Preliminary Assessment of Best Practices and Standardized Cost Accounting in Healthcare

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Abstract

Medical research studies show that patient outcomes remain constant while physician treatments for a specific condition may vary. This data suggests that variations in care represent inefficiencies in physician practice and result in higher cost of care. Healthcare researchers are examining ways to reduce variations in practice through standardization of medicine. The most widely accepted form of this standardization is Evidence Based Best Practices (EBBP). Furthermore, financial healthcare researchers are investigating methods to tie costs to products in order to increase efficiency of treatment and patient quality of care. Such proposals are contentious because they limit authority of physicians and report physicians' actions to administration.

The intent of this exploratory study is to examine the ramifications of tying a standard costing system with EBBP. The author interviewed 9 physicians. The research question presented to each physician was 'What are physicians', who work in a hospital environment, reactions to and concerns with combining standard costing techniques with EBBP?' The interviews were free of form. The physicians' responses were recorded and analyzed using Grounded Theory Methodology. The physicians generated three main areas of concerns in response to this question. While this study is only preliminary, it does indicate that physicians have many concerns about implementation, with the most emphasis placed on ethical concerns. This study can be used as a sounding board for further research into specific areas of concern which will make the implementation of the proposal more effective in the future.

I. Introduction

Healthcare costs in the United States have been rising at an alarming rate over the last several decades, outpacing the Consumer Price Index. In the year 2001 healthcare costs accounted for 14.1% of the Gross Domestic Produce (GDP) for the United States and costs are projected to rise 7% annually for the next decade (Davis). In part, rising costs have been attributed to an increasing use of unwarranted tests and treatments performed primarily as defensive medicine against malpractice suits and in some cases simply to increase revenue flow. These inefficiencies are often termed by researchers as clinical variations, although few researchers are willing to attribute such variations to a specific cause. But regardless of the reasons for variability, most researchers believe that these variations may represent an inefficiency of practice and according to Dr. Blanton Bessinger, president of the Minnesota Medical Association, fewer variations in practice would result in less unnecessary medicine and lower medical costs (Adams). Clinical variations can affect not only cost of medical care, but also the quality of care received by patients. W.G. Carnett in *Quality Management Health Care* states that a leading cause of inadequate care can be traced to clinical variations unaccounted for by patient variations (Carnett).

In theory, one way to reduce clinical variations and thereby control rising costs in healthcare, is to implement the concept of evidence based best practices. Evidence based best practices (also called clinical pathways, clinical practice guidelines [CPGs], and standards of quality) define a general treatment plan for diagnosis of a disease or condition using the doctor's knowledge of the patient's symptoms, the appropriate tests needed to confirm the doctor's diagnosis, and the best

treatment for the average patient. In theory, adherence to best practice guidelines should result in less clinical variations and possibly lower healthcare costs. Indeed data does suggest that 'CPGs can improve health processes and outcomes, including shorter hospital length of stays and reduced costs and utilization of resources." (Flores, 496).

Professional medical organizations, the government, and medical specialty societies design these evidence based best practices taking into account clinical experience, research data, and patient type. The American Medical Association, American Association of Health Plans, and Agency for Healthcare Research and Quality sponsor a web site (www.guideline.gov) that lists evidence based best practices. Many hospitals and health plans have begun implementing the best practices approach for treatment of common ailments such as asthma, diabetes, and coronary artery disease. In essence, evidence based medicine represents a standardization of medical practices particularly for more common ailments.

Independent of the evidence based approach to medicine, business oriented strategic and financial healthcare planners have expressed interest in the standardization of medical costs as a tool for budgeting, planning, and budget variance analysis. For example, William Cleverly in ***Essentials of Health Care Finance*** has proposed a model for standardizing medical treatment costs for specific Diagnostic Related Groups (DRGs) (See Appendix A for definition and examples). He introduces the concepts of Standard Treatment Protocols and Standard Cost Profiles, which are discussed later, as a way of tracking and understanding healthcare

costs. In this paper, the author has used the model Cleverly created to tie a standard costing technique to evidence based best practices.

The author believes it is only a matter of time before evidence based treatment plans or protocols are tied to standardized costs of such treatments. It can be expected that any attempt to combine medical treatment plans and standard costs will be highly contentious and will be decried by physicians as 'cookbook' medicine. In fact, according to a recent Wall Street Journal article " Doctors often fail to pass on to patient the fruits of any discoveries. In other words, even when researchers parlay basic science into 'best practices'… the actual care for thousands of people falls short." (Begley). Physicians' resistance to best practices is due in part to the physicians' attitude that the results of the scientific studies do not apply to their individual patients. Also, for a physician to realize improved outcomes in his patients, he generally has to see a large number of patients (Begley). This paper explores the possibility of taking evidence based best practices a step further by tying them to standardized costs to track the quality of care given. It is reasonable to expect that if physicians are resistant to incorporating evidence based medicine into their practice, they would be even more resistant to tying evidence based medicine to standard costs.

It is the intent of the author to investigate what problems and concerns and also what benefits physicians believe will result from combining standard costs with evidence based medicine particularly in regard to the quality and the costs of medial treatment. The author will also investigate physicians' concerns about the ethics of such proposals and the perceived effect on their professional freedom. The author

discusses the methodology and the results of this study after an introductory consideration of evidence based medicine and standard cost accounting techniques.

II. Evidence Based Best Practices

Widespread controversy has existed over the nature of services provided by a doctor or surgeon. Some are of the view that healthcare should not be treated as a business; therefore, the services provided should not be referred to as a product. Others believe that the service provided is a healthy patient, or at least a patient whose condition has been treated successfully. Still, others view the actual service provided as the product. For example, if a physician treats a child for asthma, the product is the actual service provided (the tests that are run, the physical examination) and not the treated child herself. Medicare and Medicaid take a similar view in their reimbursement of physicians and hospitals. They reimburse hospitals according to DRG codes and physicians according to CPT codes. The DRG system "takes all possible diagnoses from the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) system and classifies them into 25 major diagnostic categories based on organ systems. These 25 categories are further broken down into 511 distinct medically meaningful groupings called DRG's" (Cleverley, 22). A few examples of the DRG codes follow: DRG 426 is depressive neuroses, DRG 480 is a liver transplant, DRG 236 is fractures of hip and pelvis. This paper will follow the federal government's lead when defining the product produced by a physician or a hospital; the product a physician produces will be defined as the actual services provided which is measured through resources consumed.

Given this definition of a healthcare product, one can then examine what standards could be used to evaluate the finished product. What standards must the producer, in this case the doctor, meet to have produced a quality product? In the past, the physician himself would answer this question. The physician was responsible for setting the standards to measure himself or herself against. In contrast today professional organizations, managed care companies, and large employers are all involved in evaluating the performance of physicians. Because managed care companies and large employers pay for most of the services provided by physicians and hospitals, these organizations have the power to set standards to measure the inputs into the final product. So, from a practical point of view, the days of each physician setting his or her own performance standards are over.

Some of the most widely recognized standards used in the healthcare industry are Evidence Based Best Practices (EBBP). This paper will use EBBP as the standards applied in the healthcare profession because they are commonly used and generally accepted by most practicing physicians. To understand the nature of EBBP, one must examine their origins, quantitative evidence of their effectiveness, and the institutions that design them. EBBP are guidelines, backed by clinical studies, which have shown that a patient with a specific condition, if treated a specific way, has the best possible chance of receiving a quality outcome of care. These guidelines are set-up to help physicians give quality care to their patients by defining specific actions to take during treatment of a disease or condition (Kinney, 323). The concept of establishing standards to be followed within the medical profession arose because of three primary factors: the standard setting movement of the 1980's, the rise of

managed care in the 1990's, and advances in theory and science of measuring quality of care (Kinney, 324).

Origins of EBBP

In the 1980's, many organizations became involved in developing standards of care because of the rising cost of healthcare after the Medicare and Medicaid programs were introduced in the 1960's. The United States government, universities, specialty societies, and managed care organizations began creating standards. The American Medical Association began to collaborate with several medical specialty societies and "launched a major standard setting initiative that signaled the true endorsement of medical standard-setting by the organized medical profession." (Kinney, 324). Federal agencies began to be more involved with standard setting as well. The Health Care Financing Administration (HCFA), which has now been replaced by the Centers for Medicare and Medicaid Services (CMS), sponsored a multimillion-dollar research project to develop a scientific basis for medical standards of care. The National Institute of Health, along with the Veterans Administration, began studying, creating, and evaluating medical standards of care as well (Kinney, 324).

The standard setting movement of the 1980's led to the rise of managed care in the 90's. The federal government incorporated managed care into the Medicaid and Medicare programs. Managed care did well, perhaps too well. Managed care had achieved its goal of significant cost containment, but developed a poor reputation from the public in the process. Many enrollees felt they were deprived of more expensive health care services by the managed care companies simply on the basis of cost and not on the individual patient's need for the service. According to Kinney,

towards the end of the 1990's "the managed care industry [had] begun to appreciate that reforms [were] in order and [had] looked to medical standards of care as important tools in that reform." (Kinney, 325).

The third primary cause that brought evidence based standards into the health care environment was the theoretical developments in quality science. Before 1980, institutions were generally evaluated according to whether or not they met structural input requirements and process criteria. After 1980, quality assurance methods began to focus on the outcome of care provided as a quality measure. Several research studies were partly responsible for quality management's paradigm shift. The studies revealed that large geographic variations occurred in how physicians treated a specific condition or disease state. These wide variations of treatment did not account for differences in patient outcomes (Kinney, 326). These studies on variations in medical practice began in the mid 1970's. Studies conducted more recently have shown explicitly how the incorporation of EBBP into the provider's routine service can improve the process and outcomes of care when EBBP are developed, disseminated, and implemented correctly (Carnett). The evidence in these studies ranges from anecdotal to statistical. The Duke Catastrophe is an example of a case that resulted in catastrophic failure because physicians failed to follow medical guidelines.

