot of Management Responsibilities Effect on Question 15588.....	34
Figure 5-9 Plot of Years Worked Effect on Question 15557.....	35
Figure 5-10 Plot of Years Worked Effect on Question 22796.....	35
Figure 5-11 Plot of Age Effect on Question 15916 .....	37
Figure 5-12 Plot of Age Effect on Question 15906.....	38
Figure 5-13 Plot of Category Effect on Question ‘a’ .....	57
Figure 5-14 Plot of Category Effect on Question ‘b’.....	58
Figure 5-15 Plot of Category Effect on Question ‘k’ .....	58
Figure 5-16 Plot of Category Effect on Question ‘p’ .....	59
Figure 5-17 Plot of Category Effect on Question ‘u’ .....	60

## List of Tables

Table 5-1 Overview of data sets .....	24
Table 5-2 Characteristic of the patient subjects ... ..	25
Table 5-3 ANOVA Summary for patients survey .....	26
Table 5-4 Characteristic of the subjects (employees) .....	31
Table 5-5 ANOVA Summary for employees survey .....	32
Table 5-6 Characteristic of the subjects (physicians) .....	36
Table 5-7 Regression Output on Patients Data .....	40
Table 5-8 Regression Output on Physicians Data .....	42
Table 5-9 Regression Output on Employees Data .....	44
Table 5-10 Regression Output on Patients Factor Scores .....	46
Table 5-11 Regression Output on Physicians Factor Scores .....	48
Table 5-12 Regression Output on Employees Factor Scores .....	49
Table 5-13 Comparison of R- Squares .....	52
Table 5-14 Characteristic of the subjects .....	56
Table 5-15 ANOVA Summary .....	56
Table 5-16 Means of non-significant questions by their category.....	61
Table 5-17 Significant Questions from Regression Analysis .....	62
Table 5-18 Classification of Questions into Attributes .....	64

## **Chapter - 1**

### **INTRODUCTION**

#### **1.1 Challenge of Health Care**

During the course of last two decades, the manufacturing industry was overtaken by the service industry. The service industry has become one of the primary factors in the US economy. These two sectors differ with each other in areas such as inventory or product types and the quality measurements.

The growing importance for the quality in the service industries has made them to re-evaluate their systems to stay successful in the business. Healthcare industry is a specialized type of service organization with some unique characteristics. Unlike in the manufacturing industry, the customers in the Healthcare industry are patients in addition to their family members and can be even their friends. Any kind of error in this industry can potentially affect the lives of the patients and put their quality of life at stake. Apart this, extensive amount of transactions and staff involved in the care provided to the patients make determining the quality more challenging.

Donabedian in the year 1996 addressed quality in health care as being relevant to the structure, process, and outcome. This is one of the most widely used models of quality in health care. The process in health care is comprised of the decisions and judgments made, along with all the procedures and treatments that are administered. The interaction between a health care worker and a patient is included in the process portion. The outcome is the most measurable portion and is generally agreed to be the recovery or survival of the patient subsequent to treatment or care (Donabedian, 1966).

## **1.2 Scope of Thesis**

In manufacturing industry, it has already been shown that the quality of the product or outcome is influenced by the quality of its process. This implies that the customer satisfaction for a product can be improved by improving the quality of the process by which that product is manufactured. The main intent of this research is to apply these concepts of process and product quality of manufacturing to the health care field, where defining the defects or quality is more difficult.

Initially, the historical data on patient satisfaction and provider attributes was taken from a regional agency will be analyzed using different linear modeling analyses (ANOVA and Regression) to yield the process parameters that affect the patient outcome. The yielded process parameters will be used for developing a generic survey for patients, physicians and nurses. This generic survey will be further used to demonstrate the concept that process quality influences product quality in health care domains.

## **1.3 Chapter Details**

The thesis is presented in the following chapters. Chapter 2 reviews the literature on the concepts of quality, health care quality and process improvement methods. Chapter 3 describes the rationale of this research. Chapter 4 presents the research objectives, historical data analysis for the process parameters, demonstrating the hypothesis and use of six sigma methodologies for effective process improvement in health care. The results of the analysis are compiled in the chapter 5. Chapter 6 summarizes the major findings of this research and their implications towards demonstrating the hypothesis. The limitations and future work of this study are also presented in this chapter.

## **Chapter - 2**

### **LITERATURE REVIEW**

#### **2.1 Quality**

Throughout the years, the concept of “quality” has been considered with continued attention and is of extreme interest even today. For the managers and executives in the contemporary organizations, “quality” is the most commonly repeated mantra. Zeithaml et al. (1990) conducted a survey in which the executives ranked the most critical challenge facing the United States businesses was improving service and product quality.

Feigenbaum (1982) described quality as "the single most important force leading to the economic growth of companies in international markets". Quality has many aspects and cannot be easily defined in one some simple phrase or sentence. Abbott (1955) and Feigenbaum (1951) defined quality as “value”, Gilmore (1974) as the “conformance to specifications”, Crosby (1979) as “conformance to requirements”, Juran (1974) as “fitness for use”, Taguchi as "loss imparted to society from the time the product is shipped”, and Parasuraman et al. (1985) defined it as “meeting and/or customer expectations”. The concept of quality has many and often tangled definitions regardless of the time and context in which it is examined. It has been used to describe wide variety of phenomena.

Godfrey (2002) cites that quality is relative and customer focuses mainly on the value, which he thinks it to be quality over price ratio of a product. To really succeed in the business, a company has to offer more value to the product than its competitor. This gives us the idea that quality is not only making a product to satisfy the customer needs, but

also the company should make profits by selling their product. It makes us to include the customer satisfaction, production efficiency and competitive pricing to the definition of the quality.

Quality can be mainly by classified it into two different categories: Service quality and Product quality. The following two sections give brief idea about service quality and product quality.

## **2.2 Service Quality**

In any workplace, it is very important to define service quality and its components. The organization should feel it as an important endeavor to define the service quality so that the employees will not be left to form and act upon their own definition of quality, which may not be accurate for most times. This will also help the employees not to be left with indefinite instructions to improve the service quality in the workplace. Parasuraman et al. (1985) identified over 200 factors that determine service quality by conducting extensive series of interviews with the customers and provided different tools to gauge a firm's performance. Parasuraman et al. (1988) condensed their list into five main factors that determine the service quality which includes tangibles, reliability, responsiveness, assurance and empathy.

Parasuraman et al. (2006) defined the service quality as “the degree and direction of discrepancy between customers' service perceptions and expectations”. This concludes that the service is said to be of high quality if the expectation is lesser than the perception and service is said to be of low quality if the expectation is higher than the perception.

Even now, the measuring of service quality perceptions does not have unanimity among the scholars. Brady and Cronin (2001) stated that “work on service quality can best be described as divergent.” According to the Woo and Ennew (2005), SERVQUAL is the most dominantly used model for evaluating the service quality. In spite of being criticized by the scholars like Buttle (1996) and Cronin and Taylor (1992), the SERVQUAL is the most commonly used model for evaluating the service quality. Brady et al. (2005) cites in their paper that all the service quality, customer satisfaction and product value had direct impact on behavioral intentions. They proposed a comprehensive model which consists of only thirteen survey questions for measuring the service quality in the firm more accurately.

### **2.3 Product Quality**

Product quality can be defined as the collection of features and characteristics of a product that contribute to its ability to meet the given requirements. The advanced methods of controlling the product quality include Statistical Quality Control (SQC) and Statistical Process Control (SPC) was evolved during the mid-1950. These methods utilize the sampling techniques for finding the mean and variance in process performance. During the years between 1960 and 1980, the cost and quality of the products became the main important things for the customer satisfaction. The firms began to focus on the manufacturing systems to produce goods with achieving high quality at less cost. Because of this continued trend, the goals of the product quality are mostly driven by the customer requirements and specifications.

According to the manufacturer, product quality can be measured by the degree of conformance to the predetermined standards and specifications. The poor quality can be

defined as the deviation from these predetermined standards. The quality improvement for overall reduction in production costs can be done by aiming at eliminating defects, the need for scrap and rework. The consumer view of product quality is the product that satisfies their preferences and expectations.

Quality Control (QC) is a method used for ensuring that the product is produced and delivered with the predetermined requirements and standards. The Quality Control consists of data collection, analysis using different sampling techniques and drawing different control charts for monitoring the manufacturing products in the process. Concurrent Engineering, Quality Function Deployment (QFD), and total quality management (TQM) are modern management approaches for improving product quality through effective planning and integration of design, manufacturing, and materials management functions throughout an organization. Mainly, the typical goal of Quality improvement method will be reducing the warranty claims and associated costs. These warranty data will impact the product quality dimensions directly or indirectly.

Consistency and reliability are critical to product quality to meet the regulatory requirements and company standards. The business requires that the system has the highest standards and processes for ensuring consistent product safety and quality – which will be from the start of the production to the delivery of the product.

The discussion in the above sections gives us the idea that service industries have no common instrument as in manufacturing industries to measure quality and lot of research needs to be done in this area. Among all the service industries, there is more need to improve quality in hospitals to reduce the growing healthcare costs and improve patient safety.



## **2.4 Health Care Quality**

After the Total Quality Management (TQM) achieved the remarkable success across all the manufacturing and service industries, there was a significant amount of skepticism as to whether this quality approach could be successfully applied and can be implemented in the field of health care. Unlike in the manufacturing industries, there is no standard product or assembly line in the health care. It is also not easy to measure or define the quality in health care and also the belief that the higher quality would lead to higher cost which makes already expensive health care into more expensive (Berwick et al., 1990). It is also difficult to involve the physicians in the measuring of healthcare quality. Mostly, the healthcare is a service industry which consists of a very complex system with interconnected processes.

A significant amount of research was done by the experts to formulate a definition for healthcare quality which is concise, significant and commonly applicable (Palmer, 1990). When applied to health care, “Quality is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge’ (Chassin, 1998b). Donabedian (1980) defined healthcare of high quality as “that kind of care which is expected to maximize an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts.” In 1984, the American Medical Association defined high quality care as care “which consistently contributes to the improvement or maintenance of quality and/or duration of life.” The association identified that the efficient use of resources in healthcare, the well-versed participation of patients, timeliness and importance of health promotion along with the

disease prevention as the essential dimensions in determining the healthcare quality (David Blumenthal, 1996). The most widely cited definition formulated by the Institute of Medicine in 1990 (Lohr et al., 1992 and Lohr, 1990), holds that quality consists of the “degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.”

In 2007, the American Medical Association suggested that it is also important to identify a health care facility as ‘a formally organized and legally constituted entity that arranges or contracts for the provision of health care and shares public accountability for the quality, accessibility, and costs of such care with the health professionals who provide or direct the care’. There are several agencies that are dedicated to frequently monitor the healthcare quality which is extremely important.

#### **2.4.1 Metrics to Measure Health care quality**

The measuring of healthcare quality involves measuring the patient satisfaction and their safety. Other metrics include disparities in health care, adequate medication and also the timeliness of the treatment. Beal et al (2004) identified nineteen measure sets and 396 individual measures to assess the quality in healthcare. The study indicates that distribution of healthcare domain was safety, 14.4%; effectiveness, 59.1%; patient-centeredness, 32.1%; and timeliness, 33.3%. The distribution of patient’s perspective domain was staying healthy, 24%; getting better, 40.2%; living with illness, 17.4%; end of life, 0%; and multidimensional, 23.5%. Health care providers’ attitude, education, training, interaction, available equipment that is consistent with current technology will be the process attribute measures.

The survey method is the most common tool used to measure quality in most fields. This method helps in more interaction between the investigator and the patients. The survey methodology will have more stability, accuracy, and precision of measurement. They can be done in many ways mail, telephone, using face-to-face interviews, as handouts, or electronically.

A study by Taylor and Hermann (2000) indicates that when resources are limited and data is needed for a large sample, survey questionnaire helps in obtaining the optimum results. Questionnaires also help in maintaining the privacy of the participants because the responses can be made anonymous or confidential. This is particularly important when gathering sensitive information. The survey questionnaire can be interpreted into different languages which will help in obtaining information of different ethnicities. The data collected from the surveys can be used for future studies or to compare the old and new data results.

There are many problems in healthcare that needs to be addressed and measured. The problems in the healthcare should be identified before selecting a method to measure quality or improve the process.

## **2.5 Problems in Health care Quality**

Chassin and Galvin (1998) were in the national round table on health care quality, convened by the Institute of Medicine to identify the issues related to the health care quality. It includes the measurement, assessment and improvement of health care quality in the United States. They concluded that the serious and widespread quality problems exist throughout American medicine and it is harmful to many number of citizens as a

direct result. Current efforts to improve will not succeed unless a major, systematic effort is taken to overhaul the way of delivering the health care services, educate and train clinicians, and assess and improve quality.

Healthcare quality has always been a concern for providers. Problems associated with quality can occur at rates of 20 to 50 percent, or in other words 200,000 to 500,000 quality problems per million patients (Chassin, 1998a). These are the problems that frequently lead to the customer dissatisfaction due to the inefficient processes. These problems also add hidden costs that are associated due to poor quality. This makes the entire healthcare industry to believe that they have to invest more in the continuous improvement processes.

The past researches have shown the different ways by designing surveys to evaluate the patient satisfaction and every researcher had used different dimensions to evaluate the patient satisfaction scores which in turn contribute significantly to the overall quality of health care. The conventional methods are insufficient in assessing the patient satisfaction (Barr and Vergun, 2000). They developed a survey tool with 67 questions that collect the information of different dimensions like health status of the patient, prior healthcare, and ancillary services utilized by the patient along with their demographic information. Guyatt et al. (1995) hypothesized that as their instruments measure patient satisfaction only considering the intensity of care provided and participation in the decision- making, they will be best usable for the younger patients and their families who are chronically ill. So, there need to be development of tool that will have all the dimensions that affects the healthcare quality. Sitzia and Wood (1997) suggested that the patient satisfaction mainly

depends upon the patients evaluation of the attributes which they believe are present in the process of care.

Stump et al. (1995) suggested that it is important to test the instrument which is off the shelf or newly designed before it will interact with the target population. In assessing quality and in improvement initiatives, it is important to include all the staff, nurses and desk personnel (Harris, 1999).

The studies suggest that more “personal” care by the organizations will result in the improved patient satisfaction scores. Some of the studies also suggest that the high satisfaction scores will result in the better quality of care, but there is lack of enough data which is consistent. The further research should be done to find new determinants of the patient satisfaction that affects healthcare quality. There is also necessity in revealing exact relationship between quality in healthcare and patient satisfaction (Cleary and McNeil, 1988).

The identifying of attributes that effect quality in healthcare and measuring alone does not improve quality. There are different process improvement methods that can be used to improve the identified attributes for better healthcare quality.

## **2.6 Process Quality Predicts Product Quality**

A process improvement project was presented in an International conference (Kablinger and Bishu, 2008). This study explores the fact that process quality leads to product quality. Objectives of this study were to do in-depth statistical analysis on patient satisfaction survey data and identify process parameters that can be improved or

enhanced to improve overall product quality. Specifically, this study focused on eight quality attributes of customer satisfaction, linking them to process data to enhance operations improvement for an area hospital. Data from an Agency for Health research and Quality (AHRQ) -based patient satisfaction survey instrument was analyzed. Process data for the same time period was obtained independently. The two data sets were combined to develop cause effect relations. It was interesting to note from the analysis that the factor 'unit' from which patients received the services made a difference in the overall rating of the hospital. In summary, based on these results a few factors (for example location and department) were found to be significant to enhance operations improvement, and were recommended for further study.

## **2.7 Process Improvement Methods**

For many years, TQM and Continuous Quality Improvement (CQI) were being introduced into the healthcare industries which resulted in the quality improving managers having differing degrees of success. After that, the different methodologies of the quality improvement have been inherited from the manufacturing industries to the healthcare service industries. There are many process improvement methods like Six Sigma, Lean Thinking and Theory of Constraints. Lean thinking mainly works on the reducing the waste in the process to improve the business performance through improved workflow. Theory of constraints addresses the system constraints and emphasizing the faster system throughput.

The Six Sigma methodology problem solving approach focuses on variance reduction in the process that will improve the output of healthcare quality. The healthcare's most

difficult problems can be solved using this methodology with highly effective, reliable and most consistent solutions.

Published literatures have identified that Six Sigma methodology is used to improve services rendered in hospitals. For example, in a case study literature by Ganti et al. (2004) shows that Long Island Jewish, NY, Stanford Medical center, CA, M.D. Anderson, TX, Virtua Health System, NJ, Charleston Area Medical Center, WV, Boston Medical center, MA, Yale New Haven Medical center, CT, Verdugo Hills Hospital, CA, Johns Hopkins Hospital, MD, and Good Samaritan Hospital, OH have implemented six sigma principles to improve service quality. Six Sigma is a powerful technique that is used in the healthcare to meet the expectations of the patients, to improve the profitability and cash flow.

Bandyopadhyay and Coppens (2005) focused on the modeling of Six Sigma approach to improve productivity and quality in health care delivery system. It is a highly measurement and data driven approach. Citibank used this approach to focus on the reduction of cycle times within the company. Six Sigma approach is mainly used for patient's satisfaction in the healthcare industry.

Schwall and DeYoung (2003) implemented the Six Sigma in the Mount Caramel Health System at Columbus, Ohio. In the first year, the focus was on projects that were the biggest operational headache, the next year the project was focused on six themes which were revenue enhancement, bad debt reduction, patient throughput in all operational units, labor/right staffing, labor retention and recruitment, and patient safety. About three million dollars cost reduction was realized after its implementation.

Heuvel et al. (2005) applied Six Sigma methodology in a Red Cross hospital at Beverwijk, Netherland. The major problems were misunderstanding of project goals with strategic goals, lack of a process to determine project relevance, lack of a procedure for evaluating project cost effectiveness, poor project decision making, lack of ability to access potential savings of other projects, lack of project monitoring and project comparison tools. The application of six sigma principles helped the organization minimize costs by \$440,000 in total savings.

The Good Samaritan Health Systems in Kearney, Nebraska want to improve patients' surgery process as there were many cancelations and delays. Lazarus et al. (2003) used the six sigma approach to found the main problem was cancellation of most of the surgeries before 48 hours of scheduled time and was able to improve the scheduling process.

The Charleston Area Medical Center (CAMC) in West Virginia came up with a project to reduce cycle time and to change many processes in their facility. Regardless of the fears in the center about the results after Six Sigma implementation, it had been successfully implemented by Lazarus (2003) and used even now at CAMC in medication safety, coordination of care, recruitment of new employees, reduction in denials of payment, and reduction of inventory.