The Duke Catastrophe occurred when Jesica Santillan died on February 22, 2003 at Duke University Hospital from receiving an organ transplant that failed because the blood type of the donor did not match her blood type (Vedantam). Dr. William Fulkerson, the Vice President and CEO of Duke University Hospital, stated

in a letter dated February 24, 2003 that "human error occurred at several points in the organ placement process that had no structured redundancy. The critical failure was absence of a positive confirmation of ABP compatibility of the donor organs and the identified recipient patient." (Fulkerson). Jesica was a seventeen year old female with restrictive cardiomyopathy and secondary nonreactive pulmonary hypertension who needed a heart and lung transplant (Fulerson, Vedantam). Dr. Jaggers and Carolina donor services both assumed that the other had checked the blood type. Neither had. The organ donor had type A blood while Jesica had type O. The mismatched organs were placed in her body on February 7th. Immediately her immune system started reacting to the foreign blood type and the doctors tried to stabilize her by suppressing her immune system. On February 19th, another set of lungs and a heart became available; the doctors transplanted these organs into Jesica on February 20th. The surgery was successful, but she had swelling and bleeding inside the brain. She was removed from life support on February 22 because she had no brain activity (Vedantam). In response to this event, Duke conducted a root cause analysis of the organ procurement process and a lack of redundancy was the key weakness. According to Dr. Fulkerson, "validation of the ABP compatibility and other key data elements regarding the donor and recipient will now be performed by: the transplant surgeon, the transplant coordinator, and the procuring surgeon." (Fulkerson). Because of the unfortunate loss of Jesica's life, Duke University Hospital implemented a practice guideline for all organ transplant physicians in the hospital to follow.

Quantitative Evidence Supporting EBBP

One can also see the value of EBBP by examining quantitative research conducted to measure the effects of EBBP. Seven cases are briefly presented below.

(1) A study in a large urban teaching hospital was conducted to measure the effects of practice guidelines for tonsillectomy and adenoidectomy. Patients treated using the practice guidelines were found to have fewer preoperative lab tests, decreased duplication of services, and shorter operating room turnovers. In this study, the physicians who followed the practice guidelines had positive opinions concerning the guidelines (Stewart, Harrill).

(2) Practice guidelines for endoscopic sinus surgery were developed and implemented at a teaching hospital. To measure the effectiveness of the practice guidelines, the researchers compared a control group to a group of patients treated with practice guidelines. After a year, the patients treated with the practice guidelines had significantly lower median hospital costs than did the patients in the control group and maintained acceptable short-term clinical outcomes (Stewart, Hillman).

(3) According to some clinical trials, a better adherence to EBBP would reduce complications due to diabetes. For instance, decreasing hemoglobin A/C levels by one percentage point would reduce microvascular complications by 25 to 30 percent. Also, by reducing blood pressure by 10mm Hg macrovascular and microvascular

complications and mortality rates would decrease by 25 to 55 percent (Hitchens).

(4) A survey of family physicians in Louisiana who cared for patients with diabetes showed that physician attitudes do not appear to be barriers to guideline implementation (Chasuk).

(5) In yet another study, a team effort reduced operating room costs of adult cardiac surgery by 25 percent by focusing on and evaluating process improvements such as standardizing practices, reevaluating equipment, and reducing operating room cycle time (Lain).

(6) A national survey of Pediatrician's attitudes, beliefs, and practices regarding clinical practice guidelines was conducted in 2000. This study showed that, of the respondents, 35 percent of pediatricians used practice guidelines, 44 percent used them in part, and 21 percent did not use them at all. The most commonly used practice guideline was for asthma; 77 percent of the respondents followed asthma guidelines. Some common reasons for using practice guidelines were standardization of care (17 %) and helpfulness (10%). Commonly cited problems with practice guidelines were failure to allow for clinical judgment (54%), use in litigation (16%), and limitation of autonomy (5%). Some important features listed by physicians to consider when creating EBBP are simplicity, feasibility, demonstrated efficacy, logic, appropriateness, and accessibility (Flores).

(7) A similar study was conducted of Canadian physicians; the sample size was 3,000 and 62 percent responded. When asked about their confidence in practice guidelines, most physicians expressed confidence in guidelines issued by various physician organizations, but over 50% were not confident in guidelines issued by federal health ministries or by health insurance plans. Over half of the physicians strongly agreed that EBBP are a convenient source of advice and good educations tools, and one-fifth of them had concerns about loss of autonomy, the rigidity of guidelines, and decreased satisfaction with medical practice when EBBP are used (Hayward).

Most physicians, when practicing with EBBP, refer to a published checklist to help take EBBP out of the theoretical realm and into physician practice. This checklist is a summary of the full text version of EBBP, which can be as long as one hundred pages. For an example of an EBBP checklist for the management of diabetes mellitus, see Appendix B.

Defining EBBP

The studies conducted recently show that EBBP, when developed correctly, can improve the outcome of care. If this is the case, why aren't physicians following them? One of the many answers to that question lies in how EBBP are created. No single source generates all EBBP; several EBBP can exist for one single condition or disease state. The federal government, managed care companies, and medical specialty societies are three institutions that define the majority of EBBP.

The largest player in the current healthcare environment is the federal government. The Veterans Health Administration (VHA) is the largest system of

managed care and the largest healthcare delivery system in the United States. From October 1999 to October 2000, the VHA spent 18 billion dollars on healthcare for its 3.2 million veterans, of which 2 billion dollars were for prescription costs alone (Cassidy). In 1997, the VHA created the Department of Veterans Affairs National Formulary (VANF) to help reduce geographic variations in access to pharmacy products. The VHA's goals in establishing the VANF were: "to standardize drug availability in VA facilities, to decrease variations in practice by using clinical guidelines, [and] to centralize the process for evaluating evidence of safety and effectiveness in selecting drugs…" (Cassidy).

The VHA also created the Quality Enhancement Research Initiative (QUERI) in 1998. The President of the Society for Neuroscience, when submitting testimony to the House and Senate Appropriations Subcommittees on Veterans Affairs, Housing, and Urban development, said the purpose of QUERI was "to create and implement a national system to translate research discoveries and innovations of known effective and efficient diagnostic and treatment strategies into high-quality patient care and system-wide improvements." (Gage). QUERI is an outcome based quality improvement program that has the following six steps:

1. Identify high-risk/high volume diseases or problems
2. Identify best practices
3. Define existing practice patterns and outcomes across VA and current variation from best practices
4. Identify and implement interventions to promote best practices
5. Document that best practices improve outcomes
6. Document that outcomes are associated with improved health related quality of life (Gage)

Such programs are evidence of governmental agencies' intent on implementation and documentation of evidence based medicine with the goal of improving the quality of life for patients and controlling costs by the elimination of inflated products.

Another large player in the healthcare game is the managed care organizations. Insurance companies are in the business of providing health care at an affordable cost; for that to be possible the companies must control their costs to make available specific healthcare services to their enrollees. Health plans conduct their own research studies on the effects that EBBP can have on the costs of care and quality of care received. In Minnesota, five health plans have collaborated and are promoting standardized guidelines to treat and control around fifty common illnesses and conditions such as hypertension, diabetes, and asthma. It is hoped that physicians will use these EBBP to increase the quality of care given as well as reduce costs. The Minnesota health plans endorse evidence based guidelines developed by the Institute for Clinical Systems Improvement (ICSI) which is a nonprofit organization that provides quality improvement services to over 21 medical groups, including the Mayo Clinic. In one study conducted by ICSI, it was reported that 60% of patients had blood pressure at a target level after the practice guidelines were implemented compared with 49% of patients before the implementation (Adams).

Medical specialty societies also develop and disseminate their own EBBP. They are disseminated through specialty magazines such as *Pediatrics*, *American Journal of Cardiology,* and *Journal of Bone and Joint Surgery*. An interesting collaboration between the government, a managed care association, and a medical society resulted in the web-site www.guideline.gov. This site is a database of

evidence based best practices and receives over 4,000 hits on an average weekday. The American Medical Association, American Association of Health Plans, and Agency for Healthcare Research and Quality sponsor this site.

To understand how EBBP can be used as a management and cost control tool, one must have a basic awareness of accounting methodology.

III. Accounting Methodology

In general terms, there are two types of accounting: financial accounting and managerial (cost) accounting. Financial accounting primarily gathers and records data that eventually is used in financial statements. It is of primary interest to investors, creditors, and regulatory agencies. In contrast, managerial accounting involves gathering and recording data used by management to make daily, routine decisions as well as to plan and evaluate long-term projects. Management accounting also allows the user to evaluate individual departments, processes, or activities of the company as a whole while financial accounting generally only allows the user to view the aggregate progress of the organization (VanDerbeck, 6-7). Financial accounting is constrained in the methods it uses to record financial data through the required use of Generally Accepted Accounting Principles (GAAP) while managerial accounting has no such restrictions (Horngren, 6). Management accounting is used to help in the decision-making process and does so through using past data to estimate and project future profits for specific branches, divisions, or production lines. So, while this type of accounting relies on past data, the whole management process is future oriented (Cheatham, 118).

Cost accounting is the focus of this study because it “provides the detailed cost data that management needs to control current operations and plan for the future” (VanDerbeck, 1). This discussion of cost accounting will first focus on different types of product costing systems and then examine standard costing and its use in the decision making process. The author will then discuss how standard costing techniques can be combined with evidence based medicine.

For management to measure how much income a specific product line adds to their firm, management must know how much it costs to produce the items in that product line. Of course, to do that, one must be able to define the product. This seems like a simple task in the manufacturing industry - whatever item rolls off the assembly line is the finished product. But, the identification process becomes more complex when service industries such as healthcare become the 'producers' of a 'product'. Once the product being produced is defined, management uses a product costing system to determine the cost of producing that item. Three product costing systems are discussed below - job order costing, process costing, and activity-based costing.

Product Costing Systems

Two primary types of product costing systems have been prevalent throughout the twentieth century: job order costing and process costing (Martinson, 17). Job order costing is used when each product produced by the company is unique, each product requires customized input, the task required to make the product has a beginning and end, and the product requires a significant amount of resources. A contractor might use job order costing when building a home or a lawyer might use this costing system when billing the client for the time spent on her case. Process

costing, on the other hand, is used mostly in manufacturing companies where the products produced are identical to each other and the production process is one continuous flow (Martinson, 21).

The newest type of product costing system in accounting is Activity Based Costing (ABC). It was introduced in the early 1960's and popularized in the 1990's. It is considered to be a costing system as well as a management system because it provides an integrated view of the organization (Cooper, 1). The basic concept of ABC is to track the cost of all resources being consumed to the specific activity incurring the cost. After this has been done, all activities are then assigned, using cost drivers, to the appropriate output such as products, services, customers, and projects thereby relating the cost to the output (Martinson, 20 & Cooper, 10). Because modern factories are producing so many different products, "a substantial portion of the overhead may be more a function of the complexity of the product being made rather than the number of products made" (VanDerbeck, 164). Activity Based Costing takes into account non-volume-related activities that go into the production process for each product. Examples of these non-volume-related activities are the number of machine setups required for each product or product design changes a particular product line needs during production (VanDerbeck, 164). Activity Based Costing systems are different from the traditional methods of cost accounting in two major areas: cost pools and cost drivers. In ABC, cost pools are defined as activities rather than as production cost centers, and the cost drivers in ABC are structurally different from the ones used in traditional costing systems. Some examples of ABC cost drivers are number of alteration notices per product, number of stock-to-stock

transfers per part number, dollars of reported scrap per product, customer complaints per product, and hours of direct labor per product (Cooper, 11, 18).

Standard Costing Systems

Product costing systems are often used in conjunction with standard costing systems. These systems essentially compare actual costs to standard costs and evaluate performance based on deviations from those standards. This comparison allows for performance evaluations of product lines and workers and shows management which operations are efficient and which are not (VanDerbeck, 23-24). According to some theories of management, to motivate employees toward accomplishing the organization's goals, management must measure the performance of each employee and relate incentives to performance. Cost accounting systems help to provide one type of performance measurement because effective systems provide timely and accurate feedback on the efficiency of operations. According to a study conducted by Otto Martinson and commissioned by the Institute of Management Accountants, zero percent of healthcare firms surveyed used cost accounting systems to provide information for performance evaluations (Martinson, 41-42).

Since a standard cost accounting system can be used in conjunction with any of the product costing systems, this paper explores the possibility of joining a standard cost system with evidence based best practices (EBBP) to evaluate the quality of care provided in the healthcare industry through measuring the cost of the service provided. To better understand the example proposed later in this paper, one must first understand the basics of the standard cost system. Key elements will be introduced and an example will be given to better acquaint the reader with standard costing.

Example of Standard Costing

In standard cost accounting, standards are used as "a norm against which the actual performance can be measured. The objective of setting standards is to measure efficiency and to monitor costs by assigning responsibility for deviations from the standards." (VanDerbeck, 282). The first step in standard costing is to set the standards for the product being produced. One takes into account historical cost data as well as future predictions about changes in the economy, in the firm's industry, and within the firm itself to determine the standard costs. Two basic standards that are computed are the materials cost standard and the labor cost standard. A materials cost standard is calculated by multiplying the estimated quantity of materials required for one unit of a product times the unit cost to purchase the materials. A labor cost standard is calculated much the same way, only substituting labor hours and cost of labor for materials quantity and cost of materials. A simple example of materials standard cost and labor standard cost is presented below.

Table 1.
Standard Cost Summary of Luckey's Glass Blown Vase

Direct Materials	2.25 lb. @ $6.00 per lb.	$13.50
Direct Labor	.75 hours @ $18.00 per hour	$13.50
Factory overhead	35% of direct labor cost	$ 4.73
Standard cost per vase		$31.73

A standard per unit cost is much harder to determine for factory overhead than for direct materials and direct labor. Several techniques can be used to calculate a standard cost for factory overhead; each technique depends on what cost drivers are driving the production of a product or service, what type of product a firm produces

or service a firm provides, and the facilities and administrative staff needed to run that firm. In the example above, direct labor hours were used as a driver for the cost of factory overhead. This method is simple and easy to understand although other methods may require the assistance of engineers to create the complex equations to provide the cost of factory overhead. Most companies do a cost/benefit analysis to determine what model they will use to calculate factory overhead; the cost of calculating the standard costs cannot outweigh the benefit these standards provide.

After standards have been set, the actual cost of the materials, labor, and overhead can be compared to the standards. Then variances can be calculated to evaluate employee performance. Below is an example of the standard cost to produce 1,000 vases versus the actual cost.

Table 2.
Standard Cost for 1,000 vases

Direct Materials:	(2250 lbs. x $6.00/lb)	$13,500
Direct Labor:	(750 hours x $18.00/hour)	$13,500
Factory Overhead		$ 4,730
Total Standard Cost for 1,000 vases		$31,730

Table 3.
Actual Cost for 1,000 vases

Direct Materials:	(2000 lbs. x $7.00/lb.)	$14,000
Direct Labor:	(775 hours x $18.00/hour)	$13,950
Factory Overhead		$ 4,730
Total Actual Cost for 1,000 vases		$32,680

As one can see, the actual cost for producing this batch is more than the estimated cost set up at the beginning of production. To better identify the variances

that have occurred during the production process, a variance analysis can be conducted. Below are the price and usage variances for Luckey's Glass's production run.

Illustration 1.
Materials and Labor Variance Analysis

Material's price variance = (Actual unit price of materials - Standard unit price of materials) x actual quantity of materials used
Example: (7.00 - 6.00) x 2000 = Material's price variance
2000 = Material's price variance
This is an unfavorable 2000 variance because actual > standard

Material's usage variance = (Actual quantity of materials used - Standard quantity of materials estimated) x standard unit price of material
Example: (2000 - 2250) x 6.00 = Material's usage variance
-1,500 = Material's usage variance
This is a favorable 1500 variance because actual < standard

Labor price variance = (Actual labor rate per hour - standard labor rate per hour) x Actual number of labor hours worked
Example: (18.00 - 18.00) x 775 = Labor price variance
0 = Labor price variance
There is no variance because actual = standard

Labor usage variance = (Actual number of labor hours - standard number of labor hours) x standard labor rate per hour.
Example: (775 - 750) x 18.00 = Labor usage variance
450 = Labor usage variance
This is an unfavorable variance because actual > standard

These calculations can be done as frequently as necessary: every month, week, day, or even hour. So, what implications do these variances carry? How does management use them to make decisions? Take a look at the Material's price variance. It had an unfavorable $2000 variance because the actual price of materials was more than was originally estimated. Reasons for this increase in price could be that the market price increased, different material was used than estimated, or inefficient purchasing methods were used. Corrective actions could include updating the standard cost model to account for the rise in market price for the materials or

updating the standard cost model to represent the new materials being used. If inefficient purchasing methods is the reason for the variance, the purchasing department manager should be held responsible and appropriate actions taken to eliminate the problem (VanDerbeck, 291-295).

With this base knowledge of cost accounting, one can understand the following, more complex example presented of combining standard cost accounting with a theoretical EBBP for a by-pass surgery.

IV Combining Best Practices and Standardized Costing Techniques

In the past, one primary reason hospitals or doctors did not develop standard cost accounting systems is that, due to the nature of the billing process, no need existed. Physicians used to be paid on a fee for service basis meaning that the patient would pay the full amount for whatever service was provided; the physician himself determined this amount. Now, most health care firms are paid on a capitated basis for every DRG or CPT listed, meaning that the physician or hospital is paid a fixed rate for each service provided to customers within a specific managed care organization; this fixed rate is established by the managed care company and not the physician. Health care providers now must realize that "cost is now a function of both utilization and cost per episode' (Cleverley, 266).

Measuring the actual costs incurred has become more important with the changes in physician reimbursement. Cost accounting systems specialize in measuring variable and fixed costs. So by pairing a standard cost accounting system with medicine, one may be able to address two very important issues that often times

seem to be mutually exclusive: one could evaluate specific departments or services to see which ones are revenue generators and one could also have a quantitative tool able to measure and improve the quality of care provided in those departments.

As addressed earlier, a standard costing system must first have a defined product. The concept of a product in healthcare is an extremely nebulous one. Is the product the treated patient himself? Or is the product a function of resources consumed to treat the patient? The reason it is hard to measure a product in healthcare is because it is hard to judge whether or not the patient became well because of the doctor's actions or because of the passage of time itself. This same problem is not limited to healthcare alone; try to define a product produced by an educational institution. Is the product a graduating class of seniors that have a well-rounded education of humanities, mathematics, and the sciences? How does one measure whether the products are satisfactory or unsatisfactory? Exit exams are used in an attempt to measure the effectiveness of the teaching, but are the exams really indicators of students' abilities? What the healthcare industry and educational institutions are experiencing is a difficulty in measuring the outcome of the services provided; so, instead of measuring the outcomes, they focus on the inputs into the products. In an educational institution, administrators have begun to evaluate the resources used to produce these graduating seniors. One way to control the inputs in an educational institution is by applying a mandatory curriculum to each class. Educational institutions require that teachers include certain topics in each class. If the administrators can control the inputs, the hope is that the outputs (products) will be as close to satisfactory as possible. Now, apply this concept to healthcare. The

healthcare industry uses DRGs which are ways of defining what a patient's particular diagnosis is. DRGs can be equated with the graduating seniors; we know somehow that this is the product, but how do we measure whether the product is satisfactory? The answer may lay in a Standard Treatment Protocol for each DRG. A Standard Treatment Protocol (STP) defines how a particular diagnosis should be treated. A STP is a step-by-step checklist of sorts created from the summary of an EBBP like the one in Appendix B. A STP defines exactly what resources should be used to treat an average patient. Examples of these resources are number of level one nursing care hours needed, the number and type of blood tests, time between each test, amount of time the surgery should take, length of hospital stay, etc (Cleverly, 267-268). The STP for healthcare can be equated with the mandatory curriculum incorporated into Education Institutions. DRGs and STPs are both approximate measures for what the physician is trying to do - diagnose and treat the patient. In this paper, STPs will be used as the product created by physicians since STPs explicitly define what resources the average patient should consume.