Lloyd et al. (2006) implemented Six Sigma approach at The Commonwealth Health Corporation. The training about Six Sigma methodology and change management skills was provided to the participants to build support for using Six Sigma, and system development inside the corporation. The training was mainly focused on the participants



work environment. At the end, the operating costs were decreased by \$800000 in the radiology department. The radiology cost was decreased by 21.5% from \$68.13 to \$49.55 per procedure. Errors in MRI ordering process were decreased by 90%. The waiting and examination time for the patients was decreased which leads to the patient's satisfaction. There was a total saving of \$1.65 million per year.

The other area, where more focus is required is in the field of medical errors. The study was done in the state of Florida, where 225 medical errors occur per year in an average hospital. Six Sigma approach was used and reduced the number of deaths when compared to the average deaths all over the U.S.

Frankel et al (2005) performed a methodological project in addressing the ICU incidents that causes infections. They mainly addressed catheter-related bloodstream infection (CR-BSI) rate, and hypothesized that the usage of Six Sigma approach will decrease catheter-related bloodstream infection rate. Catheter-related bloodstream infection was reduced in the hospital where other quality improvement methods had failed.

Hirst and Weimer (2008) implemented Lean and Six Sigma to help eliminate the wasted time and effort in treating heart attack patient. The main focus was to empower each employee to make improvements, reducing time and costs, synchronizing processes, improving quality and also the patient experience. In an Ohio hospital in the Emergency department there was a saving of about \$ 6000 by having the right supplies at the right time which helped in reduction in wasted time. Lean approach helped in implementation of road maps for fast and better service for patients.

The above research suggests that the process improvement method like Six Sigma is very important for an organization to improve overall performance for providing quality healthcare to patients. The extended benefits by implementing an effective process improvement method include increase in cash flow which increases profits, reduce healthcare costs and also to improve patient's safety. It was also helpful in saving time, cost and optimization of resources for quality improvement.

## Chapter - 3

### RATIONALE OF THE RESEARCH

#### 3.1 Summary

The measuring of quality in the service industry is not easy as it is in the manufacturing industry and often defies objective measurement. Unlike in manufacturing, both provider and customers are involved to produce a unit of service. In the recent years, service organizations have realized that quality is critical for surviving in this competitive world. Healthcare organizations are unique service organizations in the sense that any kind of error in this industry can potentially affect the lives of the patients by placing their quality of life at stake.

A typical healthcare organization will have the following attributes:

1. Customers are patients and their family
2. Cost of errors are can be devastating
3. Transactions (treatments) are many
4. Service providers are many
5. Under very high level of regulation

In a typical health care facility, because of large number of transactions, and variance in all possible performance measures both between transactions and within transactions, makes determination of quality real challenging.

Public and private decision makers in this field have been experimenting with ways to accomplish this goal, and this research seeks to both facilitate and quickly learn about the ways in determining and improving quality in healthcare.

### **3.2 Our Postulation**

Initially, the product quality was the main concern in any manufacturing industry. During the recent years, the importance of the process quality was realized by the researchers. It is now believed that the process quality influences the product quality in the manufacturing industry.

A simple quality model that has withstood the test of time in manufacturing is that,

**PROCESS QUALITY-----→PRODUCT QUALITY----→CUSTOMER SATISFACTION**

From the available literatures on the quality in the healthcare organizations, most researches were focused on measuring the quality from the patients' perspective rather than from the process perspective. The above model should be valid for health care as well. The above model is very consistent with Donabedian (1966) 'Structure-Process-Outcome' model. In our postulation, "process Quality' would refer to all the attributes on the 'service provider side'. It would include personal attributes of all the health care providers, would include attributes of all equipment and other resources, and would also include all the attributes of the actual service (treatment) component. Product Quality will refer to the outcome measures at the end of a service unit. That could be treatment

time, error free medication, treatment quality, or any other measurable attribute of the outcome. Finally, ‘customer satisfaction’ would refer to the overall patient/family experience.

We postulate that:

1. Patient satisfaction will not be consistent across all treatments in health care facilities.
2. Appropriately designed surveys will indicate differences in attributes of treatments within health care facilities.
3. Attributes at service provider end will influence quality of treatment and ultimately patient outcome.
4. Six sigma methods can be used to improve these service provider attributes so that over all patient satisfaction can be improved.

### **3.3 Objectives**

The specific objectives of this research are:

1. To analyze historical data both on patient satisfaction and on provider attributes to yield process parameters for a particular area in a hospital.
2. To validate the model that “Process quality influences product quality” in health care domains.
3. To identify the significant process parameters and demonstrate the use of lean six sigma methodologies to improve them to improve quality of outcomes.

## **Chapter – 4**

### **RESEARCH METHODOLOGY**

#### **4.1 Overview**

The main intent of this research is to validate the hypothesis that process quality influences product quality in health care domains. This chapter gives the methods involved in analyzing historical data both on patient satisfaction and on provider attributes to yield the process parameters for developing a generic survey. This chapter also provides the method to introduce lean six sigma methodologies in health care domain to improve process quality that would improve quality of outcomes.

#### **4.2 Historical Data Analysis for Process Parameters**

Data on patient satisfaction and on provider attributes will be sought from a regional agency that is specialized in measuring patient satisfaction for number of hospitals. As most of the hospitals do not have a combined patient satisfaction and provider attribute data, data sets taken from the agency consists of responses to patient, employee and physician questionnaires collected during same overlapping time periods.

Initially, one-dimensional descriptive analysis will be done on survey questionnaire with the intention to determine whether responses for the questions are consistent. This analysis will capture any major differences among the responses to different questions for the survey instrument. Analysis of Variance (ANOVA) will be performed on the data to determine the effects of any categorical variables that are present in the survey.

The regression analysis will be performed as a main analysis on the data that will enumerate the relation between final outcome measures (patient satisfaction) and provider attributes.

Thus the outcome at this phase will be detailed analyses of the historical data that would have been statistically combined. It is expected that this analyses will indicate some directions for quality improvement.

### **4.3 Development of Method to prove model**

Since the main objective of this research is to demonstrate the concept that process quality would predict product quality, the next step would be to obtain controlled information on both sides, i.e., the patient (customer) side and the provider side. The attributes that are significant from the above analyses will be considered as the main determinants for measuring patient satisfaction. After choosing a particular department in a hospital, a generic survey that can be used by patients, physicians, and nurses has been designed mainly using the significant attributes from the previous analysis. The survey will be designed such that it contains all the information from both the provider side and the customer (patient) side. After the completion of the survey, it will be submitted to the Institutional Review Board (IRB) at UNL for the approval. The approved survey will be used for collecting data after the consultation with quality director and other appropriate personnel of the participating hospital. The survey will be administered to all concerned in a selected time window.

### **4.4 To Validate Hypothesis**

The survey data will be analyzed from various perspectives. First the reliability of responses will be measured through Cronbach's alpha. Secondly, since the final survey will have some demographic variables, ANOVA will be performed on the data to determine effects of these demographic variables. Finally regression analysis will be

performed. The main intent is to relate customer outcome variable (patient satisfaction) with provider parameters.

It is expected that this analyses will demonstrate the concept that process quality (defined by provider parameters in the above model) will influence the product quality (measured by outcome variable) in the health care arena.

#### **4.4 Use of Six Sigma Methodologies for process improvement in Healthcare**

The provider parameters identified from the analyses of data collected by generic survey tool will be subjected to improvement through six sigma methods. The following tasks will be performed to improve outcome of identified parameter using Six Sigma:

##### **Define**

The project to be performed will be defined in measurable terms here. The project charter will be specified in fair amount of detail. The intent will be to improve effectiveness of the identified parameter and reduce its redundancy. Formation of a project team is also part of this task. The team will be appropriately chosen.

##### **Measure**

Proper metrics will be developed to measure the effectiveness, timeliness and redundancy of the variable that need to be improved. Process flow charting will be performed to identify existing procedure and to get an estimate of its measure. This would also give an estimate of gap between the “existing condition” and the “desired condition” as stipulated by the *define* phase.



**Analyze**

This is a critical part in process improvement. The key input variables affecting the identified parameter are to be determined here. The starting document for this stage is the process flow chart. The input variables that will affect the identified parameter and extent of its influence should be analyzed with the use of tools such as FMEA (Failure Mode Effects Analyses) and or ANOVA and or Regression.

**Improve**

Once potential causes for issues in the identified variable are found, the next logical step is to improve them. The improvement may be through alternate technology, or better training or better process. This may involve some experimentation or some process reengineering. This will also involve selection from a set of alternatives. The least cost alternative that gives the required improvement will be selected.

**Control**

Once improvements are decided from *Improve phase*, the next step is implementation of the improvements and its sustenance. Process control tools will be put in place here to ensure sustenance.

All the above Steps will be performed for all the provider parameters that need to be improved.

## Chapter - 5

### RESULTS

This chapter has four sections – historical data analysis, model formation, developing of generic survey and validation of the model. SAS and SPSS were used for computing the results.

#### 5.1 Historical Data Analysis

Three data sets were taken from a regional agency, which specialized in monitoring patient satisfaction for hospitals. The data set consists of responses to patient, employee and physician questionnaires (three key drivers) collected during overlapping time periods in 2006-7. The three surveys used for collecting the responses from patients, employees and physicians were attached in Appendix 1 .The overview of the data set is given below in the table:

**Table 5-1 Overview of data sets**

	Patients	Physicians	Employees
No. of variables	55	57	97
No. of observations	547	117	302

### 5.1.1 Descriptive Analysis of Questionnaires

#### Patients

A total of 547 patients participated in this study. Thirty-six patients (6.7%) were African American, 499 patients (92.9%) were White and remaining 0.4% of patients were Asians and Native Hawaiians. According to the survey, 99.6% patients mainly speak English at home and only 0.4% patients responded that they speak some other language at home. For patients' highest grade or level of school completed, 30.2% of them were high school graduates and 15.5% of patients responded that they were 4-year college graduates. Table 5-2 shows the distribution of characteristic of respondents.

**Table 5-2 Characteristic of the Patient Subjects**

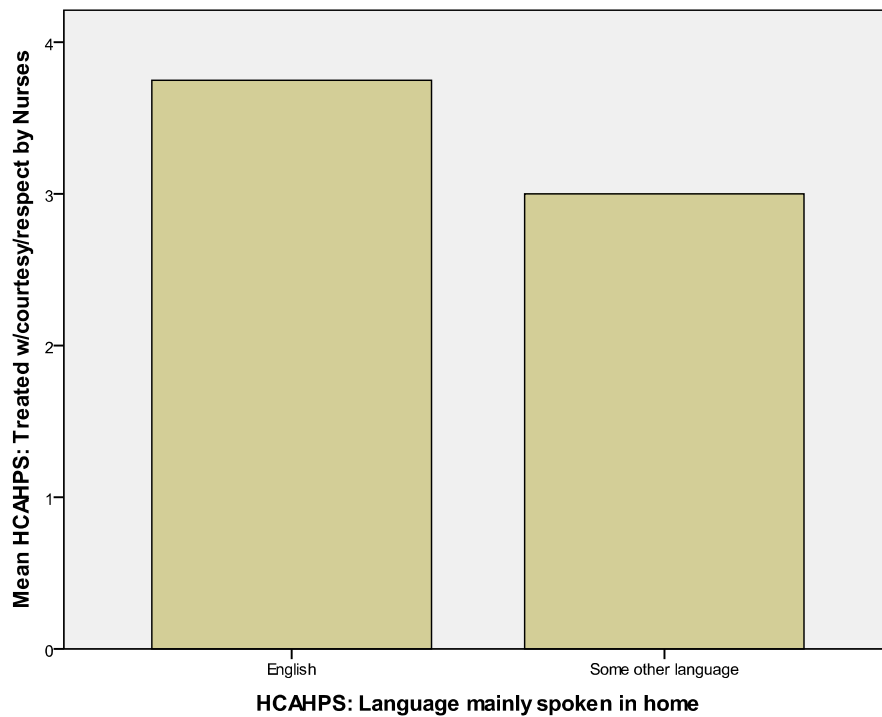
	<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Race</b>	White	499	92.9
	African American	36	6.7
	Asian	1	.2
	Native Hawaiian	1	.2
<b>Language</b>	English	537	99.6
	Some other language	2	.4
<b>Highest Grade Completed</b>	8th grade or less	3	.6
	Some high school, but did not graduate	22	4.2
	High school graduate or GED	160	30.2
	Some college or 2-year degree	165	31.2
	4-year college graduate	82	15.5
	More than 4-year college degree	97	18.3

The Analysis of Variance (ANOVA) was used to test whether the differences existed in the perceptions of patients' service quality between the race (R), highest level of grade completed (G), and the language (L) usually spoke at home. Table 5-3 shows the ANOVA summary. All the significant effects are marked "S". It appears that grade completed was significant for questions 9, 21, 33, 34, 37, 40, 41, and 51. Language was significant for questions 1, 4, 8, 9, 23, 31, and 51.

**Table 5-3 ANOVA Summary for patients' survey**

Question	G	L	R	Question	G	L	R	Question	G	L	R
Q1		<b>S</b>		Q21	<b>S</b>			Q41	<b>S</b>		
Q2				Q22				Q42			
Q3				Q23		<b>S</b>		Q43			
Q4		<b>S</b>		Q24				Q44			
Q5				Q25				Q45			
Q6				Q26				Q46			
Q7				Q27				Q47			
Q8		<b>S</b>		Q28				Q48			
Q9	<b>S</b>	<b>S</b>		Q29				Q49			
Q10				Q30				Q50			
Q11				Q31		<b>S</b>		Q51	<b>S</b>	<b>S</b>	
Q12				Q32				Q52			
Q13				Q33	<b>S</b>			Q53			
Q14				Q34	<b>S</b>			Q54			
Q15				Q35				Q55			
Q16				Q36							
Q17				Q37	<b>S</b>						
Q18				Q38							
Q19				Q39							
Q20				Q40	<b>S</b>						

Question 1 (shown in Figure 5-1) "Treated with courtesy and respect by Nurses" was statistically significant with the language mainly spoken at home. The result shows that English speaking patients were more satisfied than the "other language" speaking patients.



**Figure 5-1 Plot of Language Effects on Question 1**

Question 9 (shown in Figure 5-2) “How often was area around your room quiet at night?” was statistically significant with language. The result shows that the patients speaking English mainly at home were more satisfied about the quietness around the room during the night at the hospital.

Question 4 (shown in Figure 5-3) “Got help as soon as wanted?” was statistically significant with language. The result shows that patients speaking some language other than English were less satisfied in getting the help as soon as wanted.

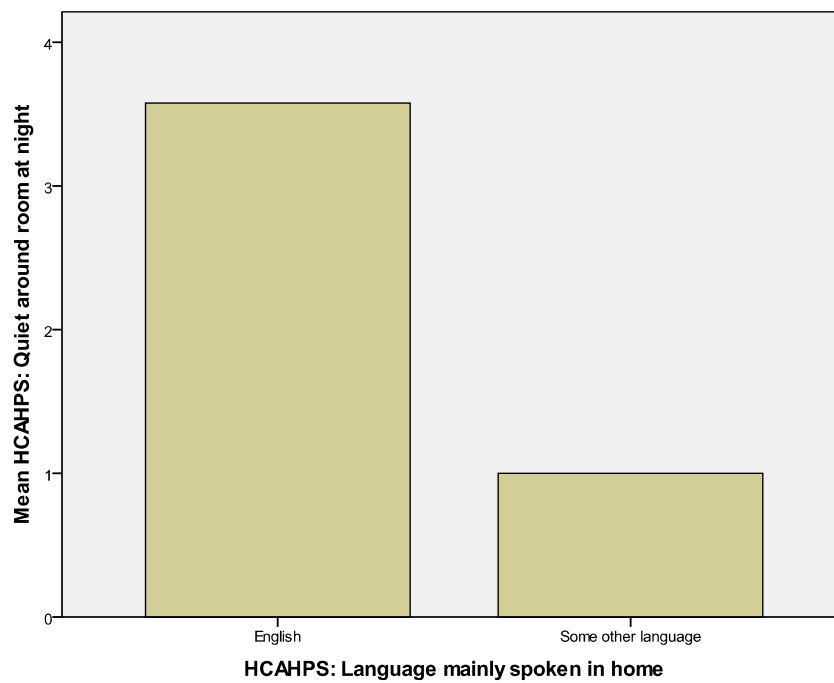


Figure 5-2 Plot of Language Effects on Question 9

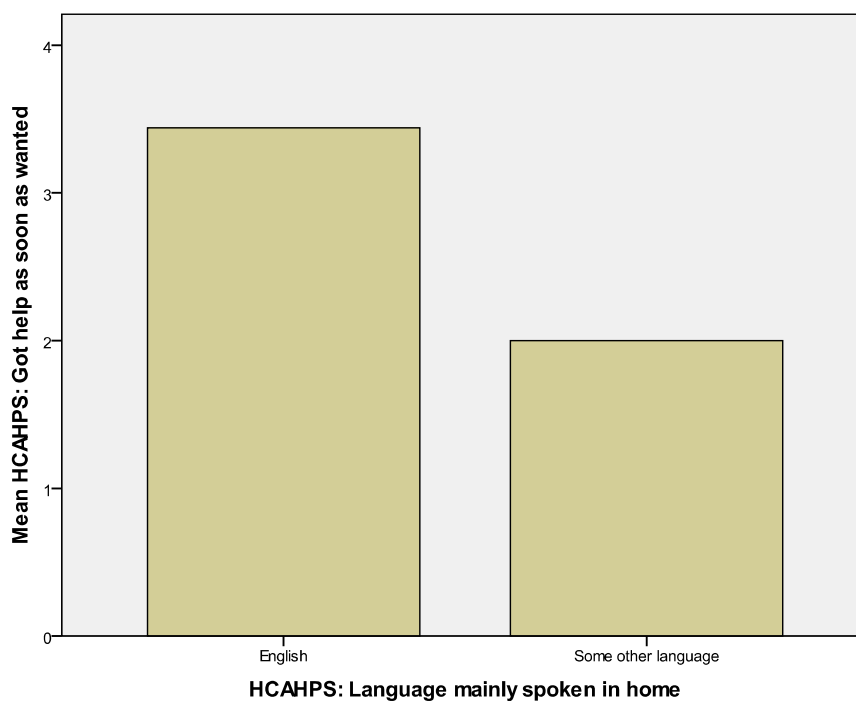
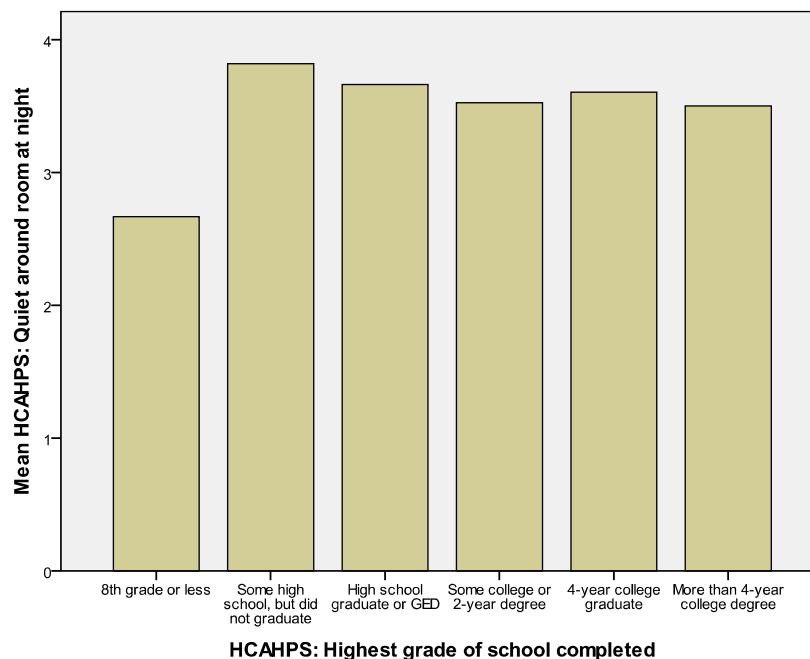


Figure 5-3 Plot of Language Effects on Question 4



**Figure 5-4 Plot of Highest grade of school completed Effects on Question 9**

Question 9 (shown in Figure 5-4) was statistically significant with the highest grade of school completed by patients. From the Tukey test result revealed that there was no significant difference in question 9 for the five different levels of school completed.