Now that healthcare's product has been reestablished, one must have a standard by which to measure the actual performance of the producers (physicians) to have a cost accounting system. For reasons stated in the previous section, EBBP is the most logical answer to this question. EBBP will be used to calculate the Standard Treatment Protocol (STP) and Standard Cost Profile (SCP) for each DRG. A STP is essentially a step-by-step checklist of the services provided when a patient has a specific type of condition or disease. The STP is based on actions and procedures recommended in EBBP for that particular DRG and patient type. After a STP is

created, a Standard Cost Profile (SCP) can be developed for the STP. A SCP shows the estimated cost for each of the service units, or resources used, during the entire episode of care (Cleverly, 264-268). The Luckey's Glass example showed the standard cost summary of producing one blown vase. In this summary, one could see that one pound of direct materials cost $6.00/lb. and one hour of direct labor cost $18.00/hour. A SCP would do the same thing, except the product it costs out is actually a service and not a physical product.

After a SCP is created, variance analysis is conducted between what the costs actually were and what they should have been according to the SCP. This variance analysis allows for a review of the resources used by each of the physicians to treat specific patients. If the resources actually used are much higher or lower than expected, this can serve as a red flag alerting the administrative reviewers to look into the case further and explore what caused the discrepancy. Did the quality of the service provided meet the standards originally set, was this patient just an outlier (an extremely sick patient), or do our standards need to be re-evaluated and new ones set? The ultimate end in setting up this costing system is to attempt to measure the quality of service provided to the patient as a function of the cost of the service provided.

The following example guides the reader through a theoretical situation in which EBBP and standard costing techniques are combined to show the standard cost for a by-pass surgery. Please note that all the numerical data and the SCP and STP are created for illustration purposes only. They are not meant to indicate actual dollar amounts for an actual EBBP; this is left for future research.

Example of Standard Treatment Protocol

First, a Standard Treatment Protocol (STP) must be created. This essentially describes the service being provided. In this theoretical example, a STP is created for use in a by-pass surgery. To create a STP, the hospital refers to a summary of EBBP regarding by-pass surgeries like the one in Appendix B. Then, an administrative board and doctors from the hospital converts that summary into a STP. An example of what the STP could look like is below.

Illustration 2.
Standard Treatment Protocol for By-pass Surgery

Diagnostic Tests
Education of available choices
Administrative Receiving charges
Nurse 'prep' time before surgery
Surgery
Hours of nursing care/day
Meals
Housekeeping
Linen Services
Pharmacy
Preventative Education
Administrative Billing charges

Average total time patient in hospital = two days

This STP is very general. The actual one created would specifically list which diagnostic tests should be done and when, the amount of nurse prep time before surgery, what drugs will be needed from the pharmacist, etc. As one can see, meals and linen services are included in the STP; these items are usually not on the patient's bill. They are usually considered indirect costs because they are not costs directly related to treating the patient. By tracing each indirect cost to its revenue generating service, one is able to create a more exact and precise costing system.

Example of Standard Cost Profile

Once the STP is created, each line item or service unit can be broken down and looked at individually. The cost of each service unit can be divided into its fixed and variable components. Below, one can see the cost breakdown for service unit 020 which is one regular patient meal (indirect service) and service unit 131 which is pharmacy costs for regular coronary by-pass surgery (direct service).

Illustration 3. Cost Breakdown for Service Units 202 and 131

One Regular Patient Meal - Service Unit 202 (Assuming 2,000 patients a day, 365 days a year.)

Direct Cost		*Variable Units*	*Fixed Units*	*Unit Cost*	*Variable Cost*	*Fixed Cost*	*Total Cost*
Direct Materials		1.00	0.00	$ 1.10	$ 1.10	$ -	$ 1.10
Direct Labor							
	Manager	0.00	1.00	$ 0.02	$ -	$ 0.02	$ 0.02
	Chefs	0.05 of 1 hour	0.00	$ 12.00	$ 0.60	$ -	$ 0.60
	Servers	0.05 of 1 hour	0.00	$ 7.50	$ 0.38	$ -	$ 0.38
	Dishwashers	0.05 of 1 hour	0.00	$ 6.75	$ 0.34	$ -	$ 0.34
	Total Direct Labor				$ 1.31	$ 0.02	$ 1.33
	Total Direct Costs				$ 2.41	$ 0.02	$ 2.43
Allocated Cost							
Housekeeping		0.00	0.10	$ 1.00	$ -	$ 0.10	$ 0.10
Overhead		0.00	1.00	$ 0.15	$ -	$ 0.15	$ 0.15
	Total Allocated Costs				$ -	$ 0.25	$ 0.25
Total Cost					$ 2.41	$ 0.27	**$ 2.68**

Calculations
Managers Unit Cost

Salary	$ 45,000.00
Meals/year	2,190,000.00
cost/meal	$ 0.02

Pharmacy costs for regular coronary by-pass surgery patient - Service Unit 131

Direct Costs		*Variable Units*	*Fixed Units*	*Unit Cost*	*Variable Cost*	*Fixed Cost*	*Total Cost*
Direct Materials							
	Drug ABD	1.00	0.00	$ 10.00	$ 10.00	$ -	$ 10.00
	Drug XYZ	3.00	0.00	$ 32.00	$ 96.00	$ -	$ 96.00
	Drug MNO	1.00	0.00	$ 45.00	$ 45.00	$ -	$ 45.00
Direct Labor							
	Pharmacists	0.00	1.00	$ 0.99	$ -	$ 0.99	$ 0.99
Total Direct Costs					$ 151.00	$ 0.99	$ 151.99
Allocated Costs							
housekeeping services		0.00	0.10	$ 1.00	$ -	$ 0.10	$ 0.10
overhead		0.00	1.00	$ 0.15	$ -	$ 0.15	$ 0.15
Total Allocated Costs					$ -	$ 0.25	$ 0.25
Total Costs					$ 151.00	$ 1.24	**$ 152.24**

Calculations

Salary of pharmacists	90000
number of pharmacists	8
Total cost/year	720000
# of patients/year	730000
cost/patient	0.99

After each service unit needed for a by-pass surgery has been broken down and costed out as in the examples above, a Standard Cost Profile (SCP) can be used to show, in summary form, the standard fixed and variable costs associated with each service unit. An example of a SCP for a by-pass surgery is shown on the following page.

Illustration 4.
Standard Cost Profile for By-pass Surgery

Standard Cost Profile for By-pass surgery

Service Unit	*Service Unit Name*	*Quantity*	*Variable Cost per unit*	*Fixed Cost per unit*	*Total Cost per unit*	*Total Var. Cost*	*Total Fixed Cost*	*Total Cost*
92	Diagnostic Tests		$ 200.00	$ 150.00	$ 350.00	$ 200.00	$ 150.00	$ 350.00
900	Education of available choices	1	$ 4.00	$ -	$ 4.00	$ 4.00	$ -	$ 4.00
500	Administrative Receiving charges	1	$ 30.00	$ 15.00	$ 45.00	$ 30.00	$ 15.00	$ 45.00
211	Nurse 'prep' time before surgery	1	$ 2.50	$ 0.50	$ 3.00	$ 2.50	$ 0.50	$ 3.00
300	Surgery	1	$ 2,200.00	$ 1,000.00	$ 3,200.00	$ 2,200.00	$ 1,000.00	$ 3,200.00
201	Nursing Care Level 1	2.5	$ 18.00	$ 0.30	$ 18.30	$ 45.00	$ 0.75	$ 45.75
202	Nursing Care Level 2	5	$ 10.00	$ 0.30	$ 10.30	$ 50.00	$ 1.50	$ 51.50
020	Meals	6	$ 2.41	$ 0.27	$ 2.68	$ 14.46	$ 1.62	$ 16.08
010	Housekeeping	2	$ 1.20	$ 0.40	$ 1.60	$ 2.40	$ 0.80	$ 3.20
015	Linen Services	1	$ 1.20	$ -	$ 1.20	$ 1.20	$ -	$ 1.20
131	Pharmacy	2	$ 151.00	$ 1.24	$ 152.24	$ 302.00	$ 2.48	$ 304.48
124	Laboratory Tests		$ 52.00	$ 48.00	$ 100.00	$ 52.00	$ 48.00	$ 100.00
901	Prevention Education	1	$ 6.00	$ -	$ 6.00	$ 6.00	$ -	$ 6.00
502	Administrative Billing charges	1	$ 40.00	$ 10.00	$ 50.00	$ 40.00	$ 10.00	$ 50.00
	Total					$ 2,949.56	$ 1,230.65	**$ 4,180.21**

After the SCP has been developed for an episode of care, one can see that at the end of the process a very specific dollar amount is reached concerning the total cost. In the above example, the total cost for providing a cardiac by-pass surgery to an average patient is $4,180.21. This number is meant also to be an indicator of the quality of care provided to the patient. If the total cost at the end of the episode is $2800, a team of doctors and administrators should investigate this $1300 discrepancy. The low cost could serve as an indicator that not all the steps outlined in the best practices were followed, thus bringing into question whether or not this patient received the best care possible. On the other end of the spectrum, if the cost of the surgery was $5400, then that same investigative team should take a look at the individual case of the patient to see if resources were overused. The team may find that the patient was already very sick and had an extremely costly pharmacy bill, the patient may not have been diagnosed correctly the first time, or the patient may have had complications during the surgery.