Question 33 (shown in Figure 5-5) “Did you have confidence and trust in the nurses treating you?” was statistically significant with the highest grade of school completed by patients. The Tukey test result found that there was a significant difference between High school graduate and 4-year college graduate.

Question 37 (shown in Figure 5-6) “Did your family have enough opportunity to talk to your doctor?” was significant with the highest grade of school completed by patients. The Tukey test result shows that there was a significant difference between High school graduate and 4-year college graduate.

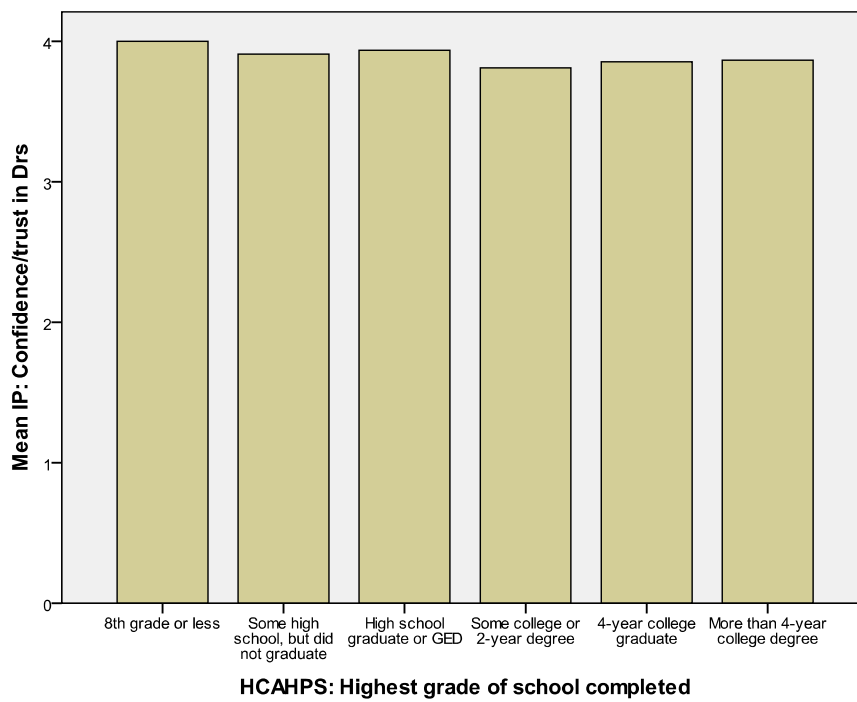
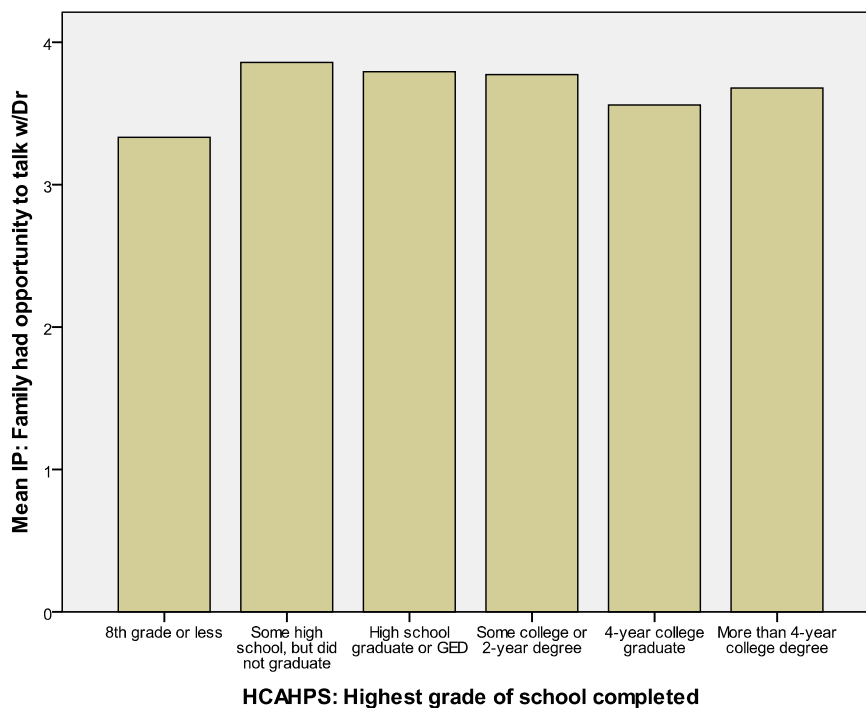


Figure 5-5 Plot of Highest grade of school completed Effects on Question 33





**Figure 5-6 Plot of Highest grade of school completed Effects on Question 37**

### Employees

A total of 302 employees were responded for the survey. Sixty-seven employees (22.2%) were working in the organization for less than 1 year, while 49.7% of them were working for 1 to 2 years. For the question “Do you have management or supervisory responsibilities in this organization”, 72.2 % of the employees responded “No” and 27.5% of them responded “Yes”. Table 5-4 shows the distribution of characteristic of respondents.

**Table 5-4 Characteristic of the Subjects (employees)**

	Variables	Frequency	Percentage (%)
<b>Worked in the Organization</b>	Less than 1 year	67	22.2
	1 to 2 years	150	49.7
	3 to 5 years	61	20.2

	More than 5 years	22	7.3
<b>Management Responsibilities</b>	Yes	83	27.5
	No	218	72.2

The Analysis of Variance (ANOVA) was performed on the responses of the survey against the two categorical variables: “Management Responsibilities and number of years worked in the organization”. Table 5-5 shows the ANOVA summary. The table shows the questions which were significant under the given categorical variable.

**Table 5-5 ANOVA Summary for employees’ survey**

<b>Management Responsibilities</b>	<b>Years Worked</b>	<b>Years Worked</b>
Q15582	Q15596	Q15582
Q15588	Q22800	Q15588
Q23793	Q26947	Q22796
Q23692	Q19019	Q22793
Q26811	Q26946	Q15557
Q26761	Q23790	Q15579
Q26760	Q23789	Q15581
Q26762	Q23798	Q15552
Q22796	Q26944	Q15606
Q22793	Q23795	Q15574
Q26941	Q22798	Q22794
Q26943	Q23788	Q15568
Q26942	Q23796	Q15587
Q26758	Q15586	Q15555
Q26945	Q15590	Q15580
Q15557	Q15591	Q15562
Q15579	Q23786	Q15601
Q15581	Q23782	Q15599
Q15552	Q23797	Q26947
Q15553	Q23787	Q19019

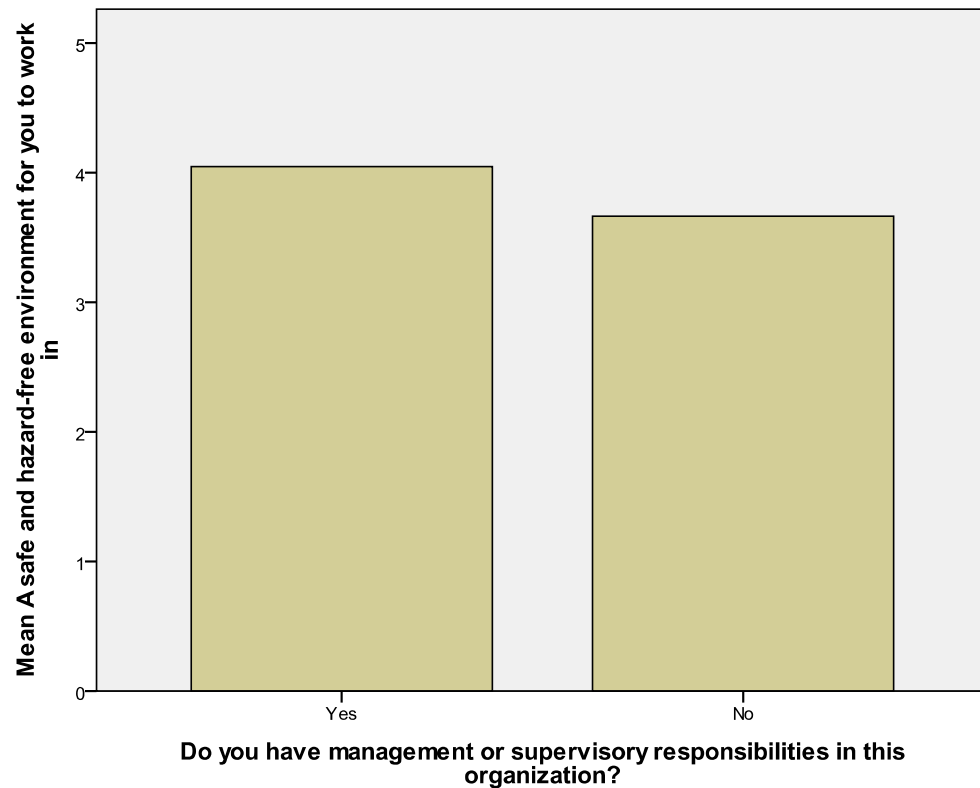
Q15574	Q23794	Q19434
Q26948	Q23792	Q28777
Q22794	Q22801	Q15586
Q26759	Q15566	Q15600
Q15568	Q15551	Q15590
Q15587	Q15567	Q15591
Q15555	Q28778	Q15566
Q15580	Q28776	Q15567
Q15562	Q15589	Q28778
Q15601		Q28776
Q15598		Q26755
Q15599		Q15589

Question15582 (shown in Figure 5-7) “A positive and fun environment to work in” was significant with the categorical variable “employees having management responsibilities or not”. The result shows that the nurses with management responsibilities were more satisfied with the working environment than the nurses who do not have management responsibilities.



**Figure 5-7 Plot of Management Responsibilities Effect on Question 15582**

Question 15588 (shown in Figure 5-8) “A safe and hazard-free environment for you to work in” was significant with the categorical variable “employees having management responsibilities or not”. The result shows that the nurses with management responsibilities were more satisfied with the hospital environment than the nurses who do not have management responsibilities.



**Figure 5-8 Plot of Management Responsibilities Effect on Question 15588**

Question 15557 (shown in Figure 5-9) “Fair and equal treatment by the person you report to or receive daily instruction from” was statistically significant with the years worked in the present position by employees. The Tukey result shows that there was a significant difference between employees worked “Less than 1 year” and “1 to 2 years”.

Question 22796 (shown in Figure 5-10) “ Are you generally satisfied with the training opportunities provided to you?” was statistically significant with the years worked in the present position by employees. From the Tukey test, results revealed that there was no significant difference in question 22796 for the four groups.

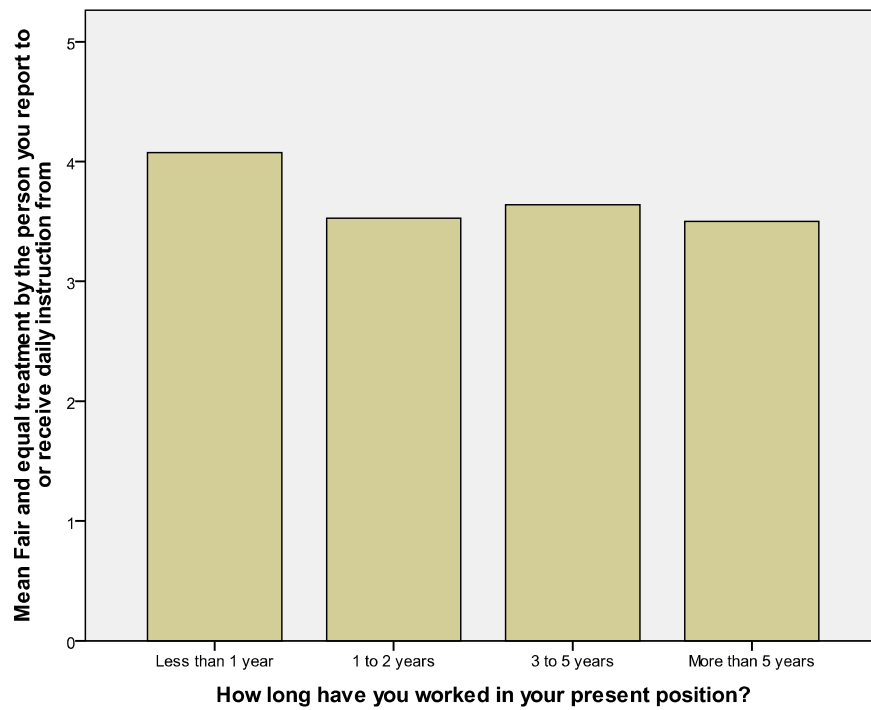


Figure 5-9 Plot of Years Worked Effect on Question 15557

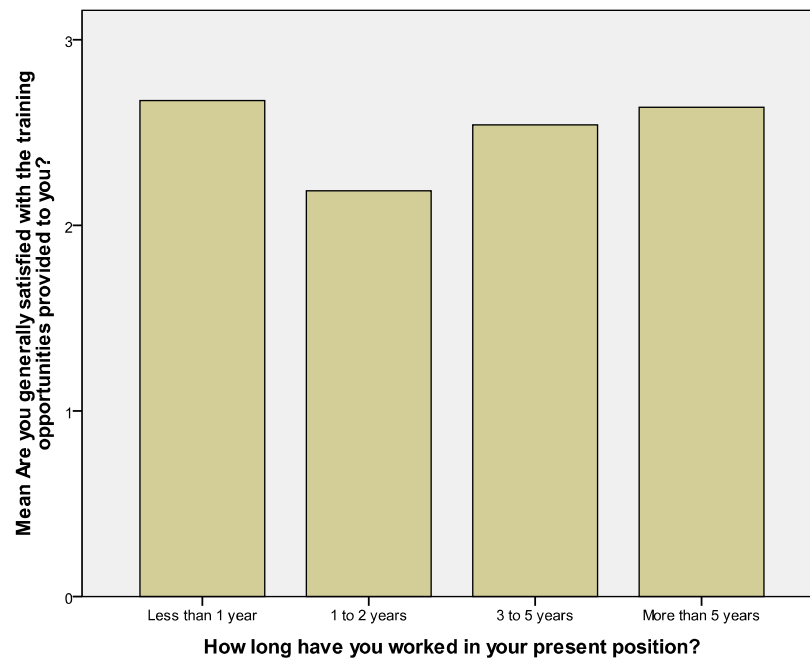


Figure 5-10 Plot of Years Worked Effect on Question 22796

## Physicians

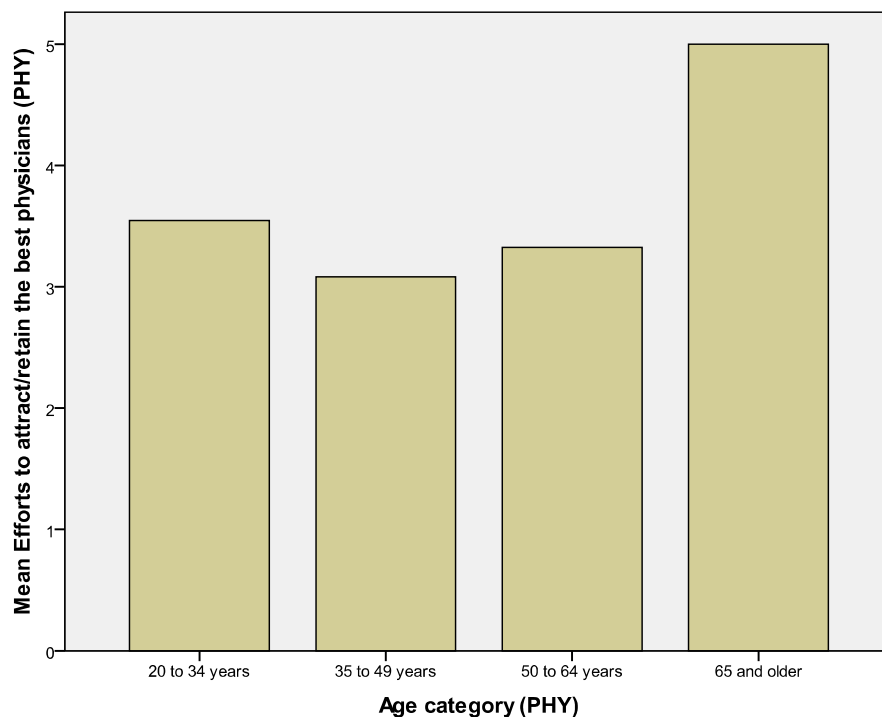
A total of 117 physicians were participated in the survey. Seventy-one (68.9%) of them were male and 31.1% of them were female. According to the survey data, 51 physicians were between ages 35 to 49, and only two physicians were older than 65. Fifty-one physicians (48.6%) of physicians were in practice for longer than 16 years, where only 7.6% of physicians were in practice for less than a year. Table 5-6 shows the distribution of characteristic of respondents.