Example of Variance Analysis

The purpose of this cost accounting system is to help the hospital and doctor better understand their costs and to help improve the quality of care given to the patient. The numerical standards set using the SCP should be used as an indicator that something about this patient's case is different than what had been predicted. It is a way for management to effectively and efficiently investigate individual cases that deviate from the norm. These numerical standards are set up and put into action so that the actual numbers gathered can be compared to the estimated ones to determine if the organization is meeting its short-term and long-term goals. The standards shown here help one to evaluate the product produced by the healthcare

sector by evaluating the inputs into the actual process since the ‘outcome’ of the process is extremely difficult to measure. The comparison between the actual and estimated amounts allows the organization to make immediate adjustments to their service providing process to provide the highest level of care to the patient. It also allows the organization to reexamine the standards it set in the beginning. If the actual numbers keep coming up significantly larger or smaller than the estimated standard cost, then the data the accountants used to estimate the standards might not be representative of reality and the accountants will have to gather new data and create new standards. So, the standard setting process is like a living organism; it can constantly adapt to change and react to new information provided. Below is an example of how a variance analysis might work when used in the healthcare sector.

Illustration 5.
Variance Analysis of Service Unit 202

Service Unit	*Service Unit Name*	*Quant.*	*Variable Cost per unit*	*Fixed Cost per unit*	*Total Cost per unit*	*Total Var. Cost*	*Total Fixed Cost*	*Total Cost*
202	Nursing Care Level 2	5	$ 10.00	$ 0.30	$ 10.30	$ 50.00	$ 1.50	$ 51.50

Now, here are the ACTUAL numbers for last week.

200 by-pass surgeries were completed this quarter, 220 surgeries were estimated

900 Nursing level 2 hours were used this quarter, 1100 hours was estimated

Because of nursing shortages, wages were raised in order to keep the nurses we have…. 11.50/hour

I. Price Variance

PV is the difference between price paid and standard price used in budgeting process.

Price Variance = (acutal price - standard price) Actual Quantity

**if variance is positive, unfavorable variance

Ex. (11.50-10.00) x 900hours

Price Variance = 1350 unfavorable

II. Efficiency Variance

EV is the difference between actual quantity used and standard quant. used in budgeting process

It reflects productivity in production process.

Effi. Var = (acutal quantity - standard quantity) standard Price

**if variance is positive, unfavorable variance

Ex. (900-1000) x 10.30

Effi. Var= -1030 favorable

III. Volume Variance

VV is the difference between expected output and real output.

It is a factor to be considered in situations involving fixed costs.

Volume Var = (budgeted volume - acutal volume) avg. fixed cost/unit.

**if variance is positive, unfavorable variance

Ex. (220 - 200) x 1.50

Volume Var = 30 unfavorable

IV. Intensity Variance

IV reflects the difference between the quantity of service units it actually took to provide the servic versus the standard quantity listed in the SCP.

Intensity Var = (actual # of service units - standard # of service units) standard cost per SU.

**if variance is positive, unfavorable variance

Ex. (4.5 hours - 5 hours) x 10.00

Intensity Var = -5.00 favorable

The calculations done above can be applied to any service unit listed in the SCP. Armed with these variances, the investigative team can understand more clearly what caused the deviations from the standards. Did the price of resources go up or down, did the volume needed to provide the service go up or down, or were more service units needed to actually provide the service than was planned for?

For example, an unfavorable price variance of $1350 exists in the example above indicating that the actual price was greater than the estimated price. One reason for this variance could be that a shortage of nurses in healthcare caused a significant increase in their wages, which was not accounted for in the standard that was set. Therefore, the original standards need to be revised to reflect this change in the market environment.

A favorable efficiency variance of $1030 exists in the above example indicating that the actual quantity of nursing hours used was less than originally estimated. This means that nurses, on average, gave only 4.5 hours of care to the patient when the estimated time was 5.0 hours. Management would first try to figure out if the outcome of care for the patients treated during this time period was close to average or if it was less. If the outcomes of care while the nurses gave only 4.5 hours

of attention to each patient are the same as when the nurses gave 5.0 hours, then the standards might need to be re-examined and updated. If the outcome of care was lower than previously, then the investigative body would talk with the nurses and let them know that their performance was not sufficient and more time should be spent with the patients. Management should also be careful not to lay the blame on the performance of the caregivers alone. For example, one reason the nurses might be spending only 4.5 hours with the patient and not 5.0 hours could be that there is a staffing shortage at the hospital. One nurse can see only so many patients per day and spend so much time with each one. So, the 4.5 hours could be an indicator to management that more nurses are needed if the hospital is to provide quality care to its patients. All these questions and more can be addressed through variance analysis.

The theory explained above was presented to physicians in an attempt to capture their thoughts and concerns about pairing EBBP with standard cost accounting. The following sections explain the methodology used and present the nine physicians' responses to this theory.

V. Methodology

The author interviewed 9 physicians to record their responses to the proposal of tying standard costing techniques with EBBP. The author gathered and interpreted the data following a qualitative research methodology called Grounded Theory. Carla Willig in *Introducing Qualitative Research in Psychology* gives a brief introduction to Grounded Theory as follows:

> Grounded Theory was originally developed by two sociologists, Barney Glaser and Anselm Strauss. They were unhappy about the way in which existing theories dominated sociological research. They argued that researchers needed a method that would allow them to move from data to theory so that new theories could emerge. Such theories would be specific to the context in which they had been developed. They would be 'grounded' in the data from which they had emerged rather than rely on analytical constructs, categories or variables from pre-existing theories. Grounded Theory, therefore, was designed to open up a space for the development of new, contextualized theories. (Willig, 32)

Grounded Theory is a qualitative research tool used to develop a theory based on data gathered during fieldwork. When using Grounded Theory, the researcher is constantly doing a comparative analysis between the data already collected and new data; this process enables the researcher to identify categories in data and then explore the relationships that exist between those categories. After relationships are mapped, a theory can emerge from the data. Since the research being done in this project is exploratory in nature, Grounded Theory was chosen as the methodology because it is "designed to facilitate the process of 'discovery', or theory generation"(Willig, 32).

Briefly, qualitative analysis begins with a research question which can change as one gathers new data and maps new relationships. The researcher then goes into the field and collects data. Data collection is an ongoing process. After the initial data have been gathered, the researcher begins coding the data; the coding of data leads to the formation of categories and then to a mapping out of the relationships that exist within these categories.

In this project, the research question was 'What are physicians', who work in a hospital environment, reactions to and concerns with combining standard costing techniques with EBBP?'. After interviewing 7 physicians, the majority of concerns

could be placed into at least one of three categories: ethical concerns, implementation concerns, and barriers to implementation. Two more physicians were interviewed to test theoretical saturation; their responses fit into the three categories as well. Within each category, more categories and subcategories exist which allows for a full representation of the physicians' reactions. Several of the same concerns were found in each interview conducted. Nine interviews in all were conducted. The consent form is shown in Appendix C.

The interviews were free form. The author did not force an agenda upon the interviewee; the whole process resembled a conversation. The author gave a general explanation of cost accounting, introduced EBBP (all were familiar with EBBP already), explained the proposal of combing cost accounting with EBBP using visual aids like those shown in Appendix D, and then the author asked the research question. The doctors' responses are summarized in the following section.

This approach allows for a preliminary assessment of best practices and standardized costing, one that identifies the pros and cons of implementation, thereby enabling further research into the specific areas of concern.

VI. Physicians' Responses

When presented with the research question, the physicians responses fell into three main categories of concern: ethical concerns, implementation concerns, and barriers to implementation. Each of these categories contains sub-categories as well. For a graphical depiction of the relationships, please see Figures 1, 2, and 3 on pages 47-49.

Ethical Concerns

Eight of the nine physicians express concerns about the ethical implications of the theory. Five common areas of concern are: responsibility without authority, indicator versus reprimand, differing health values, data collections, and declining moral values in healthcare (see Figure 1).

Physicians are concerned that they will be responsible for costs that they have no authority over as in the case of residents, interns, emergency room physicians, and hospitalists. For example, Dr. Jones might be the admitting emergency room physician when a patient enters the hospital. But, every 12 hours the ER physicians (in this example) rotate patients. If the patient is hospitalized for two days, she will see several physicians. Dr. Jones does not want to be responsible for the tests the other doctors order, medication they prescribe, etc.

Physicians are also concerned about the use of variance analysis for performance evaluation. The interviewees do not want the variance analysis used as a reprimand or to carry punitive damages. If the variance analysis is used as an indicator that initiates discussion between the hospital and physician or between the physician and his partners, the physicians would have fewer ethical problems with using the analysis for performance evaluation.

The third ethical subcategory to develop from physicians' responses was concerns about different values between patients, doctors, and EBBP. EBBP are developed by agencies on the basis of scientific thought, generally without regard to other concerns. For example, some patients may not agree to blood transfusions for religious purposes. Another example of differing health values would be a patient who is diabetic and overweight. A physician who has treated this patient as primary

care physician for five years has educated the patient each visit about how being over-weight and diabetic can generate many more health problems for the patient. The patient each time chooses not to begin an exercise program; the patient holds differing health values than the doctor. Some physicians feel that imposing EBBP directly on every patient will not be an effective means of measurement because not all patients hold the same health values as the EBBP extol.

Anonymous data collection is another ethical concern mentioned. The information shared between a patient and the physician is confidential. Therefore when data is collected for the purpose of compiling the cost of an entire episode of care, patient identifiers should not be attached to the data. This makes tracking repeat visits to the patient's original episode of care close to impossible. For example, if a 73-year old woman has just been released from the hospital for circulation problems related to diabetes and then is re-admitted the following week because of breathing problems, the two are probably related. But, this relationship will not show up in the data collected because patient identifiers should not be attached to the cost data.

The last category to emerge regarding ethical concerns is the concept of declining moral and ethical values in healthcare. As services to patients are viewed as products, doctors are afraid that the actual care may become business like and impersonal. Some doctors are afraid they will loose the ability to treat the individual patient if EBBP are taken to extremes and no leeway is provided for treatment of patients using an individual care path.

Implementation Concerns

The second major category that developed during the interviews was physicians' concerns regarding the implementation of the proposal. Their responses

can be sub-divided further into three secondary categories: gathering data, actual implementation, and maintenance (see Figure 2).

To have the best possible sample of cost data, the interviewees suggest several things to be cautious of when gathering data. For example, two interviewees stress that the entire episode of care should be traced. That is, do not simply track the cost of running a specific diagnostic test by itself and then the cost of surgery by itself and then the cost of nursing hours by itself. Track these costs as a group for each episode of care treated. For example, track the diagnostic lab work, nursing hours, surgery time and costs, and recovery time of a patient who undergoes by-pass surgery. Compare this cost data with other by-pass surgery patients within the same hospital and see where the hospital and doctors stand in comparison to the standards they have set. When attempting to track this entire episode of care, it would be beneficial to track the patient from the in-patient facility to the outpatient facility. Other suggestions for gathering data are to use a large database, take into consideration the demographics of the patients being treated, and track the time it takes for patients to access healthcare services. Two interviewees suggest looking at common chronic diseases and conditions first because these tend to have more generally accepted EBBP and also have more reliable and larger data collections regarding cost. Such common conditions are diabetes, arthritis, heart disease, and asthma. Also, three physicians recommend that the researcher take into account co-morbid conditions when trying to track an entire episode of care. An example of a co-morbid condition is an overweight diabetic with heart disease. If this patient has by-pass surgery, the patient would have a greater chance of complications during the surgery than

someone who has only heart disease. If this surgery's cost is higher than the average standard cost, the increase cost is because of the co-morbid condition and not due to the over utilization of resources by the doctor.

With regard to the actual implementation of the proposal, the interviewees' responses fell into five categories: case-mix adjustments, uniform comparisons, patient rotations, incentives for doctors, and quality measures (see Figure 2).

Two physicians stress the importance of case-mix adjustments when implementing the proposal. These adjustments help to ensure the data gathered represents the patients the hospital admits. The adjustment is needed in situations where a hospital uses standards created by another institution. Data representative of patients in a hospital that serves middle-class patients is not representative of patients in a hospital that serves low-income patients. The patients' demographics are different, education levels are different, and amounts of preventative care are different. A case-mix adjustment allows the low-income hospital to adjust and use the data gathered at middle-income hospital through using weighted equations.

Uniform comparisons need be taken into consideration as well when implementing the proposal. For example, one should not compare Erlanger's cost data for a cardiac arrest to a rural Tennessee's cost data. Erlanger has a state-of-the-art cardiac treatment center; the hospital has its own emergency center for cardiac arrests that is separate from the general emergency unit; therefore, comparing Erlanger's costs to a rural hospital's costs is not a uniform comparison. Other factors contribute to an unfair comparison such as the demographics of the community in

which the hospital operates, the percentage of uninsured patients admitted to the hospital, etc.

Another implementation concern involves variance analysis and patient rotations. The admitting doctor is not always the one who takes care of the admitted patient; the doctors in a hospital actually rotate the patients they see every couple of days. This would make variance analysis more difficult to do because one doctor is not responsible for all the costs incurred during that defined episode of care.

The fourth implementation concern to emerge from the data was physician incentive. What will be the motivation for physicians to help gather the cost data for the hospital and to follow EBBP? The reason this is a concern is because hospitals and doctors get reimbursed in different ways. Dr. A gets paid the same amount no matter what the outcome of the surgery is or how the surgery is performed because she is reimbursed at fixed rates according to DRG codes. Dr. A can choose to use a new state-of-the-art laser stapler that just came on the market or she can use the 'older' regular stapler. With either stapler, the patient receives the same outcome of care. Most doctors, in the opinion of an interviewee, choose the newer method because it is more fun or they just like it; generally, they will not be worried about the added cost to the hospital of purchasing the new laser stapler. Hospital reimbursement is determined by CPT codes; the hospital gets reimbursed a set amount of money for each patient no matter how many days a patient is in the hospital. For example, Mrs. Blue may be in the hospital for 9 days after her surgery, but if the CPT code allows only 7 days for the procedure, the hospital is reimbursed for only 7 days worth of care. One can see where the hospital is very financially concerned about the amount

of money and time it takes to treat a patient while the doctors have no financial reason to be concerned about how long a patient stays in the hospital. The real crux of the situation is that hospitals cannot cut costs that physicians find important (new laser stapler) because the physicians can choose to work at another hospital which would take patients and revenue away from one hospital and to another. Now, one can see why some additional incentive for the physicians would be beneficial in the gathering of data and the actual implementation of the proposal.

When implementing the proposal, one physician suggests looking at quality outcome measures such as complications or infections after surgery. If a doctor follows an EBBP but his patient has a high number of infections, the patient may be diagnosed incorrectly or the patient may have an additional medical condition that needs treated. Viewing outcome measures as quality measures not only helps improve patient care directly, as in the example above, but also is helpful during physician reviews. The reviewer can study the doctor's number of post-surgery infections and complications and compare that number to the number of times she diverged from EBBP.

The third sub-category to develop under implementation concerns was the maintenance of EBBP. Once a hospital or group of practicing physicians adopts specific EBBP, how will these EBBP be disseminated and who will be responsible for monitoring the changes in EBBP? What is considered EBBP today might not be the best way to treat the disease in seven months. In response to these questions, one interviewee stated that any physician who subscribes to journals related to his professional field, keeps abreast of current issues in his field, and thoughtfully attends

conferences in his field, knows when a standard has been replaced with another. A conflict between knowledge and practice does not seem to exist.

Barriers to Implementation

The last main concern to develop was specific barriers that could impede the implementation of the proposal. Five barriers to implementation are: financial resources, limitations of EBBP, financial training, hesitancy to view medical services as a business, reimbursement and motivation (see Figure 3).

Financial resources may be a limiting factor in the implementation of the proposal. The technology to collect the cost data, analyze it, and integrate standard costing with EBBP would be expensive. Most hospitals are hard pressed to balance budgets without adding a large expense that does not directly generate revenue immediately.

Another barrier is imbedded in EBBP itself; EBBP do have limitations. As mentioned before, the patient population being treated with EBBP may have different health values than their doctors. Also EBBP are based on scientific studies conducted predominantly on white males; therefore, the EBBP are biased towards white males. Different ethnic groups may have different symptoms, different drug reactions, or be more susceptible to a specific disease than the white male. Thus, since the EBBP are based primarily on white males, they are distorted when applied to any group that isn't predominantly white male. Another factor that causes the distortion to become even more extreme is the language barrier that exists between the doctors, who are predominantly white males, and the patients who are becoming more and more diverse. Also, according to one interviewee, the patients who belong to an ethnic minority group are more likely not to participate in scientific studies because they

think they are being used as guinea pigs. The physician feels the root of this problem can be traced back to the language barrier and miscommunication. Still another limitation of EBBP is the hostility from some in the medical field towards evidence based medicine. Some physicians feel they are being told how to treat their patients by someone who is not present to examine the patient. EBBP are sometimes referred to as 'cookbook medicine'. At times, doctors feel their independence as a qualified medical doctor is infringed upon and their previous years of experience in the medical field must take second place to standards being forced upon them by 'outsiders'.

A third barrier in the implementation process is that most physicians lack financial training. Studying costing issues and budgeting within their own practice can seem dull, tedious, irrelevant, and maybe not even worth their time. Physicians do spend a lot of time focusing on their patients and keeping up-to-date on new medical news and breakthroughs and feel frustrated when asked to know about financial budgeting as well. But the service they are providing is a business and for a business to be successful, i.e. generate enough revenue to cover expenses, the owner needs to know the cost of the product or service provided to determine an appropriate price. Since the price is usually negotiated before hand for doctors, it is even more important for a physician to understand his costs and how they operate.

Viewing the medical services provided by physicians as a business is the fourth barrier in implementing the proposal. A strong sentiment exists within the medical community that if the services provided by a physician are seen as a business, more and more ethical values will be lost. Instead of viewing the patient as

an individual in need of medical help, the physician would be more apt to see the patient as a paycheck.

The last barrier to emerge from the interviews was that reimbursement doesn't necessarily lead to motivation. One physician explained this concept by classifying physicians as good and bad. A good physician, Dr. A, is one who stays abreast of current issues in his field, thoughtfully attends specialty conferences, thoughtfully reads specialty journals, and in general is concerned about quality of patient care. A bad physician, Doctor B is one who sees his services as a job and does only enough to get by. Doctor A and Doctor B get paid the same amount of money for doing the same surgery even if Doctor B's patient has an extremely long recovery time because of post-surgery infections or because of complications during surgery. The reason for this is that physicians get reimbursed, generally, according to DRG codes, not according to how well the service is provided. So, from this point of view, there is no monetary incentive for following EBBP or even being concerned about the *overall* cost of the surgery.

The three categories presented above depict physicians' resistance and skepticism about evidence based medicine by itself and the prospect of combing EBBP with standard costing. But, the healthcare industry is in the process of making evidence based medicine a crucial part of the delivery of care. For example, some hospitals are now employing specialists called intensivists. These doctors are specially trained and certified in critical care medicine and work in the Intensive Care Unit (ICU). Intensivists focus on standardized evidence based care when treating their patients. Studies have shown that these critical care physicians can decrease

mortality rates by as much as thirty percent, decrease length of ICU stay, decrease length of hospital stay, and decrease complications (Stickler). As evidence based best practices becomes more mainstream in the healthcare profession, doctors will probably be more willing to accept an accompanying standard costing system. As new technology becomes available, combining standard costing systems and evidence based medicine becomes more and more feasible. Robots are already being used in some hospital pharmacies to decrease pharmacy costs and decrease errors in patient dosage. Electronic handheld equipment can be used to keep track of patient data and send updates to the pharmacy regarding prescriptions and dosages. This equipment also allows for easy and quick communication of patient records from one doctor to the next and is a convenient way to consult EBBP checklists.