**Table 5-6 Characteristic of the Subjects (physicians)**

	<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Worked in the Organization</b>	Less than 1 year	13	12.6
	1 to 5 years	33	32.0
	6 to 10 years	19	18.4
	11 to 15 years	10	9.7
	16 or more years	28	27.2
<b>Gender</b>	Female	32	31.1
	Male	71	68.9
<b>Years in Practice</b>	Less than 1 year	8	7.6
	1 to 5 years	17	16.2
	6 to 10 years	14	13.3
	11 to 15 years	15	14.3
	16 or more years	51	48.6
<b>Age</b>	20 to 34 years	11	10.5
	35 to 49 years	51	48.6
	50 to 64 years	41	39.0
	65 and older	2	1.9

The Analysis of Variance (ANOVA) was performed on the questions of the survey against the four categorical variables: years worked in the organization, years in practice, gender and age group of the physicians. The results have shown that age group was significant for questions 15916, 15950, and 15951; furthermore, gender was only significant for question 15906. The other two categorical variables were not significant to all the questions.

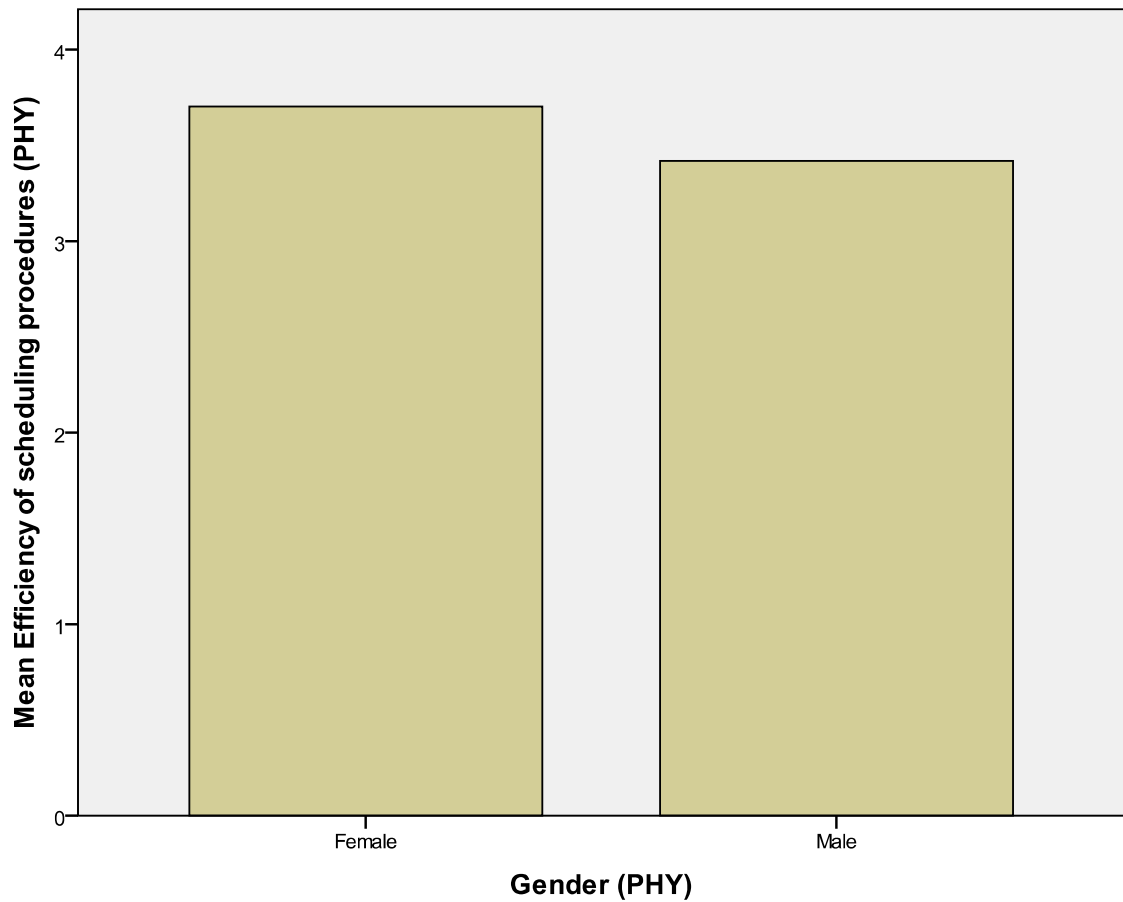
Question 15916 (shown in Figure 5-11) “Efforts to attract/retain the best physicians” was statistically significant with age. The Tukey test results revealed that there was no significant difference in question 15916 for the four age groups.



**Figure 5-11 Plot of Age Effect on Question 15916**



Question 15906 (shown in Figure 5-12) “Efficiency of Scheduling Surgery” was significant with gender. The graph denotes that the female physicians had the maximum satisfaction with the scheduling than the male physicians.



**Figure 5-12 Plot of Gender Effect on Question 15906**

### **5.1.2 Regression Analysis**

#### **Patients**

Two questions from the patients' questionnaire were identified, which potentially determines the outcome of the survey (patient satisfaction). The dependent variables (potential Y's) that measure final outcome were recognized as Overall Rating of Hospital (RH) and Recommending Hospital to others (Recom). Three questions were identified as the categorical variables. The remaining questions were further divided into 7 pre-determined attributes by the regional agency, namely Continuity and Transition (CT), Continuity of Care (CC), Emotional Support (ES), Information and Education (IE), Involvement of Family and Friends (FF), Physical Comfort (PC) and Respect for Patient Preferences (RPP) were considered as the attributes (potential X's) that affect the final outcomes (Y's). Each pre-determined attribute had a set of questions that can describe the attribute. For the analysis, the mean of the responses by a patient to the set of questions corresponding to the respective attribute was considered as the response of the attribute.

The categorical variable "highest grade or school level completed", which has uniform distribution of responses and most significant questions was used to stratify the respondents. The regression analysis was performed using combined, qualitative question attributes as the predictors of the responses to two patient outcomes (dependent variables).

The summary for the output of regression analysis is displayed using Table 5-7. The table consists of dependent variables on left side and predetermined attributes on the top of the table. This table also displays the R-square value for each corresponding model to

estimate the model fit. The table gives an overall view of the attributes about their potential effect on both of the dependent variables.

The table shows that the “Respect for Patient Preferences” is the most significant attribute which affects the dependent variables for all the respondents. The “Physical Comfort” attribute is significantly affecting the dependent variables for the patients with high school degree patients. The patients with “some college”, “more than 4 year college” degree feel that the “Emotional Support” affects the overall rating of the hospital and recommending the hospital to others. The table shows that the Continuity & Transition attribute is the only one that has no impact on the dependent variables.

**Table 5-7 Regression Output on Patients Data**

		Continuity & transition	Continuity of care	Emotional support	Information and Education	Involvement of family and frnds	Physical comfort	Respect for patient preferences	R <sup>2</sup>
high school graduate	Rating Hospital	NS	NS	NS	NS	NS	S	S	0.35
	Recommending	NS	NS	NS	S	NS	NS	S	0.28
some college	Rating Hospital	NS	S	S	NS	NS	S	S	0.69
	Recommending	NS	NS	S	NS	NS	S	S	0.57
4 year college graduate	Rating Hospital	NS	NS	NS	NS	NS	NS	S	0.56
	Recommending	NS	NS	NS	NS	NS	NS	NS	0.37
more than 4 yr college degree	Rating Hospital	NS	S	S	NS	S	NS	S	0.77
	Recommending	NS	NS	S	NS	S	NS	S	0.77

NS - Not Significant S - Significant

The R<sup>2</sup> values shows that the model consisting of responses for more than 4 year college degree was the best fit model among all.

The models for the output of regression analysis with regression coefficients for the patients can be written as:

### **High school graduate**

- $Y_{RH} = 0.189 + 0.7PC + 1.41RPP$
- $Y_{Recom} = 0.9 + 0.29IE + 0.45RPP$

### **Some college**

- $Y_{RH} = -3.3 - 1.075CC + 1.37ES + 1.3PC + 1.41RPP$
- $Y_{Recom} = -0.43 + 0.37ES + 0.29PC + 0.43RPP$

### **4 year college graduate**

- $Y_{RH} = 0.59 + 1.43 RPP$

### **More than 4yr college degree**

- $Y_{RH} = -2.12 - 0.77CC + 2.03 ES + 0.76 FF + 1.32 RPP$
- $Y_{Recom} = -1.42 + 0.67ES + 0.25 FF + 0.81RPP$

### **Physicians**

The physicians' survey consists of two dependent variables that predicts outcome of the survey. These identified variables, Overall Rating of Hospital (RH) and Recommending Hospital to others (Recom) by physicians were considered as dependent variables for the regression analysis. The questions except the categorical variables were further divided into 13 pre-determined attributes namely Communication (CM), Work Practice (WP), Involvement (IN), Leadership (LP), Retention (RN), Teamwork (TW), Respect (RS), Infrastructure (IR), Patient Support (PS), Mission (MN), Hospital Environment (HE), Patient Centered Care (PCC) and Organizational Commitment (OC).

The regression analysis was repeated as same as in the case of patients except considering age and gender as the stratifying categorical variables. The output of the regression analysis is presented in table 5-8.

**Table 5-8 Regression Output on Physicians Data**

		CM	WP	IN	LP	RN	TW	RS	IR	PS	MN	HE	PCC	OC	R <sup>2</sup>
age 35 to 49yrs	overall rate	NS	NS	NS	S	NS	NS	NS	NS	NS	NS	NS	NS	S	0.82
	recomm	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	S	NS	0.72
age50 to 64 yrs	overall rate	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	S	0.80
	recomm	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	S	0.71
female	overall rate	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.80
	recomm	NS	NS	NS	NS	S	S	NS	NS	NS	S	NS	NS	NS	0.80
male	overall rate	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	S	0.74
	recomm	NS	NS	NS	NS	NS	S	NS	NS	NS	NS	NS	NS	S	0.61

NS – Not Significant S- Significant

The table shows that the most of attributes are not significantly affecting the physician outcomes. For both female and male physicians, the teamwork is the main significant factor in recommending the hospital to others. Unlike female physicians, male physicians feel that Organizational Commitment is a key determinant to impact their outcomes.

The models for the output of regression analysis with regression coefficients for the physicians can be written as:

**Age 39 to 45 Years**

$$Y_{RH} = 0.009 + 0.30LP + 0.27OC$$

$$Y_{Recom} = -0.45 + 0.94PCC$$

**Age 50 to 64 Years**

$$Y_{OR} = 0.66 + 0.47OC$$

$$Y_{Recom} = 2.27 + 0.35OC$$

**Female**

$$Y_{Recom} = 3.5 - 0.38RN + 0.28TW + 0.31MN$$

**Male**

$$Y_{RH} = -0.64 + 0.19OC$$

$$Y_{Recom} = 0.26 - 0.27TW + 0.18 OC$$

**Employees**

The employees' survey consists of 97 variables in which two variables that predict the survey outcome, Overall Rating of Hospital (RH) and Recommending Hospital to others (Recom) by employees were considered as dependent variables for the regression analysis. The variables except the categorical variables were further divided into 10 pre-determined attributes namely Communication (CM), Compensation (CP), Work Practice (WP), Teamwork (TW), Respect (RS), Training (TR), Diversity (DY), Hospital Environment (HE), Patient Centered Care (PCC) and Organizational Commitment (OC).

The dependent variables were identified as Overall Rating of Hospital (RH) and Recommending Hospital to others (RE) by employees.

The regression analysis was repeated as same as in the case of patients except for using the time worked in the hospital and their responsibilities in the organization as the stratifying variables. The consolidated output of the regression analysis is presented in table 5-9.

**Table 5-9 Regression Output on Employees Data**

		CM	RS	CP	TW	WP	HE	TR	DY	OC	PCC	R <sup>2</sup>
less than1year	Hosprate	NS	NS	NS	NS	NS	NS	NS	NS	S	NS	0.64
	recomm	NS	NS	NS	S	NS	NS	NS	NS	NS	NS	0.45
1 to 2 yrs	Hosprate	NS	S	NS	NS	S	NS	S	NS	S	S	0.70
	recomm	NS	NS	NS	NS	S	NS	NS	NS	S	S	0.52
3 to 5 yrs	Hosprate	S	NS	NS	S	S	NS	NS	NS	S	NS	0.71
	recomm	NS	NS	NS	NS	NS	NS	NS	NS	S	NS	0.46
management resp	Hosprate	NS	NS	NS	NS	S	S	NS	S	S	NS	0.71
	recomm	NS	NS	NS	NS	NS	NS	NS	NS	S	NS	0.41
no management resp	Hosprate	S	S	NS	NS	S	NS	NS	NS	S	S	0.65
	recomm	NS	NS	NS	NS	NS	NS	NS	NS	S	S	0.47

NS- Not Significant S- Significant

The results show that the Organizational Commitment is the most significant factor that affects the employee outcomes. The responses from the employees with management responsibilities conclude that the patient centered care is not affecting the employees' outcome.

The models for the output of regression analysis with regression coefficients for the employees can be written as:

**Less than 1 Year**

$$Y_{RH} = -0.3 + 0.14OC$$

$$Y_{Recom} = 1.7 + 0.23TW$$

**1 to 2 yrs**

$$Y_{RH} = -1.37 + 0.26RS + 0.29WP - 0.21TR + 0.26OC + 0.56PCC$$

$$Y_{Recom} = -0.56 + 0.23WP + 0.29OC + 0.53PCC$$

**3 to 5 years**

$$Y_{RH} = -0.92 + 0.54CM - 0.26TW + 0.38WP + 0.18OC$$

$$Y_{Recom} = 0.48 + 0.27OC$$

**Management Responsibilities**

$$Y_{RH} = -1.48 + 0.33WP + 0.23HE + 0.27DY + 0.21OC$$

$$Y_{Recom} = 0.78 + 0.28OC$$

**No Management Responsibilities**

$$Y_{RH} = -0.79 + 0.22CM + 0.25RS + 0.27WP + 0.17OC + 0.30PCC$$

$$Y_{Recom} = -0.36 + 0.20PCC + 0.54OC$$



### 5.1.3 Factor Analysis on Data Sets

The above regression analyses were performed by using the attributes that were predetermined by the regional agency. The factor analysis was performed to further reduce the number of variables to few important dimensions and to statistically group the variables. The factor scores matrix to the corresponding variables was generated using the factor loadings and was used for the further regression analysis.

#### Patients

Six factors were extracted using the scree plot, which explains the most variance and the factors which have eigenvalues greater than 1. The interpreting of the factor loadings was done and names were assigned to the factors by close observation of the variables, which were loaded under them. The first five factors were named as Staff and Nurse Interaction (SNI), Doctor Interaction (DI), Interaction with Surgeon (IS), Emergency Assistance (EA), and Pain Medication (PM) and sixth factor as Pat6.

The factor scores are calculated for six factors and regression analysis was performed with the factor scores against the two important patient outcomes (Overall Rating and Recommending Hospital).

**Table 5-10 Regression Output on Patients Factor Scores**

<b>PATIENTS</b>	Staff and nurse interaction	Doctor interaction	Interaction with surgeon	Emergency assistance	Pain medication	Pat6	R <sup>2</sup>
RH	S	S	S	NS	NS	NS	0.59
Recom	S	S	S	NS	S	NS	0.49

NS – Not Significant S - Significant

The consolidated output for regression analysis is shown in the table 5-10. Except Emergency Assistance and sixth factor, all the variables are statistically significant and  $R^2$  value suggests that the both models have better fit.

The models for the output of regression analysis with regression coefficients for the factor scores can be written as:

$$Y_{RH} = -1.39 + 1.71SNI + 0.85DI + 0.43IS$$

$$Y_{Recom} = 0.11 + 0.51SNI + 0.37DI + 0.17IS + 0.1PM$$

### **Physicians**

Eight factors were extracted using the scree plot, which explains the most variance and the factors which have eigenvalues greater than 1. The interpreting of the factor loadings was done and names were assigned to the factors by close observation of the variables, which were significant under them. The factors were named as Infrastructure and Patient Support (IPS), Organizational Commitment (OC), Work Load (WL), Work Practice(WP), Patient Treatment(PT), Experience (EX) and Equipment(EQ). The first factor was not named because of large variation of the variables under it.

The factor scores are calculated for eight factors and regression analysis was performed with the factor scores against the two important physician outcomes (Overall Rating and Recommending Hospital).

**Table 5-11 Regression Output on Physicians Factor Scores**

PHYSICIANS	PHY1	Infrastructure, Patient support	Organizational commitment	Workload	practice	Patient treatment	experience	equipment	R <sup>2</sup>
RH	S	S	S	NS	NS	NS	S	S	0.76
Recom	S	S	S	NS	NS	NS	NS	NS	0.60

NS- Not Significant S- Significant

The consolidated output for regression analysis is shown in the table 5-11. Infrastructure and Patient support, and Organization Commitment attributes were significantly affecting both dependent variables. The Equipment in the hospital was significantly affecting the overall rating of the hospital. The workload, work practice and patient treatment were not significant.

The models for the output of regression analysis with regression coefficients for the factor scores can be written as:

$$Y_{RH} = -0.38 + 0.59PHY1 + 0.4IPS + 0.35OC + 0.09EX + 0.15EQ$$

$$Y_{Recom} = 0.7 + 0.34PHY1 + 0.17IPS + 0.29OC$$

### Employees

Seven factors were extracted using the scree plot, which explains the most variance and the factors which have eigenvalues greater than 1. The interpreting of the factor loadings was done and names were assigned to the factors by close observation of the variables, which were significant under them. The factors were named as Work Practice & Compensation (WPC), Organizational Commitment (OC), Patient Centered Work Load (PC), Environment & Security (ES), Teamwork (TW), Patient Interaction (PI) and Interaction with staff (IS).

The factor scores are calculated for seven factors and regression analysis was performed with the factor scores against the two important employees' outcomes (Overall Rating and Recommending Hospital).

**Table 5-12 Regression Output on Employees Factor Scores**

EMPLOYEES	Work practice & compensation	Patient centered	Organisation	Environment & security	Team work	Patient interaction	Interaction with staff	R <sup>2</sup>
RH	S	S	S	S	S	NS	NS	0.69
Recom	S	S	S	S	S	S	NS	0.51

NS – Not Significant S - Significant

The consolidated output for regression analysis is shown in the table 5-12. The table shows that the “interaction with staff” attribute is the only one that does not significantly affect any of the dependent variable.