Future research in this area could prove rewarding for the researcher, the healthcare industry as a whole, and the patients.

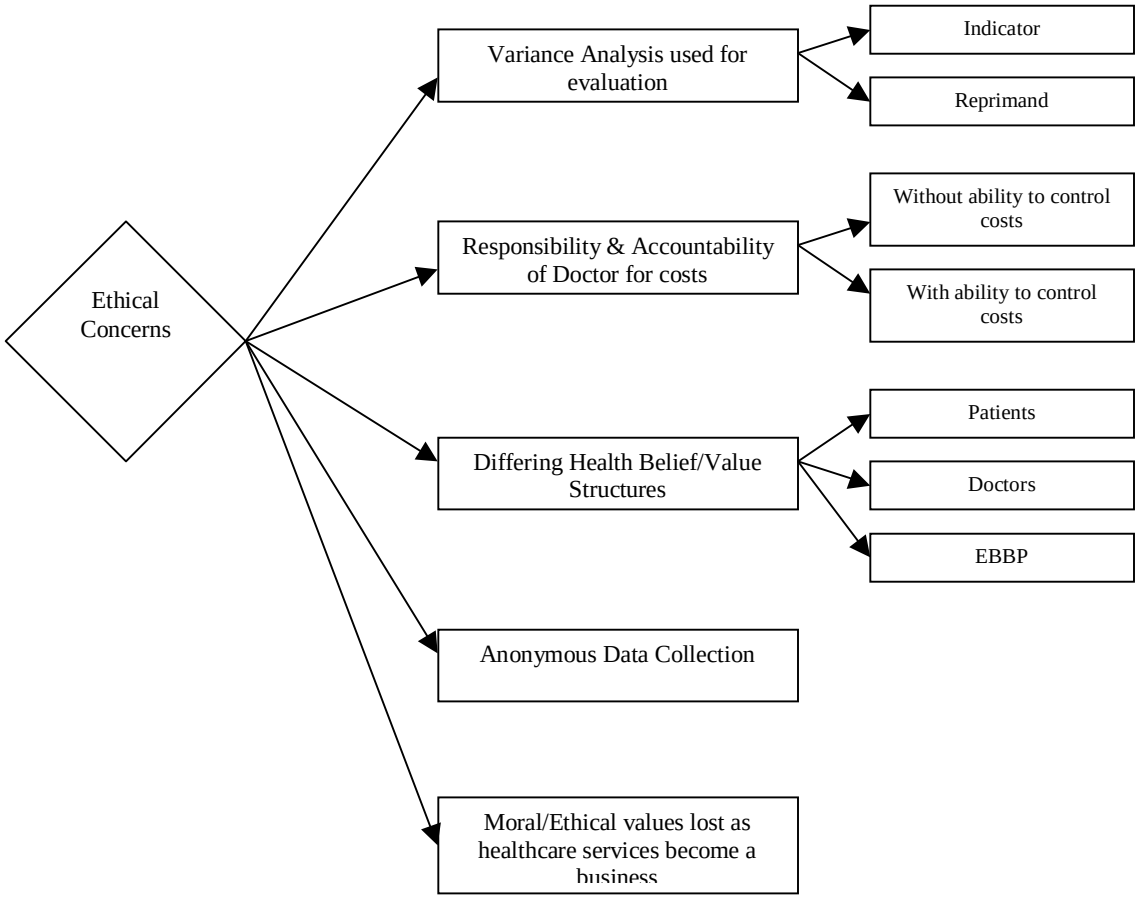

Fig. 1. Ethical Concerns

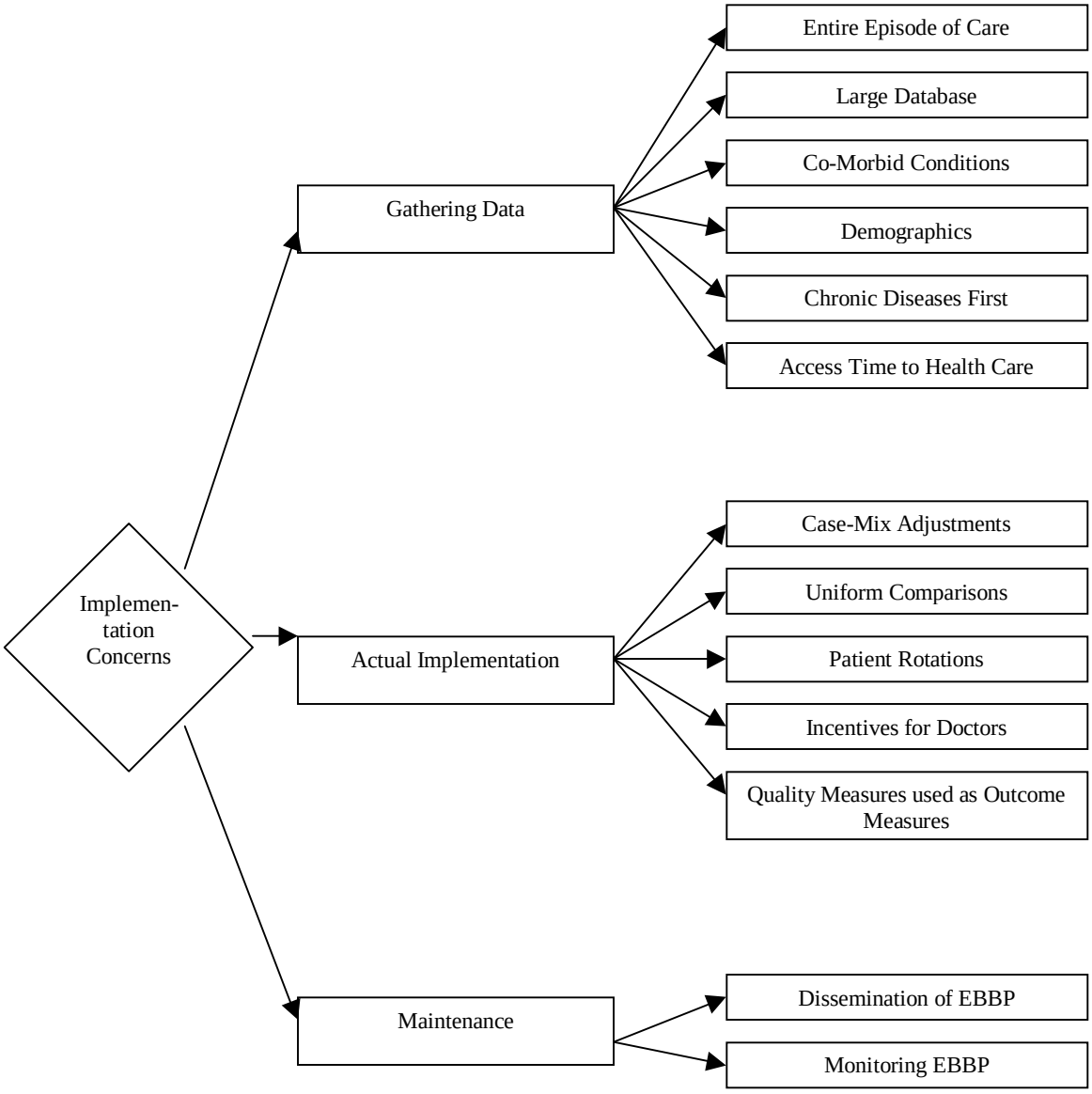

Fig. 2. Implementation Concerns

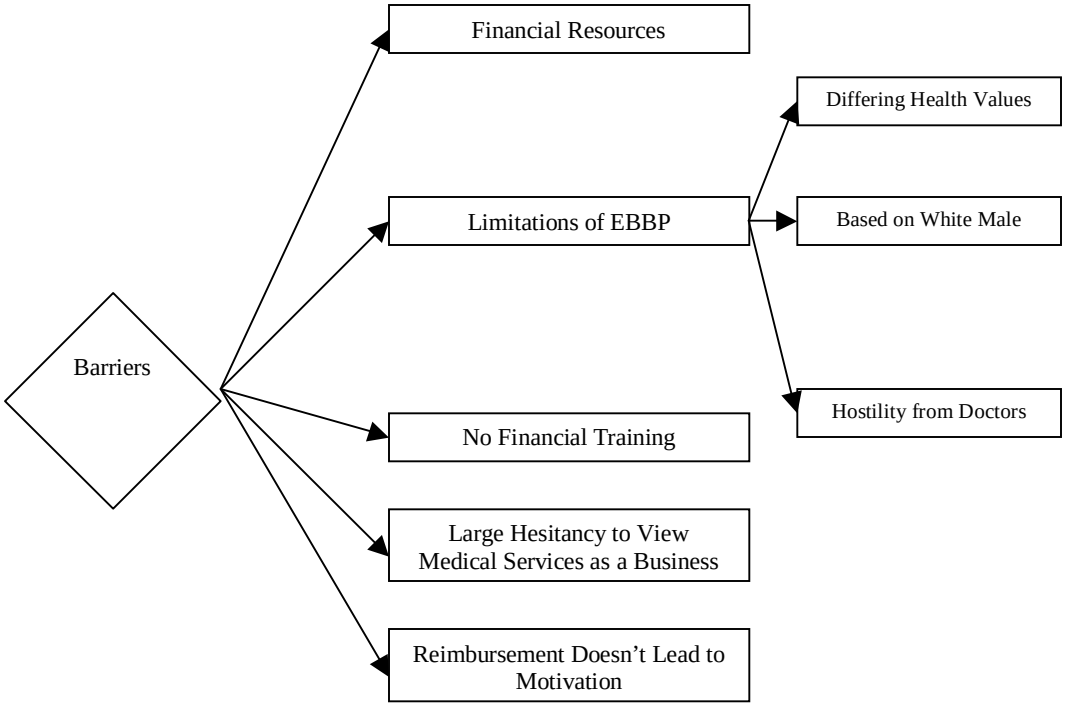

Fig. 3. Barriers to Implementation

VII. Conclusion

This study has examined the possibility of combining standard costing with evidence based medicine to measure the quality of care received as a function of the cost of care. The results of the study suggest that, while the implementation would be difficult, it is practically possible. Theoretically, the implementation would provide improved outcomes of care, reduced costs for the provider, and a quantitative means for physician evaluation. According to the exploratory research conducted, all the physicians mentioned three areas of concerns (ethical concerns, implementation concerns, and barriers to implementation) when presented with the proposal. The author believes of the three concerns addressed, ethical concerns are the most significant because providing answers to these issues may help physicians overcome their resistance to the proposal. The implementation of the proposal rests on physicians' acceptance of the model. If ethical concerns are thoroughly explored and discussed, then the proposal has the greatest possibility of moving out of the theoretical realm and into the 'real world'.