The models for the output of regression analysis with regression coefficients for the factor scores can be written as:

$$Y_{RH} = -0.2 + 0.29WPC + 0.39PC + 0.37OC + 0.28ES + 0.21TW$$

$$Y_{Recom} = 0.36 + 0.2WPC + 0.17PC + 0.29OC + 0.12ES + 0.2TW + 0.11PI$$

## 5.2 Model Development

The process quality in a healthcare organization will be determined by the perceptions of patients, physicians, and employees. The product quality will be mainly determined by the patient satisfaction. By assuming the hypothesis that the process quality influences the product quality to be valid, a combined database with all the data sets was created. The combined database will have all the attributes from the physicians, patients, and employees. The outcome variables from the patients' survey will be considered as the dependent variables.

### 5.2.1 Regression Analysis on Combined Raw Database

A common raw database for the analysis was generated by randomly selecting 115 cases from the larger patient and employee data sets and joining it to the physician case data, which was limited to 115 complete cases. This creates a combined data case matrix with 30 predetermined attributes as columns and 115 randomly selected responses as rows. By assuming that the process quality influences product quality, regression analysis was performed using all 30 of the combined qualitative question composites of three surveys as predictors of the two patient dependent variables (RH, Recom).

The analysis yielded process parameters that were significantly affecting the patient outcomes. The attributes: emotional support, physical comfort, patient centered care communication, infrastructure and hospital environment were significantly affecting the patient outcomes. These parameters will be further used in designing a new generic survey for the validation.

The models for the output of regression analysis with regression coefficients for the combined data set can be written as:

$$Y_{RH} = -9.04 + 1.16ES + 0.95PC + 1.95PCC + 0.4HE - 0.44PCC$$

$$Y_{RECOM} = -2.25 + 0.52ES + 0.93PCC - 0.17CM + 0.22IR - 0.21PCC$$

### 5.2.2 Regression Analysis on Factor Scores

The factor scores that were calculated during the factor analysis of the individual data sets were used for forming a combined database. The combined database was generated by randomly selecting 115 cases from the larger patient and employee factor scores data sets and joining it to the physician factor scores data, which was limited to 115 complete cases. This creates a combined factor scores data case matrix with 21 determined attributes as columns and 115 randomly factor scores as rows. By assuming that the process quality influences product quality, regression analysis was performed using all 21 of the combined qualitative question composites of three surveys as predictors of the two patient dependent variables (RH, Recom).

The attributes: physical comfort (pc), staff and nurse interaction (sni), doctor interaction (di), surgeon interaction (si) and infrastructure support (ips) were significantly affecting the patient outcomes.

The models for the output of regression analysis with regression coefficients for the combined data set can be written as:

$$Y_{RH} = 0.39 - 0.22 PC + 1.41 SNI + 0.83DI + 0.69 IS - 0.29 IPS$$

$$Y_{Recom} = 1.04 + 0.44 SNI + 0.25DI + 0.19SI$$

### 5.2.3 Comparison of R-Squares

The R- squares from both the models of Raw Data Analysis and Factor Analysis were compared to find the best fit model among each other. The table 5-13 shows the comparison of R-squares between them.

**Table 5-13 Comparison of R- Squares**

Comparison of R <sup>2</sup>	Raw Data		Factor Analysis	
	RH	<u>recom</u>	RH	<u>Recom</u>
patient	0.59	0.5	0.59	0.49
physician	0.74	0.6	0.76	0.6
Employees	0.68	0.46	0.69	0.51
Random Data Base	0.77	0.65	0.71	0.61

The Comparison table shows that there is no significant difference between the R-squares of the models. This concludes that results from the raw data analyses can be considered in developing a generic survey.’’

#### **5.2.4 Significant Process Parameters from Historical data Analysis**

The results from the analyses of model and the individual analyses of the surveys yielded a number of parameters that will influence the health outcomes. The significant parameters from the historical data analysis that help in validating the hypothesis are listed below:

- Doctor, Nurse and Patient interaction with each other
- Physical Environment and Safety in Hospital
- Emotional support by staff
- Infrastructure and Equipment support in Hospital
- Organizational Commitment of Nurses and Patients
- Work Practice and Work Load
- Teamwork between Nurses
- Teamwork between Nurses and Physicians



### **5.3 Development of Generic Survey**

As most of the surveys that were designed till now did not have a combined survey for patients, physicians and nurses; our main intent is to develop a generic survey that will have a combined patient satisfaction and provider attributes.

The survey questions were developed using the significant parameters that were found out from the historical data analysis. Each significant parameter is taken and all the factors that will help in measuring the corresponding parameter were listed down. The important factors that impact a parameter were designed in the form of questions that will be best-suited for patients, physicians and nurses to respond. The questions were designed in the form of statements. Each question will be measured on five-point Likert-type scales with anchors of 1=strongly disagree, 2= disagree, 3=neutral, 4=agree, and 5=strongly agree.

The final survey consists of three sections. The first section inquires about the category in which respondent will fall among patient, physician and nurse. The second part was composed of the questions that will measure the services rendered at the hospital which include the parameters identified from the historical data analysis. The third section addresses the demographic and general information of the participant.

The regional agency that was mentioned earlier could not provide the platform for the validation. Fortunately, a regional healthcare facility provided us with a platform for the validation. A department in the facility that provides wide range of service to the patients was selected for the validation. Because of this reason, the survey got slightly modified to make it more relevant for this department. The survey went through couple of iterations before it was finalized by the director of Lean Six Sigma & Performance Improvement at

the hospital. The final questionnaire survey that was used for data collection after the approval from the UNL Institutional Research Board (IRB) was attached in Appendix 2.

#### **5.4 Validation of Model**

The director of Lean Six Sigma & Performance Improvement at the hospital explained the survey purpose, the significance, the benefits, and procedure of the study to all the three category of participants. It took approximately 15 minutes to complete the survey. The survey was handed out and collected by oncology department manager personally. The participants for this survey were assured that their responses would be kept confidential. The data was collected from January 2011 to March 2011. The questionnaire was completed anonymous, without the inclusion of any identifying information.

##### **5.4.1 Descriptive Analysis**

A total of 85 respondents were participated in the survey. The data consists of 48 patients, 33 nurses and 4 physicians. Twenty-five (31.3%) of the respondents were males and 68.8% of them were females. Table 5-14 shows the distribution of characteristic of respondents.

The Cronbach's alpha was computed using SAS software and alpha value came out to be 0.8 (>0.7), which concludes that the questionnaire has high reliability.

**Table 5-14 Characteristic of the subjects**

	<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Category</b>	Patients	48	56.5
	Nurses	33	38.8
	Physicians	4	4.7
<b>Race</b>	American Indian	1	1.2
	White	78	96.3
	Hispanic	2	2.5
<b>Language</b>	English	79	97.5
	Spanish	1	1.2
	Other	1	1.2
<b>Gender</b>	Female	55	68.8
	Male	25	31.3

The Analysis of Variance (ANOVA) was performed on the data to test whether the differences existed in the perceptions of respondents between category, gender, race and language spoken at home. Table 5-15 shows the ANOVA summary. All the significant questions are marked “S”.

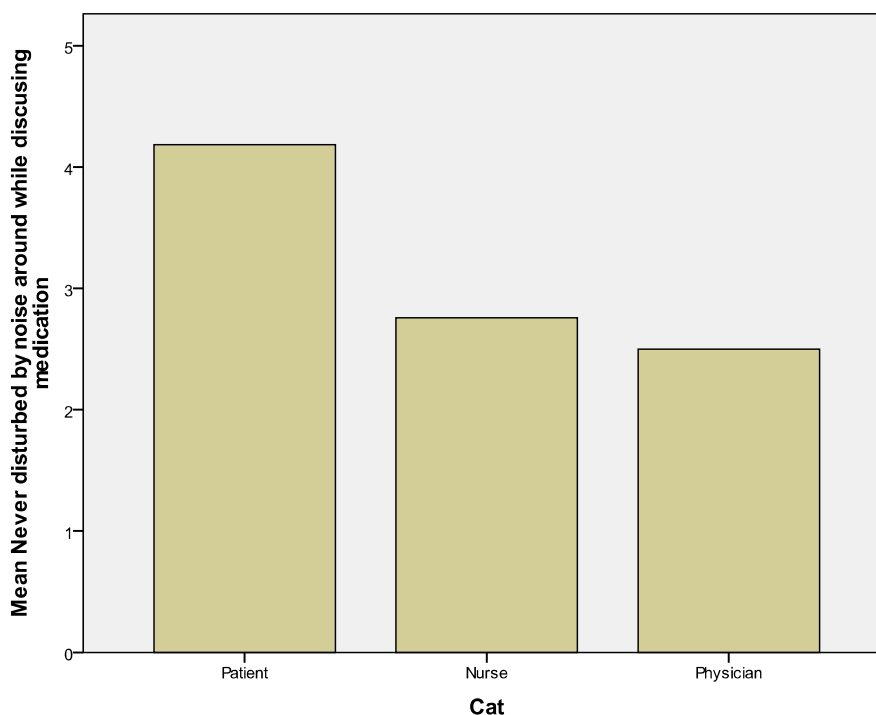
**Table 5-15 ANOVA Summary**

<b>Question</b>	<b>Category</b>	<b>Gender</b>	<b>Race</b>	<b>Language</b>	<b>Question</b>	<b>Category</b>	<b>Gender</b>	<b>Race</b>	<b>Language</b>
a	S				n	S			
b	S				o				
c	S				p	S		S	
d	S				q				
e	S				r	S			
f	S				s				
g	S				t				
h	S				u			S	
i	S				v	S			
j					w	S			
k	S	S			x				
l	S				y				
m	S				z				

It appears that the Gender is significant only for the question 'k' and race is only significant for the questions 'p' and 'u'. Language is significant for the questions d, p, u, and y, while the Category of the respondent is significant for most of the questions.

Question 'a' (shown in Figure 5-13) "never disturbed by the noise around while discussing about medication" was statistically significant with Category of the respondent. The Tukey test result shows that there was significant difference between the responses of patient and nurses. There was also significant difference between the responses of patients and physicians.

Question 'b' (shown in Figure 5-14) "treated each other with courtesy and respect" was significant with Category of the respondent. The Tukey test result shows that there was significant difference between the responses of patients and nurses.



**Figure 5-13 Plot of Category Effect on Question 'a'**

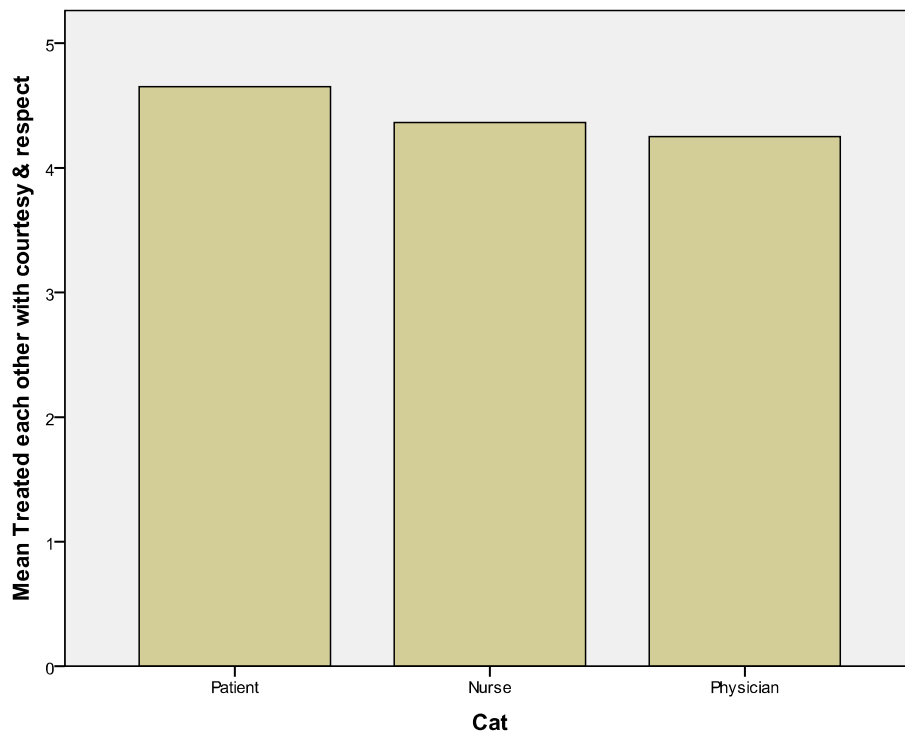


Figure 5-14 Plot of Category Effect on Question 'b'

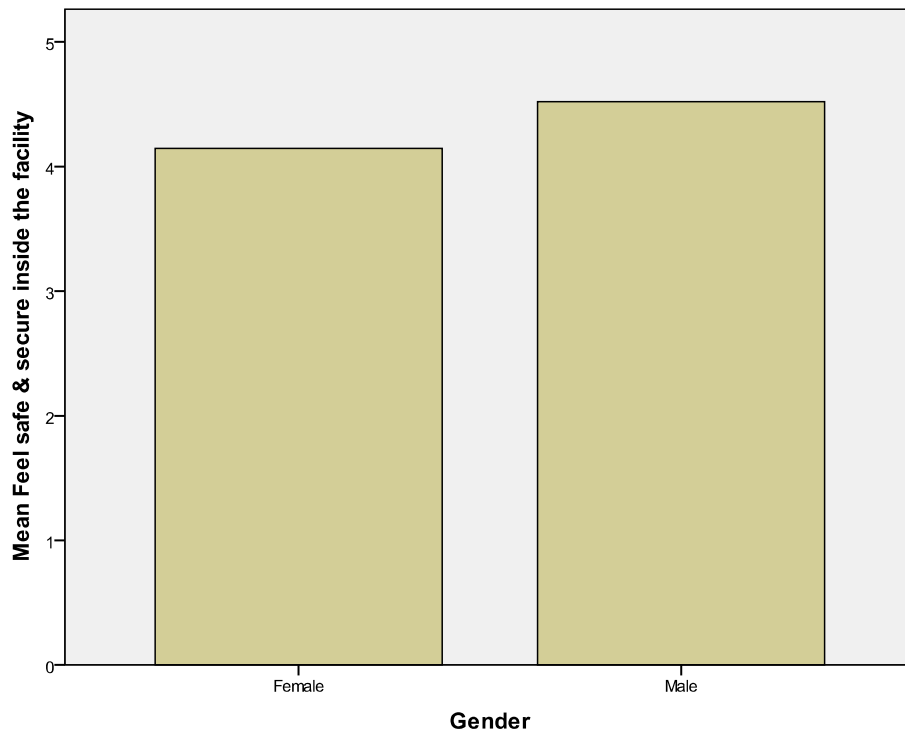
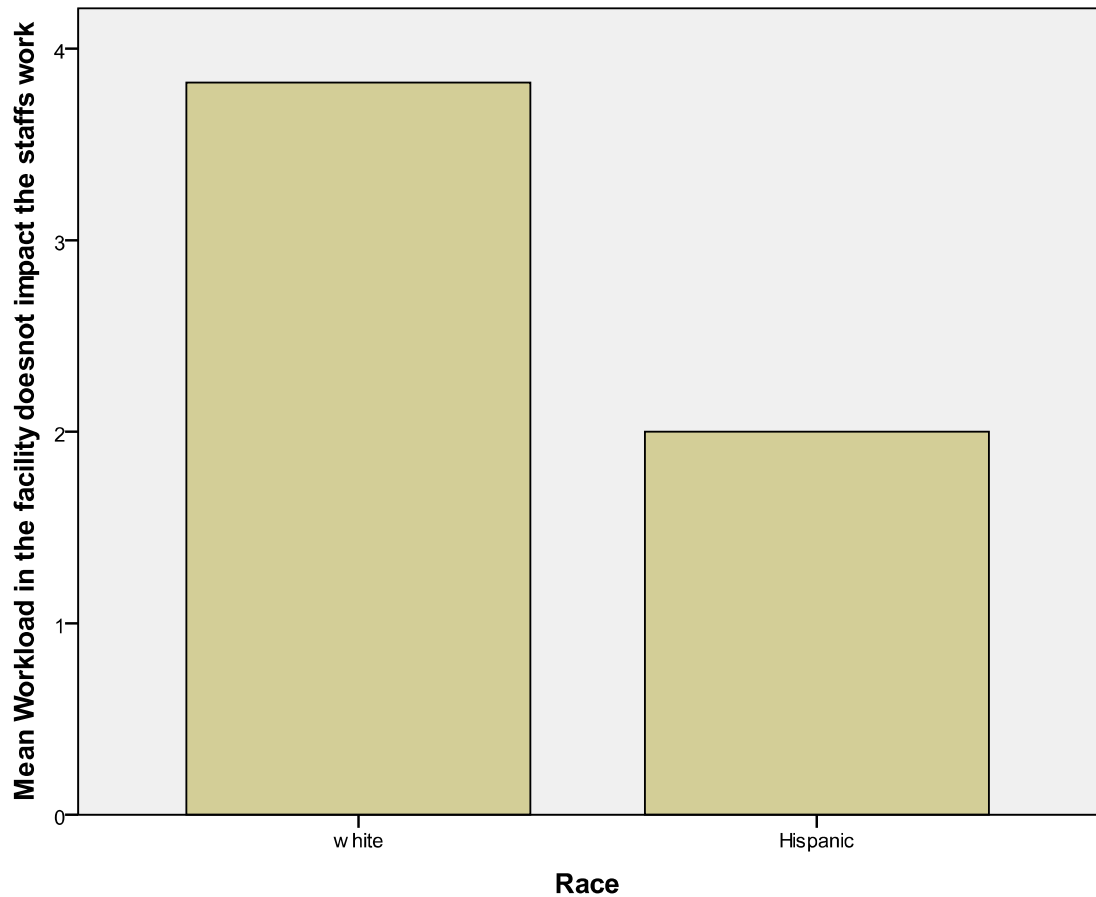


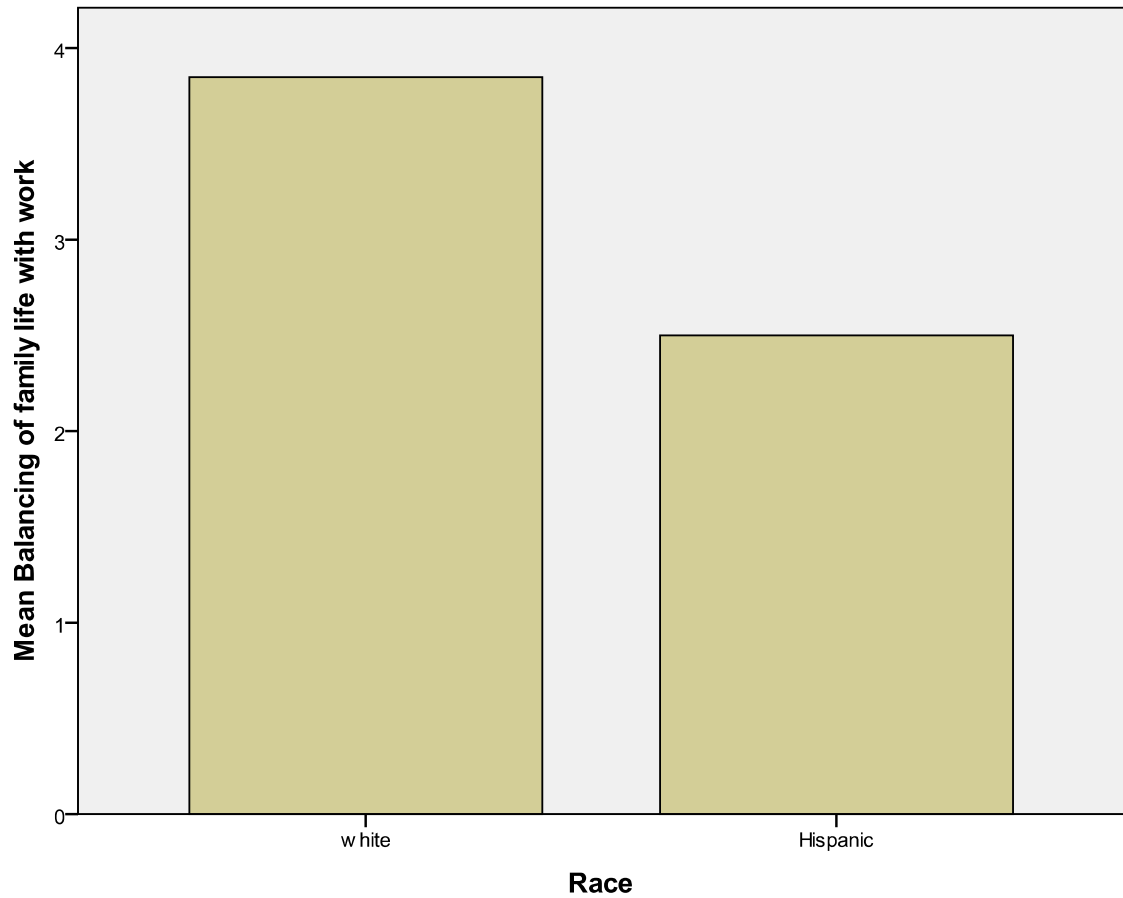
Figure 5-15 Plot of Gender Effect on Question 'k'

Question 'k' (shown in Figure 5-15) "feel safe and secure inside the facility" was significant with the gender. The results show that the females feel less secure and safe inside the facilities as compared to males.

Question 'p' (shown in Figure 5-16) "work load in the Cancer Treatment Center did not adversely impact the staffs work" was significant with the race of the respondent. The graph shows the significant difference between the White and Hispanic respondents.



**Figure 5-16 Plot of Race Effect on Question 'p'**



**Figure 5-17 Plot of Race Effect on Question 'u'**

Question 'u' (shown in Figure 5-17) "The balancing of family life has an impact on the effectiveness of the work" was significant with the race of the respondent. The graph shows there was significant difference between the White and Hispanic respondents.

The ANOVA shows that the category of the respondent is an important variable in determining the patient experiences. As most of the questions were significant with the category variable, it will be even worth to discuss the means of the responses for the non-significant questions. The table 5-16 shows the means for the remaining questions which were not significant.

**Table 5-16 Means of non-significant questions by their category**

Mean for the Question	Category		
	patients	nurses	physicians
Easy to find way around Hospital	3.80	3.55	3.50
Teamwork between nurses and doctors	4.55	4.30	4.50
Flexibility in scheduling work hours	3.67	3.17	2.75
Nurses feel positive and fun place to work	3.92	4.19	4.00
Doctors feel positive and fun place to work	3.88	3.55	4.00
Impact of balancing family life on work	3.77	3.72	4.33
satisfied with pay and benefits	3.27	3.29	2.75
Overall rating for hospital	4.64	4.38	4.75
Recommending hospital to others	4.86	4.79	5.00

The above table shows that the physicians are not satisfied with flexibility in scheduling their own work hours as compared to the nurses. The patients also feel that the nurses and physicians are not completely satisfied. The table shows that the physicians are also not satisfied with their pay and benefits as compared to the nurses. The mean of the responses from the patients also shows that the physicians and nurses are not completely satisfied with their pay and benefits.



### 5.4.2 Regression Analysis using Raw Data

In the total of 26 questions, two questions ‘y’ and ‘z’ which represents “overall rating of hospital (HR)” and “recommending hospital to others (Recom)” respectively were considered as the dependent variables.

The linear regression analysis was performed using the two dependent variables against each of the remaining 24 questions. The significant questions for the corresponding dependent variable were shown in the table 5-16.

**Table 5-17 Significant Questions from Regression Analysis**

<b>Overall Rating of Hospital (RH)</b>	<b>R<sup>2</sup></b>	<b>Recommending Hospital to others (Recom)</b>	<b>R<sup>2</sup></b>
Treated each other with courtesy and respect (b)	0.37	Treated each other with courtesy and respect (b)	0.17
		Nurses and doctors have complete flexibility in scheduling their own work hours (q)	0.33
		Doctors feel the Cancer Treatment Center is a positive and fun place to work (t)	0.21
		Balancing of family life has an impact on the effectiveness of the work (u)	0.33

The models for the output of regression analysis with regression coefficients can be written as:

$$Y_{RH} = 0.5 + 0.8b$$

$$Y_{Recom} = 3.2 + 0.3b$$

$$Y_{Recom} = 3.9 + 0.2q$$

$$Y_{Recom} = 4.0 + 0.2 t$$

$$Y_{\text{Recom}} = 3.8 + 0.2u$$

The results show that the health outcomes can be enhanced by improving the significant process parameters that were mentioned in the table 5-16. Six Sigma methodology will be used to improve the process parameters.

Multiple linear regression analysis was also performed using two questions ‘y’ and ‘z’ which represents “overall rating of hospital (HR)” and “recommending hospital to others (Recom)” respectively as dependent variables and remaining 24 questions as influencing factors. The regression analysis with dependent variable as “overall rating of hospital (HR)” resulted with no parameter significantly affecting it. The  $R^2$  for the model is 0.3.

The results for the multiple regression analysis with dependent variable “recommending hospital to others (Recom)” shows that the parameter “feels safe and secure inside the facility” is significantly affecting it. The  $R^2$  value for the model is 0.3, which indicates 30% of the variation in the dependent variable is predicted by the independent variables.

The model for the output of regression analysis with regression coefficients can be written as:

$$Y_{\text{HR}} = 1.5 - 0.08a + 0.26b - 0.09c + 0.04d - 0.04e + 0.08f - 1.31g + 0.25h + 0.09i - \\ 0.01j + 0.19k + 0.06l + 0.02m - 0.04n - 0.02o - 0.02p - \\ 0.17q + 0.05r + 0.22s + 0.03t + 0.09u + 0.12v - 0.09w - 0.11x$$

$$Y_{\text{Recom}} = 3.8 - 0.05a + 0.25b - 0.1c + 0.07d + 0.01e - 0.34f + 0.02g + 0.08h - 0.11i - 0.03j + 0.44k - \\ 0.07l + 0.01m + 0.05n - 0.09o - 0.06p + 0.19q - 0.09r - 0.13s + 0.14t + 0.2u - 0.16v + 0.17w - \\ 0.1x$$

### 5.4.3 Regression Analysis using attributes

For the further analysis, the questions were divided into nine attributes as shown in the table 5-16. Each attribute consists of a group of questions that will define it. The final health outcomes are considered as questions ‘y’ and ‘z’ which represents “overall rating of hospital (HR)” and “recommending hospital to others (Recom)” respectively.

The regression analysis was performed on the data with all the attributes against the outcomes (HR and Recom). The responses for an attribute will be yielded by the mean of the responses for the corresponding questions.

**Table 5-18 Classification of Questions into Attributes**

Attributes	Corresponding Questions
Interaction between physicians, nurses and physicians(I)	a, b, c, d, e, f, g
Adequate Medication(A)	h
Hospital Environment (H)	i, j, k
Availability of Equipment(E)	l, m
Teamwork between nurses and physicians(T)	n, o
Work practice(W)	p, s, t, u
Flexibility in Scheduling hours(F)	q, r
Training for nurses and physicians(TR)	v, w
Satisfied with Benefits(S)	x

The results have shown that the “Overall rating of the hospital” is not affected by any of the process parameters. “Adequate Medication” was the only process parameter that is affecting the health outcome variable “Recommending of hospital to others”.

The model for the output of regression analysis with regression coefficients can be written as:

$$Y_{\text{Recom}} = 4.5 + 0.2A$$

The regression equation can be interpreted as that the health outcome will increase by 0.4 when the A (adequate medication) goes up by one. The further step will be to improve the significant process parameter to enhance the health outcome by using Six Sigma (as mentioned in the earlier chapter).

## Chapter - 6

### DISCUSSIONS AND CONCLUSIONS

This chapter further discusses the results from the previous chapter. Based on these discussions, this chapter summarizes the study, provides the conclusions of this research. Finally, it addresses the issues of limitation and future research.

#### 6.1 Summary of Results

This study results in a generic survey for the patients, physicians, and nurses. The survey was developed by using the outputs of the historical data analysis. The survey provides patients, physicians, and nurses perspectives on satisfaction with health care services offered by the facility.

The ANOVA and Regression analysis results obtained from analyzing the generic survey data are listed as follows:

- The ANOVA results showed that the gender is significant only for the question 'k' and race is only significant for the questions 'p' and 'u'. Language is significant for the questions 'd', 'p', 'u', and 'y', while the Category of the respondent is significant for all the questions except 'j', 'o', 'k', 's', 't', 'u', 'x', 'y' and 'z'.
- The means plot identified that the female respondents feel less secure and safe inside the facility than male respondents.

- The study also determined that the nurses and physicians were more disturbed by the noise around them while discussing about medication than the patients.
- The means plot have also shown that the balancing of family life for the whites has more impact on the effectiveness of their work as compared to Hispanics.

From the linear regression analysis, treating each other with courtesy & respect is the factor that is significantly affecting the overall rating of the hospital. Recommending the hospital to others by the respondents was significantly affected by the variables: treating each other with courtesy and respect, flexibility of scheduling, balancing of family life and work, and facility as fun & positive place to work to physicians. The multiple regression analysis on the raw data has shown that the hospital security is significantly affecting the dependent variable: Recommending hospital to others. The multiple regression analysis using the attributes as the predictor variables have shown that the adequate medication provided by the providers is significantly affecting the dependent variable: Recommending hospital to others. Overall health outcomes can be predicted by the seven models that were mentioned in chapters 5.4.2 and 5.4.3. Moreover, the variables 'b', 'q' 'k' and 'u' had the highest coefficients which are at 0.001 level. It points out that these dimensions contribute the most to the variation in health outcomes.

## **6.2 Overall Discussion**

The objectives for this study as follows:

1. To analyze historical data both on patient satisfaction and on provider attributes to yield process parameters for a particular area in a hospital

This study consists of three different surveys one each for patients, physicians and employees. The three surveys were analyzed using ANOVA and regression analysis for determining the significant parameters that were affecting the health outcomes from their respective surveys. Further ANOVA and regression analysis were performed on the factor scores of the variables that were generated by the factor analysis.

2. To demonstrate the concept that “Process quality influences product quality” in health care domains.

Initially the concept is demonstrated by model formation using the raw and factor scores data. The model using three data sets was generated by randomly selecting 115 cases from the larger patient and employee data sets and randomly joining to the physician case data, which was limited to 115 complete cases. Multiple regression was performed using all 30 of the combined qualitative question composites as predictors of the 2 patient dependent variables. Regression was repeated using the 21 combined quantitative composites derived from each of the 3 data sets independently via dimension reduction by factor analysis. These analyses identified several potential 'key drivers' for the patient satisfaction. By using these key dimensions, a generic survey is designed for the patients, physicians and nurses. Using this survey and partnering with a health care facility, a preliminary analysis was done to validate the concept.

3. To identify the significant process parameters and use Six Sigma methodology to improve them to improve quality of outcomes.

The generic survey was used to collect the responses in a particular department at a health care facility. After calculating the Cronbach's alpha for testing the reliability of the survey, linear Modeling Analyses will be performed (both ANOVA and regression) for identifying the potential process parameters that affects the health outcomes. The identified process parameters can be improved using Six Sigma approach as proposed in the chapter 4.

### **6.3 Conclusions/Recommendations**

The significant process parameters that were identified from the generic survey analysis can be improved using the Six Sigma methodology as demonstrated in the previous chapter to improve the health outcome. The general steps that can be taken to improve the process parameters were given below:

- The measures should be taken to improve the security and safety inside the facility.
- The nurses and doctors should be provided with training for better interaction with the patients.
- The place around the consultation should be kept quiet.
- The nurses and doctors should be given more flexibility in scheduling their work hours.
- Wellness programs should be conducted frequently in the facility to make it a fun and positive place to work.
- The classes should be conducted for nurses and doctors to better balance their family life with the work.



#### **6.4 Research Limitations**

The demonstrating and validating of the model was done with a few limitations. The primary limitation is the inability to generalize the findings of this study. There were few potential issues by missing values in responses and even small sample size created ambiguity in the satisfaction level of the respondents. The study lacked some scientific consistency in the sense that the statistical assumption was not strictly followed while demonstrating the model. Another important limitation of this study is that due to change of platform, all the yielded influence factors from historical data analysis were not included in the final survey.

#### **6.5 Future Research**

The validation of the survey tool can be done by administering the same survey at the same department after six months of implementing Six Sigma. The survey can be used at other areas of the hospital and to expand the demonstration to others hospitals as well.

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## Appendix 1

## Survey for Patients



OMB# 0938-0981

### SURVEY INSTRUCTIONS

You should only fill out this survey if you were the patient during the hospital stay named in the cover letter. Do not fill out this survey if you were not the patient. Answer all the questions by checking the box to the left of your answer.

Questions 1-22 and the "About You" section on this survey are part of a national initiative sponsored by the United States Department of Health and Human Services to measure the quality of care in hospitals. Your participation is voluntary and will not affect your health benefits. **You may notice a number on the survey. This number is ONLY used to let us know if you returned your survey so we don't have to send you reminders.**

You are sometimes told to skip over some questions in this survey. When this happens you will see an arrow with a note that tells you what question to answer next, like this:

- Yes  
 No → If No, Go to Question 1

Please answer the questions in this survey about your stay at the hospital named on the cover. Do not include any other hospital stay in your answers.

#### YOUR CARE FROM NURSES

1. During this hospital stay, how often did nurses treat you with courtesy and respect?<sup>18876</sup>
  - 1 Never
  - 2 Sometimes
  - 3 Usually
  - 4 Always
2. During this hospital stay, how often did nurses listen carefully to you?<sup>18878</sup>
  - 1 Never
  - 2 Sometimes
  - 3 Usually
  - 4 Always
3. During this hospital stay, how often did nurses explain things in a way you could understand?<sup>18879</sup>
  - 1 Never
  - 2 Sometimes
  - 3 Usually
  - 4 Always

4. During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?<sup>18882</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always
- 89 I never pressed the call button

#### YOUR CARE FROM DOCTORS

5. During this hospital stay, how often did doctors treat you with courtesy and respect?<sup>18875</sup>
  - 1 Never
  - 2 Sometimes
  - 3 Usually
  - 4 Always
6. During this hospital stay, how often did doctors listen carefully to you?<sup>18877</sup>
  - 1 Never
  - 2 Sometimes
  - 3 Usually
  - 4 Always



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7. During this hospital stay, how often did doctors **explain things** in a way you could understand?<sup>18884</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

#### THE HOSPITAL ENVIRONMENT

8. During this hospital stay, how often were your room and bathroom kept clean?<sup>18888</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

9. During this hospital stay, how often was the area around your room quiet at night?<sup>18889</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

#### YOUR EXPERIENCES IN THIS HOSPITAL

10. During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan?<sup>18894</sup>

- ① Yes
- ② No → Go to Question 12

11. How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?<sup>18896</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

12. During this hospital stay, did you need medicine for pain?<sup>18907</sup>

- ① Yes
- ② No → Go to Question 15

13. During this hospital stay, how often was your pain well controlled?<sup>18910</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

14. During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?<sup>18911</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

15. During this hospital stay, were you given any medicine that you had not taken before?<sup>18916</sup>

- ① Yes
- ② No → Go to Question 18

16. Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?<sup>22560</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

17. Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?<sup>22547</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always

#### WHEN YOU LEFT THE HOSPITAL

18. After you left the hospital, did you go directly to your own home, to someone else's home, or to another health facility?<sup>18929</sup>

- ① Own home
- ② Someone else's home
- ③ Another health facility → Go to Question 21



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19. During this hospital stay, did doctors, nurses, or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?<sup>18935</sup>

- Yes  
 No

20. During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?<sup>18937</sup>

- Yes  
 No

#### OVERALL RATING OF HOSPITAL

Please answer the following questions about your stay at the hospital named on the cover. Do not include any other hospital stays in your answer.

21. Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?<sup>18941</sup>

- 0 Worst hospital possible  
 1  
 2  
 3  
 4  
 5  
 6  
 7  
 8  
 9  
 10 Best hospital possible

22. Would you recommend this hospital to your friends and family?<sup>18943</sup>

- Definitely no  
 Probably no  
 Probably yes  
 Definitely yes

#### MORE QUESTIONS ABOUT YOUR STAY AT THE HOSPITAL

The next set of questions will give us more detailed information about how we can improve the care and treatment we provide.