The healthcare industry is facing pressure from patients to deliver the highest quality of care possible and pressure from its organizational and financial structure to deliver quality care within a capitated reimbursement structure. This proposal could help hospitals with both the quality of care given to the patients and the cost of that care, but not without future research. Additional research is needed to explore the three major concerns examined here and to refine and enhance that list. The researcher should also look for ways to expand the theory to implement it; one approach could be to focus research efforts on one common chronic condition. Two

doctors suggested using diabetes as the first condition for which to gather the cost data. Because of the aging population in the United States, the Veterans Administration has extensive data collections on diabetes already. Also, the evidence based best practices for treating and caring for diabetic patients is largely followed by doctors because they can directly observe an improvement or regression in their patients' outcomes. For example, if the proper guidelines are followed, a physician can see a decrease in the amount of sight loss his diabetic patients experience. The goal of future research should be to persuade accountants, physicians, hospital administrators, and financial analysts to work together; if they pool their resources, the proposal may very well be implemented

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Appendix A. Definition and Example of DRG

Diagnosis-Related Groups (DRGs) are the basis for the prospective payment system. Cleverley gives a brief history and definition of the DRG system in *Essentials of Health Care Finance.* An excerpt is below.

> The basis of PPS payment is the DRG system developed by Yale University. The DRG system takes all possible diagnoses from the *International Classification of Diseases, 9th Revision, Clinical Modification* system and classifies them into 25 major diagnostic categories based on organ systems […] These 25 categories are further broken down into 511 distinct medically meaningful groupings called DRGs. Medicare contends that the resources required to treat a given DRG entity should be similar for all patients within a DRG category."
>
> (Cleverley, 22).

A few examples of the DRG codes follow: DRG 426 is depressive neuroses, DRG 480 is a liver transplant, DRG 236 is fractures of hip and pelvis.

Appendix B. Example of an EBBP checklist

The American Association of Clinical Endocrinologists has published an EBBP checklist for the management of diabetes mellitus. The original medical guidelines were released in January of 2000 and were revised in January 2002.

The checklist is available online at http://www.guideline.gov/summary/summary.aspx?doc_id=3172&nbr=2398&string=diabetes . This checklist is primarily a tool for physicians but can be viewed by the public as well. Physicians are permitted to copy this checklist and use it during their practice, but due to copyright issues, the author cannot reproduce or retransmit the checklist without written permission of American Association of Clinical Endocrinologists/ American College of Endocrinology.

Appendix C. Consent Form Presented to Physicians Interviewed

Consent Form
For Interview with Elizabeth Luckey
Regarding Best Practices, Standardized Costing Methods and Healthcare

I realize that by my participation in this interview I am consenting to allow the interviewer to use my responses in her Departmental Honors Research Paper. I understand that my identity will NOT be revealed, that my participation in this study is voluntary, and that my information will be kept confidential.

Appendix D. Visual Aids Used During Interviews.

1. Standard Treatment Profile

Diagnostic Tests
Education of available choices
Administrative Receiving charges
Nurse 'prep' time before surgery
Surgery
Hours of nursing care/day
Meals
Housekeeping
Linen Services
Pharmacy
Preventative Education
Administrative Billing charges

Average total time patient in hospital = two days

2. Cost Breakdown for Service Unit 131

Pharmacy costs for regular coronary by-pass surgery patient - Service Unit 131

Direct Costs	*Variable Units*	*Fixed Units*	*Unit Cost*	*Variable Cost*	*Fixed Cost*	*Total Cost*
Direct Materials						
Drug ABD	1.00	0.00	$ 10.00	$ 10.00	$ -	$ 10.00
Drug XYZ	3.00	0.00	$ 32.00	$ 96.00	$ -	$ 96.00
Drug MNO	1.00	0.00	$ 45.00	$ 45.00	$ -	$ 45.00
Direct Labor						
Pharmacists	0.00	1.00	$ 0.99	$ -	$ 0.99	$ 0.99
Total Direct Costs				$ 151.00	$ 0.99	$ 151.99
Allocated Costs						
housekeeping services	0.00	0.10	$ 1.00	$ -	$ 0.10	$ 0.10
overhead	0.00	1.00	$ 0.15	$ -	$ 0.15	$ 0.15
Total Allocated Costs				$ -	$ 0.25	$ 0.25
Total Costs				$ 151.00	$ 1.24	**$ 152.24**

Calculations	
Salary of pharmacists	90000
number of pharmacists	8
Total cost/year	720000
# of patients/year	730000
cost/patient	0.99

3. Standard Cost Profile

Standard Cost Profile for By-pass surgery

Service Unit	*Service Unit Name*	*Quantity*	*Variable Cost per unit*	*Fixed Cost per unit*	*Total Cost per unit*	*Total Var. Cost*	*Total Fixed Cost*	*Total Cost*
92	Diagnostic Tests		$ 200.00	$ 150.00	$ 350.00	$ 200.00	$ 150.00	$ 350.00
900	Education of available choices	1	$ 4.00	$ -	$ 4.00	$ 4.00	$ -	$ 4.00
500	Administrative Receiving charges	1	$ 30.00	$ 15.00	$ 45.00	$ 30.00	$ 15.00	$ 45.00
211	Nurse 'prep' time before surgery	1	$ 2.50	$ 0.50	$ 3.00	$ 2.50	$ 0.50	$ 3.00
300	Surgery	1	$ 2,200.00	$ 1,000.00	$ 3,200.00	$ 2,200.00	$ 1,000.00	$ 3,200.00
201	Nursing Care Level 1	2.5	$ 18.00	$ 0.30	$ 18.30	$ 45.00	$ 0.75	$ 45.75
202	Nursing Care Level 2	5	$ 10.00	$ 0.30	$ 10.30	$ 50.00	$ 1.50	$ 51.50
020	Meals	6	$ 2.41	$ 0.27	$ 2.68	$ 14.46	$ 1.62	$ 16.08
010	Housekeeping	2	$ 1.20	$ 0.40	$ 1.60	$ 2.40	$ 0.80	$ 3.20
015	Linen Services	1	$ 1.20	$ -	$ 1.20	$ 1.20	$ -	$ 1.20
131	Pharmacy	2	$ 151.00	$ 1.24	$ 152.24	$ 302.00	$ 2.48	$ 304.48
124	Laboratory Tests		$ 52.00	$ 48.00	$ 100.00	$ 52.00	$ 48.00	$ 100.00
901	Prevention Education	1	$ 6.00	$ -	$ 6.00	$ 6.00	$ -	$ 6.00
502	Administrative Billing charges	1	$ 40.00	$ 10.00	$ 50.00	$ 40.00	$ 10.00	$ 50.00
	Total					$ 2,949.56	$ 1,230.65	**$ 4,180.21**

4. Variance Analysis

Service Unit	*Service Unit Name*	*Quant.*	*Variable Cost per unit*	*Fixed Cost per unit*	*Total Cost per unit*	*Total Var. Cost*	*Total Fixed Cost*	*Total Cost*
202	Nursing Care Level 2	5	$ 10.00	$ 0.30	$ 10.30	$ 50.00	$ 1.50	$ 51.50

Now, here are the ACTUAL numbers for last week.

200 by-pass surgeries were completed this quarter, 220 surgeries were estimated

900 Nursing level 2 hours were used this quarter, 1100 hours was estimated

Because of nursing shortages, wages were raised in order to keep the nurses we have…. 11.50/hour

I. Price Variance

PV is the difference between price paid and standard price used in budgeting process.

Price Variance = (acutal price - standard price) Actual Quantity

**if variance is positive, unfavorable variance

Ex. (11.50-10.00) x 900hours

Price Variance = 1350 unfavorable

II. Efficiency Variance

EV is the difference between actual quantity used and standard quant. used in budgeting process

It reflects productivity in production process.

Effi. Var = (acutal quantity - standard quantity) standard Price

**if variance is positive, unfavorable variance

Ex. (900-1000) x 10.30

Effi. Var= -1030 favorable

III. Volume Variance

VV is the difference between expected output and real output.

It is a factor to be considered in situations involving fixed costs.

Volume Var = (budgeted volume - acutal volume) avg. fixed cost/unit.

**if variance is positive, unfavorable variance

Ex. (220 - 200) x 1.50

Volume Var = 30 unfavorable

IV. Intensity Variance

IV reflects the difference between the quantity of service units it actually took to provide the servic versus the standard quantity listed in the SCP.

Intensity Var = (actual # of service units - standard # of service units) standard cost per SU.

**if variance is positive, unfavorable variance

Ex. (4.5 hours - 5 hours) x 10.00

Intensity Var = -5.00 favorable