23. Was your hospital stay an emergency or planned in advance?<sup>8086</sup>

- Emergency  
 Planned in advance → Go to Question 26

24. How organized was the care you received in the emergency room?<sup>21801</sup>

- Not at all organized  
 Somewhat organized  
 Very organized  
 Completely organized

25. While you were in the emergency room, did you get enough information about your medical condition and treatment?<sup>21802</sup>

- Not at all  
 Somewhat  
 For the most part  
 Definitely

26. How organized was the admission process?<sup>21803</sup>

- Not at all organized  
 Somewhat organized  
 Very organized  
 Completely organized

27. If you had to wait to go to your room, did someone from the hospital explain the reason for the delay?<sup>225</sup>

- Not at all  
 Somewhat  
 For the most part  
 Definitely  
 Did not have to wait



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HOSPITAL STAFF
----------------

28. Was there one particular doctor in charge of your care in the hospital?<sup>21806</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

29. If you had any anxieties or fears about your condition or treatment, did a doctor discuss them with you?<sup>21808</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always
- 5 Did not have anxieties or fears

30. Did you have confidence and trust in the doctors treating you?<sup>21809</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

31. Did doctors talk in front of you as if you weren't there?<sup>21810</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

32. If you had any anxieties or fears about your condition or treatment, did a nurse discuss them with you?<sup>21814</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always
- 5 Did not have anxieties or fears

33. Did you have confidence and trust in the nurses treating you?<sup>21815</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

34. Did nurses ask your name, check your ID band, or otherwise confirm who you were before giving you any medications, treatments, or tests?<sup>22576</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

35. Sometimes in the hospital, one doctor or nurse will say one thing and another will say something quite different. Did this happen to you?<sup>21822</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

36. Did you have enough say about your treatment?<sup>21823</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always

37. Did your family or someone else close to you have enough opportunity to talk to your doctor?<sup>21824</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always
- 5 No family or friends involved
- 6 Family did not want or need information

38. Was the right amount of information about your condition or treatment given to your family or someone close to you?<sup>21825</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always
- 5 No family or friends involved
- 6 Family did not want or need information

39. Was it easy for you to find someone on the hospital staff to talk to about your concerns?<sup>21826</sup>

- 1 Never
- 2 Sometimes
- 3 Usually
- 4 Always
- 5 Did not want or need to talk



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**40. Were your scheduled tests and procedures performed on time?**<sup>21829</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always
- ⑤ Did not have tests or procedures

**41. Did family members or someone close to you ever have to do something or say something to staff to be sure that your medical needs were met?**<sup>21833</sup>

- ① Never
- ② Sometimes
- ③ Usually
- ④ Always
- ⑤ Do not know
- ⑥ Did not have family members or others close to me present

**SURGERY**

**42. Did you have surgery in the hospital?**<sup>8201</sup>

- ① Yes
- ② No → Go to Question 47
- ③ Not sure → Go to Question 47

**43. Did the surgeon explain the risks and benefits of the surgery in a way you could understand?**<sup>21837</sup>

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely
- ⑤ Explained to spouse or someone else
- ⑥ I did not want anything explained

**44. Did the surgeon or any of your other doctors answer your questions about the surgery in a way you could understand?**<sup>21838</sup>

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely
- ⑤ Did not have questions

**45. Did doctors or nurses tell you accurately how you would feel after surgery?**<sup>21839</sup>

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely

**46. Were the results of the surgery explained in a way you could understand?**<sup>21840</sup>

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely
- ⑤ Explained to spouse or someone else

**GOING HOME**

**47. Did someone on the hospital staff explain the purpose of the medicines you were to take at home in a way you could understand?**<sup>21841</sup>

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely
- ⑤ Did not need explanation
- ⑥ No medicines at home

**48. Did they tell you what danger signals about your illness or operation to watch for after you went home?**

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely

**49. Did they tell you when you could resume your usual activities, such as when to go back to work or drive a car?**<sup>21844</sup>

- ① Not at all
- ② Somewhat
- ③ For the most part
- ④ Definitely



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50. Did the doctors and nurses give your family or someone close to you all the information they needed to help you recover?<sup>21845</sup>

- 1 Not at all
- 2 Somewhat
- 3 For the most part
- 4 Definitely
- 5 No family or friends involved
- 6 Family did not want or need information

#### ABOUT YOU

There are only a few remaining items left.

51. In general, how would you rate your overall health?<sup>1894</sup>

- 1 Excellent
- 2 Very Good
- 3 Good
- 4 Fair
- 5 Poor

52. What is the highest grade or level of school that you have completed?<sup>18949</sup>

- 1 8th grade or less
- 2 Some high school, but did not graduate
- 3 High school graduate or GED
- 4 Some college or 2-year degree
- 5 4-year college graduate
- 6 More than 4-year college degree

53. Are you of Spanish, Hispanic or Latino origin or descent?<sup>25541</sup>

- 1 No, not Spanish/Hispanic/Latino
- 2 Yes, Puerto Rican
- 3 Yes, Mexican, Mexican-American, Chicano
- 4 Yes, Cuban
- 5 Yes, other Spanish/Hispanic/Latino

54. What is your race? Please choose one or more.<sup>23296</sup>

- 1 White
- 2 Black or African American
- 3 Asian
- 4 Native Hawaiian or other Pacific Islander
- 5 American Indian or Alaska Native

55. What language do you mainly speak at home?<sup>18952</sup>

- 1 English
- 2 Spanish
- 3 Some other language (please print):

## Survey for Physicians

### IMPROVING YOUR PRACTICE ENVIRONMENT

#### Section 1: How do you rate your organization?

Please rate your organization on the following items by filling in the oval that corresponds to your answer choice.

<b>1. COMMUNICATION</b> <sup>1179</sup>						
a. Open and honest communication from Senior Management <sup>15901</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥
b. How well the hospital communicates information to you <sup>15902</sup>	①	②	③	④	⑤	⑥
c. Open and honest communication in your unit/team <sup>15903</sup>	①	②	③	④	⑤	⑥
<b>2. WORKLOAD AND PRACTICE ISSUES</b> <sup>1202</sup>						
a. Reasonable workload <sup>15904</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥
b. Balance of family life with work <sup>15905</sup>	①	②	③	④	⑤	⑥
c. Efficiency in scheduling diagnostic and treatment procedures <sup>15910</sup>	①	②	③	④	⑤	⑥
d. Efficiency in scheduling surgery <sup>15906</sup>	①	②	③	④	⑤	⑥
e. Ease of access to medical records <sup>15907</sup>	①	②	③	④	⑤	⑥
f. Control over your practice environment <sup>15908</sup>	①	②	③	④	⑤	⑥
g. Adequate time for research and teaching <sup>15909</sup>	①	②	③	④	⑤	⑥
<b>3. PHYSICIAN INVOLVEMENT IN THE HOSPITAL</b> <sup>1203</sup>						
a. Management's interest in your ideas and programs <sup>15911</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥
b. Physician involvement in management and strategic planning <sup>15912</sup>	①	②	③	④	⑤	⑥
<b>4. LEADERSHIP</b> <sup>1204</sup>						
a. Quality of Medical Leadership <sup>15913</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥
b. Quality of Administrative Leadership <sup>15914</sup>	①	②	③	④	⑤	⑥
c. Commitment of Leadership to improving the workplace <sup>15915</sup>	①	②	③	④	⑤	⑥
<b>5. RETENTION</b> <sup>1205</sup>						
a. Hospital's efforts to attract and retain the best physicians <sup>15916</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥
b. Hospital's efforts to attract and retain the best staff <sup>15917</sup>	①	②	③	④	⑤	⑥
<b>6. REMUNERATION</b> <sup>1206</sup>						
a. Transparency of your remuneration process <sup>15918</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥
b. Amount of remuneration <sup>15919</sup>	①	②	③	④	⑤	⑥
<b>7. TEAMWORK</b> <sup>1183</sup>						
a. Teamwork between physicians and staff <sup>15920</sup>	Poor ①	Fair ②	Good ③	Very Good ④	Excellent ⑤	Not Applicable ⑥



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8. <b>RESPECT</b> <sup>1180</sup>	Poor	Fair	Good	Very Good	Excellent	Not Applicable
a. Respect and support from your medical leadership <sup>15921</sup>	①	②	③	④	⑤	⑥
b. Freedom and support to improve quality of care <sup>15922</sup>	①	②	③	④	⑤	⑥
c. Respectful environment and code of conduct in your unit/team <sup>15923</sup>	①	②	③	④	⑤	⑥
9. <b>SUPPORT INFRASTRUCTURE</b> <sup>1207</sup>	Poor	Fair	Good	Very Good	Excellent	Not Applicable
a. Quality of information systems and support <sup>15924</sup>	①	②	③	④	⑤	⑥
b. Process for space allocation <sup>15925</sup>	①	②	③	④	⑤	⑥
c. Up-to-date equipment <sup>15926</sup>	①	②	③	④	⑤	⑥
d. Support from other physicians <sup>15927</sup>	①	②	③	④	⑤	⑥
e. Quality Nursing support <sup>15928</sup>	①	②	③	④	⑤	⑥
10. <b>PATIENT SUPPORT</b> <sup>1208</sup>	Poor	Fair	Good	Very Good	Excellent	Not Applicable
a. Patients have good access to support services <sup>15929</sup>	①	②	③	④	⑤	⑥
b. Coordination of care after discharge <sup>15930</sup>	①	②	③	④	⑤	⑥
11. <b>MISSION / VISION / VALUES</b> <sup>1209</sup>						Not Applicable
a. The hospital's mission, vision and values support you and your program <sup>15931</sup>	①	②	③	④	⑤	⑥
12. <b>RECOGNITION</b> <sup>1181</sup>	Poor	Fair	Good	Very Good	Excellent	Not Applicable
a. Recognition of teaching/research efforts <sup>15932</sup>	①	②	③	④	⑤	⑥
b. Recognition and support for your role in the hospital <sup>15933</sup>	①	②	③	④	⑤	⑥
c. Support for your career <sup>15934</sup>	①	②	③	④	⑤	⑥
13. <b>TEACHING AND RESEARCH</b> <sup>1210</sup>	Poor	Fair	Good	Very Good	Excellent	Not Applicable
a. Support for research <sup>15937</sup>	①	②	③	④	⑤	⑥
b. Opportunity for teaching <sup>15938</sup>	①	②	③	④	⑤	⑥
c. Support for your academic career <sup>15940</sup>	①	②	③	④	⑤	⑥
14. <b>RESOURCES</b> <sup>1211</sup>						Not Applicable
a. Fair and appropriate distribution of resources for clinical work <sup>15941</sup>	①	②	③	④	⑤	⑥
b. Fair and appropriate distribution of resources for research and teaching <sup>15942</sup>	①	②	③	④	⑤	⑥
15. <b>ENVIRONMENT</b> <sup>1212</sup>	Poor	Fair	Good	Very Good	Excellent	Not Applicable
a. A fun and positive place to work <sup>15943</sup>	①	②	③	④	⑤	⑥

**Section 2: Patient Centered Work Environment**

	Never	Sometimes	Usually	Always	Not applicable
16. Do you believe your work unit provides top quality patient care? <sup>27346</sup>	①	②	③	④	⑤



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- |   | Never | Sometimes | Usually | Always | Not applicable |
|---|-------|-----------|---------|--------|----------------|
| 17. Do you feel that you have the right materials and equipment available to give patients the best treatment for their symptoms or conditions? <sup>27347</sup>                  | ①     | ②         | ③       | ④      | -89            |
| 18. Do you feel that you have enough help from other staff to give patients the best treatment for their symptoms or conditions? <sup>27348</sup>                                 | ①     | ②         | ③       | ④      | -89            |
| 19. Overall, is your work unit well organized to meet the needs of your patients? <sup>27349</sup>  | ①     | ②         | ③       | ④      | -89            |
| 20. Are you able to get timely information about your patients' medical condition, treatment or tests? <sup>27350</sup>   | ①     | ②         | ③       | ④      | -89            |
| 21. Do you have the time you need to talk with your patients to make sure they get the information they want about their medical condition, treatment, or tests? <sup>27351</sup> | ①     | ②         | ③       | ④      | -89            |
| 22. Do you have the time and information to prepare patients for leaving the hospital/program? <sup>27352</sup>   | ①     | ②         | ③       | ④      | -89            |
| 23. How often is communication between your unit/department and other unit/departments about a patient a problem? <sup>27353</sup>  | ①     | ②         | ③       | ④      | -89            |
| 24. Are you able to support and involve family members when requested by the patient? <sup>27354</sup>  | ①     | ②         | ③       | ④      | -89            |
| 25. Are you able to involve patients in decisions about their care? <sup>27355</sup>  | ①     | ②         | ③       | ④      | -89            |
| 26. Are you able to treat patients as individuals with unique needs and preferences? <sup>27356</sup>   | ①     | ②         | ③       | ④      | -89            |
| 27. Is senior management at Alpha Hospital committed to providing high quality, patient-centered care? <sup>27357</sup>   | ①     | ②         | ③       | ④      | -89            |
| 28. How often do managers in your work unit set clear standards for quality? <sup>27358</sup>   | ①     | ②         | ③       | ④      | -89            |

**Section 3: Organizational Commitment and Career Plans** (Rate your practice environment on the following items)

Please fill in the oval that best reflects what you think about each statement.

**29. Organizational Commitment and Career Plans<sup>1176</sup>**

- |   | Strongly disagree  | Moderately disagree | Slightly disagree | Neither agree nor disagree | Slightly agree | Moderately agree | Strongly agree |
|---|--|---------------------|-------------------|----------------------------|----------------|------------------|----------------|
| a. I talk up this organization to my friends as a great organization to work for <sup>15948</sup>                                     | ①  | ②                   | ③                 | ④                          | ⑤              | ⑥                | ⑦              |
| b. I am proud to tell others that I am part of this organization <sup>15950</sup>   | ①  | ②                   | ③                 | ④                          | ⑤              | ⑥                | ⑦              |
| c. I find that my values and the organization's values are similar <sup>15951</sup>   | ①  | ②                   | ③                 | ④                          | ⑤              | ⑥                | ⑦              |
| d. This organization really inspires the very best in me in the way of job performance <sup>15952</sup>                               | ①  | ②                   | ③                 | ④                          | ⑤              | ⑥                | ⑦              |
| e. I am extremely glad that I chose this organization to work for over others I was considering at the time I joined <sup>15953</sup> | ①  | ②                   | ③                 | ④                          | ⑤              | ⑥                | ⑦              |
| 30. How likely would you be to actively look for a new job in the next year? <sup>15957</sup>   | ① Very Unlikely    ② Somewhat Unlikely    ③ Somewhat Likely    ④ Very Likely |                     |                   |                            |                |                  |                |



\*001AMD36\*

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#### Section 4: Overall Impressions

Please rate the following at your organization.

##### 31. Overall Evaluation Questions<sup>1214</sup>

- |  | Poor | Fair | Good | Very Good | Excellent | Not Applicable |
|--|------|------|------|-----------|-----------|----------------|
| a. Overall, the quality of this hospital as a place to practice medicine. <sup>15980</sup>   | Ⓐ    | Ⓑ    | Ⓒ    | Ⓓ         | Ⓔ         | Ⓕ              |
| b. Extent to which this hospital is a comfortable place to practice, free from operational and bureaucratic difficulties. <sup>15981</sup> | Ⓐ    | Ⓑ    | Ⓒ    | Ⓓ         | Ⓔ         | Ⓕ              |
32. Overall, how would you rate Alpha Hospital as a place to work?<sup>20772</sup>  
 Ⓐ Poor   Ⓑ Fair   Ⓒ Good   Ⓓ Very Good   Ⓔ Excellent
33. How likely would you be to recommend your organization to another physician or new recruit looking for employment?<sup>15982</sup>  
 Ⓐ Very Unlikely   Ⓑ Somewhat Unlikely   Ⓒ Somewhat Likely   Ⓓ Very Likely

#### Section 5: Information about you and your practice

34. Please tell us your age category.<sup>15997</sup>  
 Ⓐ 20 to 34 years   Ⓑ 35 to 49 years   Ⓒ 50 to 64 years   Ⓓ 65 and older
35. What is your gender?<sup>15998</sup>  
 Ⓐ Female   Ⓑ Male
36. How long have you worked in this organization?<sup>15999</sup>  
 Ⓐ Less than 1 year   Ⓑ 1 to 5 years   Ⓒ 6 to 10 years   Ⓓ 11 to 15 years   Ⓔ 16 or more years
37. How long have you been in practice?<sup>16004</sup>  
 Ⓐ Less than 1 year   Ⓑ 1 to 5 years   Ⓒ 6 to 10 years   Ⓓ 11 to 15 years   Ⓔ 16 or more years

## Survey for Employees



### Alpha Hospital

#### IMPROVING YOUR WORKPLACE

##### Section 1: How would you rate your workplace?

Please rate your organization on the following items by filling in the oval that corresponds to your answer choice.

##### 1. COMMUNICATION<sup>1179</sup>

- a. Your organization's efforts to ensure quality of care as a principal goal.<sup>28776</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- b. Your involvement in decisions that affect your work<sup>15551</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- c. How clear the mission and goals of your organization are<sup>15552</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- d. How clearly defined your role and work expectations are<sup>15553</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- e. How openly and honestly the person you report to or receive daily instruction from communicates.<sup>29518</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- f. How well informed you are about corporate plans.<sup>29519</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable

##### 2. RESPECT<sup>1180</sup>

- a. How well the person you report to or receive daily instructions from responds to your ideas and concerns<sup>15555</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- b. Fair and equal treatment by the person you report to or receive daily instruction from<sup>15557</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- c. How well your organization respects staff diversity<sup>15562</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- d. Recognition and support for your role<sup>28777</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable

##### 3. COMPENSATION<sup>1182</sup>

- a. Your pay (compared to other similar organizations)<sup>15565</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable
- b. Your benefits package<sup>15566</sup>  
 1 Poor    2 Fair    3 Good    4 Very Good    5 Excellent    6 Not Applicable

3. **COMPENSATION**<sup>1182</sup>
- c. Your job security<sup>15567</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
4. **TEAMWORK**<sup>1183</sup>
- a. How well staff work together and help each other out<sup>15568</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- b. Interdepartmental/team support and communication<sup>19019</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
5. **WORK PRACTICE**<sup>1185</sup>
- a. How manageable your workload is<sup>15574</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- b. Flexibility in your scheduling/work hours<sup>15579</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- c. How well you are trained and supported on the job<sup>15580</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- d. Freedom to make improvements to how your work is done<sup>15581</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- e. A positive and fun environment to work in <sup>15582</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- f. Your opportunities for education and training<sup>28778</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
6. **PHYSICAL ENVIRONMENT AND SAFETY**<sup>1186</sup>
- a. The cleanliness of the environment you work in<sup>15586</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- b. How well the layout of the work area lets you do your job<sup>15587</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- c. A safe and hazard-free environment for you to work in<sup>15588</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- d. Your personal security and safety in your work place<sup>15589</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- e. Up-to-date computer technology for you to use<sup>15590</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
- f. Up-to-date equipment for you to use<sup>15591</sup>  
 1 Poor  2 Fair  3 Good  4 Very Good  5 Excellent  6 Not Applicable
7. **TRAINING**<sup>1414</sup>
- a. Do you and your supervisor discuss plans for your training and development?<sup>22793</sup>  
 1 Never  2 Sometimes  3 Usually  4 Always
- b. How often do you have the opportunity to attend training that can help you do your job better?<sup>22794</sup>  
 1 Never  2 Sometimes  3 Usually  4 Always



7. TRAINING<sup>1414</sup>

- c. Are you generally satisfied with the training opportunities provided to you?<sup>22796</sup>  
 1 Never    2 Sometimes    3 Usually    4 Always
8. What **three things** could your organization do to improve the safety of your work environment? (**Select three only**)<sup>20901</sup>
- |  |  |
|--|--|
| <input type="checkbox"/> 1 Safe lift and transfer education and training                       | <input type="checkbox"/> 16 Don't know |
| <input type="checkbox"/> 2 Ongoing training and management of challenging/aggressive behaviour | <input type="checkbox"/> 17 Other      |
| <input type="checkbox"/> 3 Yearly safety protocol training and drills                          |  |
| <input type="checkbox"/> 4 Increase visibility and number of security personnel                |  |
| <input type="checkbox"/> 5 Improve/up-date equipment/ensure proper functioning equipment       |  |
| <input type="checkbox"/> 6 Ergonomic assessments of work stations and equipment                |  |
| <input type="checkbox"/> 7 Improve cleanliness of work environment                             |  |
| <input type="checkbox"/> 8 Increase the use of access cards                                    |  |
| <input type="checkbox"/> 9 Provide an escort/shuttle service to parking areas                  |  |
| <input type="checkbox"/> 10 Increase number of security cameras                                |  |
| <input type="checkbox"/> 11 Increase skills training to manage high risk care situations       |  |
| <input type="checkbox"/> 12 Increase training and information related to safety hazards        |  |
| <input type="checkbox"/> 13 Reduce accessibility to work areas, i.e. more locks, swipe card    |  |
| <input type="checkbox"/> 14 Training on working safely in the community                        |  |
| <input type="checkbox"/> 15 Infection control/routine practices training                       |  |
9. What are your **three most important training needs**? (**Select three only**)<sup>20902</sup>
- |  |   |  |
|--|---|--|
| <input type="checkbox"/> 1 Clinical aspects of my job                  | <input type="checkbox"/> 12 Risk management                         | <input type="checkbox"/> 23 Don't know |
| <input type="checkbox"/> 2 Computer training                           | <input type="checkbox"/> 13 Strategies of running effective meeting | <input type="checkbox"/> 24 Other      |
| <input type="checkbox"/> 3 Quality improvement                         | <input type="checkbox"/> 14 Abuse policies                          |  |
| <input type="checkbox"/> 4 Personal leadership skills                  | <input type="checkbox"/> 15 Performance management                  |  |
| <input type="checkbox"/> 5 Time management                             | <input type="checkbox"/> 16 Coaching                                |  |
| <input type="checkbox"/> 6 Non-clinical skills specific to my job task | <input type="checkbox"/> 17 Patient/client safety                   |  |
| <input type="checkbox"/> 7 Management in the workplace                 | <input type="checkbox"/> 18 Stress management                       |  |
| <input type="checkbox"/> 8 Conflict resolution                         | <input type="checkbox"/> 19 Assertiveness                           |  |
| <input type="checkbox"/> 9 Leading a team                              | <input type="checkbox"/> 20 Emergency response                      |  |
| <input type="checkbox"/> 10 Effective communication                    | <input type="checkbox"/> 21 Staff safety                            |  |
| <input type="checkbox"/> 11 Team work                                  | <input type="checkbox"/> 22 No training needs                       |  |
10. What **three things** could your organization do to reduce work stress? (**Select three only**)<sup>20903</sup>
- |  |  |
|--|--|
| <input type="checkbox"/> 1 Provide designated relaxation rooms/relaxation or yoga sessions             | <input type="checkbox"/> 12 Don't know |
| <input type="checkbox"/> 2 Provide exercise classes  | <input type="checkbox"/> 13 Other      |
| <input type="checkbox"/> 3 Improve staff lounges   |  |
| <input type="checkbox"/> 4 Reduce workload/increase number of staff to cover work                      |  |
| <input type="checkbox"/> 5 Permit flexible hours or scheduling   |  |
| <input type="checkbox"/> 6 Provide stress management training  |  |
| <input type="checkbox"/> 7 Ensure appropriate vacation or time off is taken                            |  |
| <input type="checkbox"/> 8 Have someone staff can talk to: e.g. employee ombudsperson, councilor, etc. |  |
| <input type="checkbox"/> 9 Provide on-site massage therapy   |  |
| <input type="checkbox"/> 10 Improve equipment  |  |
| <input type="checkbox"/> 11 Provide an Employee Assistance Program (EAP)                               |  |

11. DIVERSITY<sup>1415</sup>

- a. Alpha Hospital demonstrates that it values people of different racial and ethnic backgrounds.<sup>23692</sup>  
 1 Strongly Disagree    2 Disagree    3 Neither    4 Agree    5 Strongly Agree
- b. Do staff and patients have trouble communicating because of language differences?<sup>24040</sup>  
 1 Never    2 Sometimes    3 Usually    4 Always

## Section 2: Organizational Commitment and Career Plans

Please fill in the oval that best reflects what you think about each statement.

12. I talk up this organization to my friends as a great organization to work for<sup>15596</sup>  
 1 Strongly disagree     3 Slightly disagree     5 Slightly agree     7 Strongly agree  
 2 Moderately disagree     4 Neither agree nor disagree     6 Moderately agree
13. I am proud to tell others that I am part of this organization<sup>15598</sup>  
 1 Strongly disagree     3 Slightly disagree     5 Slightly agree     7 Strongly agree  
 2 Moderately disagree     4 Neither agree nor disagree     6 Moderately agree
14. I find that my values and the organization's values are similar<sup>15599</sup>  
 1 Strongly disagree     3 Slightly disagree     5 Slightly agree     7 Strongly agree  
 2 Moderately disagree     4 Neither agree nor disagree     6 Moderately agree
15. This organization really inspires the very best in me in the way of job performance<sup>15600</sup>  
 1 Strongly disagree     3 Slightly disagree     5 Slightly agree     7 Strongly agree  
 2 Moderately disagree     4 Neither agree nor disagree     6 Moderately agree
16. I am extremely glad that I chose this organization to work for over others I was considering at the time I joined<sup>15601</sup>  
 1 Strongly disagree     3 Slightly disagree     5 Slightly agree     7 Strongly agree  
 2 Moderately disagree     4 Neither agree nor disagree     6 Moderately agree
17. How likely is it that you will actively look for a new job in the next year?<sup>15607</sup>  
 1 Very Unlikely     2 Somewhat Unlikely     3 Somewhat Likely     4 Very Likely

### Overall Impressions

18. Overall, how would you rate Alpha Hospital as a place to work?<sup>19434</sup>  
 1 Poor     2 Fair     3 Good     4 Very Good     5 Excellent
19. How likely would you be to recommend your organization to a family member or friend looking for employment?<sup>15606</sup>  
 1 Very Unlikely     2 Somewhat Unlikely     3 Somewhat Likely     4 Very Likely
20. In your staff position, do you typically have direct interaction or contact with patients? Please mark only ONE answer.<sup>26947</sup>  
 1 Yes, I typically have direct interaction or contact with patients  
 2 No, I typically do NOT have direct interaction or contact with patients

If you answered "No" in question 20, please skip to question 35.

### Section 3: Patient Centered Work Environment

21. Do you believe your work unit provides top quality patient care?<sup>26941</sup>  
 1 Never     2 Sometimes     3 Usually     4 Always     99 Not applicable
22. Do you feel that you have the right materials and equipment available to give patients the best treatment for their symptoms or conditions?<sup>26942</sup>  
 1 Never     2 Sometimes     3 Usually     4 Always     99 Not applicable
23. Do you feel that you have enough help from other staff to give patients the best treatment for their symptoms or conditions?<sup>26943</sup>  
 1 Never     2 Sometimes     3 Usually     4 Always     99 Not applicable
24. Overall, is your work unit well organized to meet the needs of your patients?<sup>26944</sup>  
 1 Never     2 Sometimes     3 Usually     4 Always     99 Not applicable

25. Are you able to get timely information about your patients' medical condition, treatment or tests?26811  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
26. Do you have the time you need to talk with your patients to make sure they get the information they want about their medical condition, treatment, or tests?26945  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
27. Do you have the time and information to prepare patients for leaving the hospital/program?26758  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
28. How often is communication between your unit/department and other unit/departments about a patient a problem?26759  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
29. Are you able to support and involve family members when requested by the patient?26760  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
30. Are you able to involve patients in decisions about their care?26761  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
31. Are you able to treat patients as individuals with unique needs and preferences?26762  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
32. Is senior management at Alpha Hospital committed to providing high quality, patient-centered care?26946  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
33. How often do managers in your work unit set clear standards for quality?26948  
 1 Never  2 Sometimes  3 Usually  4 Always  5 Not applicable
34. **Think about your hospital work area/unit...**1379
- a. It is just by chance that more serious mistakes don't happen around here?3790  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- b. Patient safety is never sacrificed to get more work done?3795  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- c. We have patient safety problems in this unit?3797  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- d. Our procedures and systems are good at preventing errors from happening?3798  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- e. People support one another on this unit.22798  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- f. When a lot of work needs to get done quickly, we work together as a team to get the work done.22799  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- g. In this unit, people treat each other with respect.22800  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- h. When one area in this unit gets really busy, others help out.22801  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- i. We are actively doing things to improve patient safety?3786  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- j. Mistakes have led to positive changes here?3789  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree

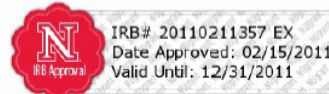
34. **Think about your hospital work area/unit...**1379

- k. After we make changes to improve patient safety, we evaluate their effectiveness23793  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- l. When an event is reported, it feels like the person is being written up, not the problem23792  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- m. Staff worry that mistakes they make are kept in their personnel file23796  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- n. Staff feel like their mistakes are held against them23788  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- o. We work in "crisis mode" trying to do too much, too quickly23794  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- p. We use more agency/temporary staff than is best for patient care23787  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- q. We have enough staff to handle the workload23782  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree
- r. Staff in this unit work longer hours than is best for patient care23785  
 1 Strongly Disagree  2 Disagree  3 Neither  4 Agree  5 Strongly Agree

**Section 4: Information about you**

35. How long have you worked in your present position?26949  
 1 Less than 1 year  2 1 to 2 years  3 3 to 5 years  4 More than 5 years
36. What is your current employment status at this organization?17096  
 1 Full-time  2 Part-time  3 Other
37. Are you a temporary, per-diem, or standby worker?26950  
 1 Yes  2 No
38. Do you have management or supervisory responsibilities in this organization?15630  
 1 Yes  2 No

## Appendix 2 Generic Survey



Industrial & Management Systems Engineering Department

### Informed Consent Form for Participants

Dear Potential Participant,

You are invited to participate in the research, "Quality in Healthcare: Developing a Patient Health Care Improvement Tool". The research employs healthcare survey to develop a new comprehensive approach in addressing the quality in Healthcare. The analysis of the results identifies the key physician and nurse determinants for the patient satisfaction.

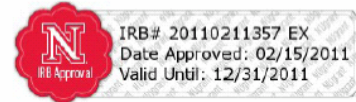
You are eligible to participate in the survey if you are 19 years of age or older. If you are willing to participate in the study, the concerned authority from the department will give you a survey which will take about 25 minutes to complete. To protect your anonymity, a survey collecting box will be placed at the reception of the hospital to drop the surveys after completed. There are no known risks in participating in this study.

Any information obtained during this study, which could identify you, will be kept strictly confidential. The data will be stored in a locked cabinet in the investigator's office and will be kept by the investigator during the study and for three years after study is completed. The information obtained in this study may be published in scientific journals or presented at scientific meetings but the data will be reported as aggregated data.

You may ask any questions concerning this research and have those questions answered before your decision to participate or while completing the survey questionnaire. You may call the investigators Vijaya Musunuru and Dr. Ram Bishu at the numbers listed below.

If you have questions concerning your rights as a research participant that have not been answered by the investigators, or to report any concerns about the study, you may contact the University of Nebraska-Lincoln Institutional Review Board, telephone (402) 472-6965.

175 Nebraska Hall / P O Box 880518 / Lincoln, NE 68588-0518  
(402) 472-3495 / FAX (402) 472-1384



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Industrial & Management Systems Engineering Department

You are free to decide not to participate in this study or to withdraw at any time without any negative effect on your relationship with the investigators, the University of Nebraska or Saint Francis Medical Center. Your decision will not result in any loss of benefits to which you are otherwise entitled.

You are voluntarily making a decision whether or not to participate in this research study. By completing and returning the survey, your consent to participate is implied. You should keep this page for your records.

Name and Phone number of investigator(s):

Vijaya Musunuru, Work: (402) 613-6753, Email: [vijay.musunuru@gmail.com](mailto:vijay.musunuru@gmail.com)

Dr. Ram Bishu, Advisor, UNL Office: (402) 472-2393

**Note: If you find any question not relevant for you, you can skip it.**

- I. Let us know which category you reside in below:
  - a. PATIENT
  - b. NURSE
  - c. PHYSICIAN

### **Survey Questionnaire**

- a. I was never disturbed by the noise around me while discussing medications
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- b. We treated each other with courtesy and respect
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- c. I am always doing other activities during the consultation
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- d. I did not have any problems understanding the accent or language of the person speaking to me
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- e. There is enough staff available to help attend to patient needs
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- f. I had enough time to discuss the diagnosis and medication
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- g. We had complete confidence and trust in each other during the disease diagnosis and the treatment
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- h. The medication given is always adequate and appropriate
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- Agree
- i. The space around me is always kept clean and quiet
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- j. It is easy to find my way around the facility
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- k. I always feel safe and secure inside the facility
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- l. The Cancer Treatment Center has up-to-date computer technology and equipment available for providing the best treatment to patients
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree

- m. Patients and staff do not a wait long time due to the non-availability of equipment needed for diagnosing and treatment
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- n. There was complete support between nursing staff to help with disease diagnosing and treatment
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- o. Doctors and nurses supported each other well during disease treatment and diagnosis
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- p. The work load in the Cancer Treatment Center did not adversely impact the staffs work
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- q. Nurses and doctors have complete flexibility in scheduling their own work hours
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- r. Patients have complete flexibility in scheduling their appointments
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- s. Nurses feel the Cancer Treatment Center is a positive and fun place to work
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- t. Doctors feel the Cancer Treatment Center is a positive and fun place to work
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- u. The balancing of family life has an impact on the effectiveness of the work in the Cancer Treatment Center
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- v. Nurses need more training to address the anxieties, fears and concerns of the patients
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- w. Doctors need more training to address the anxieties, fears and concerns of the patients
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree
- x. The doctors and nurses were satisfied with their pay and benefits package
  - 1. Strongly Disagree 2 .Disagree 3.Neutral 4.Agree 5. Strongly Agree



- y. Overall rating of the Cancer Treatment Center for the total health care provided to the patients  
1. Poor    2. Fair    3. Good    4. Very Good    5. Excellent
- z. Would you recommend this Cancer Treatment Center to your friends and family?  
1. Definitely No    2. Probably No    3. Neutral    4. Probably Yes    5. Definitely Yes

**1. PATIENTS (ONLY PATIENTS SHOULD ANSWER THESE QUESTIONS)**

- a. What is the highest grade or level of school that you have completed?  
1. *Some High school (not graduate)*    2. *High school graduate*    3. *Some college or 2-year degree*    4. *4-year college graduate*    5. *More than 4-year college degree*
- b. What is Your Race?  
1. *Asian*    2. *American Indian*    3. *African American*    4. *White*    5. *Hispanic*  
6. *Other (please specify):*
- c. What Language do you mainly speak at home?  
1. *English*    2. *Spanish*    3. *Other (please specify):*
- d. What is your gender?  
1. *Female*    2. *Male*
- e. Please tell us your age category.  
1. *20 to 34 Years*    2. *35 to 49 Years*    3. *50 to 64 Years*    4. *65 and older*
- f. Number of visits to the Cancer Treatment Center (approximately): \_\_\_\_\_

**2. NURSES (ONLY NURSES SHOULD ANSWER)**

- a. How long have you worked in your present position?  
1. *Less than 1 Year*    2. *1 to 2 Years*    3. *3 to 5 Years*    4. *More than 5 Years*
- b. What is your current employment status in the organization?  
1. *Full time*    2. *Part time*    3. *Other*
- c. Do you have management or supervisory responsibilities in this organization?  
1. *Yes*    2. *No*
- d. Please tell us your age category.  
1. *20 to 34 Years*    2. *35 to 49 Years*    3. *50 to 64 Years*    4. *65 and older*
- g. What is Your Race?  
1. *Asian*    2. *American Indian*    3. *African American*    4. *White*    5. *Hispanic*  
6. *Other (please specify):*

h. What Language do you mainly speak at home?  
1. *English* 2. *Spanish* 3. *Other (please specify):*

i. What is your gender? 1. *Female* 2. *Male*

**3. PHYSICIANS** (only physicians should answer)

a. Please tell us your age category.

1. *20 to 34 Years* 2. *35 to 49 Years* 3. *50 to 64 Years* 4. *65 and older*

b. How long have you worked with this organization?

1. *Less than 1 Year* 2. *1 to 5 years* 3. *6 to 10 Years* 4. *11 to 15 Years* 5. *16 or more Years*

c. How long have you been in practice?

1. *Less than 1 Year* 2. *1 to 5 years* 3. *6 to 10 Years* 4. *11 to 15 Years* 5. *16 or more Years*

d. What is Your Race?

1. *Asian* 2. *American Indian* 3. *African American* 4.

*White* 5. *Hispanic*

6. *Other (please specify):*

e. What Language do you mainly speak at home?

1. *English* 2. *Spanish* 3. *Other (please specify):*

f. What is your gender?

1. *Female* 2. *Male*