

# CLINICAL ROI: NOT JUST COSTS VERSUS BENEFITS

## A B S T R A C T

*Although sophisticated economic modeling can be used to quantify intangible benefits, ROI calculations for clinical information systems are driven more by the values and strategic direction of an organization than by any other considerations. But investing in clinical information tools to ensure quality and patient safety is, in reality, required as a cost of doing business and functioning as a safe hospital.*

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**R**eturn on investment calculations provide organizations with critical information on which to base capital decisions. A recent survey from the Medical Records Institute (Fifth Annual Medical Records Institute's Survey of Electronic Health Record Trends and Usage) indicated that survey respondents view funding as the greatest challenge to implementing an electronic health record.<sup>1</sup>

Although payers, including the government, have expressed interest in increasing reimbursement to organizations that invest in technology that improves patient safety, for example, little evidence exists that widespread programs such as these are about to emerge. In contrast, budget problems at both the federal and state levels probably indicate smaller reimbursement payments rather than increases in the future. In addition, the recent trend in healthcare premiums is up rather than down. Healthcare costs are now increasing at close to double-digit levels, frightening some analysts to think the days of rampant inflation in healthcare, like that which occurred in the 1980s, are ahead of the industry.

## Industry

Increased competition, rising costs, and limited budgets are not unique to healthcare. All industries, when faced with these challenges, must make difficult decisions on where and how to invest their limited capital.

Over the past 25 years, Federal Express (FedEx) became synonymous with guaranteed overnight delivery. Some consider FedEx to be the inventor of the entire overnight package delivery business. Although others such as the United States Postal Service, United Parcel Service, and Airborne compete aggressively head-to-head with FedEx, none are able to seriously erode market share.

In the face of strong business competition, changing market dynamics, and shifting economic fortune, FedEx continually makes capital investments in its business. Clearly, its success must be based upon solid business practices such as the performance of return on investment (ROI) studies for all major capital allocations. It would be impossible for any organization to be successful over the long term without measuring what they are managing.

## K E Y W O R D S

*Return on investment  
Intangible benefits*

*Composite index  
Length of stay (LOS)*

*Tangible benefits  
Investment*

Nevertheless, common sense suggests that FedEx does not do an ROI study on every investment they make. It is not practical to do so given the volume of decisions that are made each day in an organization of its size.

For example, every overnight package requires a truck for delivery. The truck needs to be in working order, reliable, and of appropriate size and functionality to satisfy its mission. Buying trucks, upgrading trucks, and replacing trucks are part of the cost of doing business. Without this investment, FedEx would not exist. Of course, the company "runs the numbers" on the number and types of trucks to buy, when to upgrade, and when to repair, but FedEx cannot afford to not buy trucks. Without trucks, FedEx cannot deliver packages.

The same concept is true in healthcare. No modern hospital can exist without patient rooms, a laboratory, or even easy access to CT and MRI imaging devices. The recent emphasis on patient safety, supported by Institute of Medicine reports, The Leapfrog Group, and government initiatives such as those by the Agency for Healthcare Research and Quality, presents hospitals with further pressures to expend capital on technology, particularly clinical information technology that can enhance and ensure patient safety.

In some respects patient safety-related clinical information technology is synonymous to trucks for FedEx — a required investment and an item for conducting business. ROI, therefore, is becoming not a means to decide on making an investment, but rather an analysis to choose the right investment for an organization. This change places a new burden on hospital senior management as they now have less flexibility in delaying many of their investment choices.

#### **CPI and Value of Healthcare**

The Bureau of Labor Statistics uses the years 1982-1984 as the baseline for comparing consumer prices, with the value 100 used as a reference point. This measure is used to monitor changes in prices of a standard basket of goods and services. In 1982 the annual year-over-year percent change in the consumer price index (CPI) was about 8 percent.<sup>2</sup> Today it is close to 2 percent. Similar calculations are made for a basket of healthcare services.

In contrast to the general CPI, the medical CPI year-over-year changes exceed the general CPI changes in almost every year since 1982. Today, the medical CPI is higher than the general CPI, and it is predicted that this will continue for the next several years. One could conclude from this data that healthcare costs are increasing at a faster rate

than other goods that make up the CPI. In fact, that might not be the case if other facts are considered.

To illustrate this point, let us first consider automobiles. No one would argue that automobiles are more expensive today than they were 20 years ago. Also, let us assume that automobiles cost twice as much today as they did in 1982. Does that mean that the inflation rate over this 20-year period for automobiles was 100 percent? Such a conclusion assumes that an automobile today is identical to an automobile of 1982. One can easily argue that automobiles today are safer, less polluting, more reliable, and more comfortable. If the quality and utility of an automobile today exceeds that of 20 years ago, then the inflation rate of 100 percent is not really accurate. Why? We receive

much more value for the higher price we pay for an automobile today.

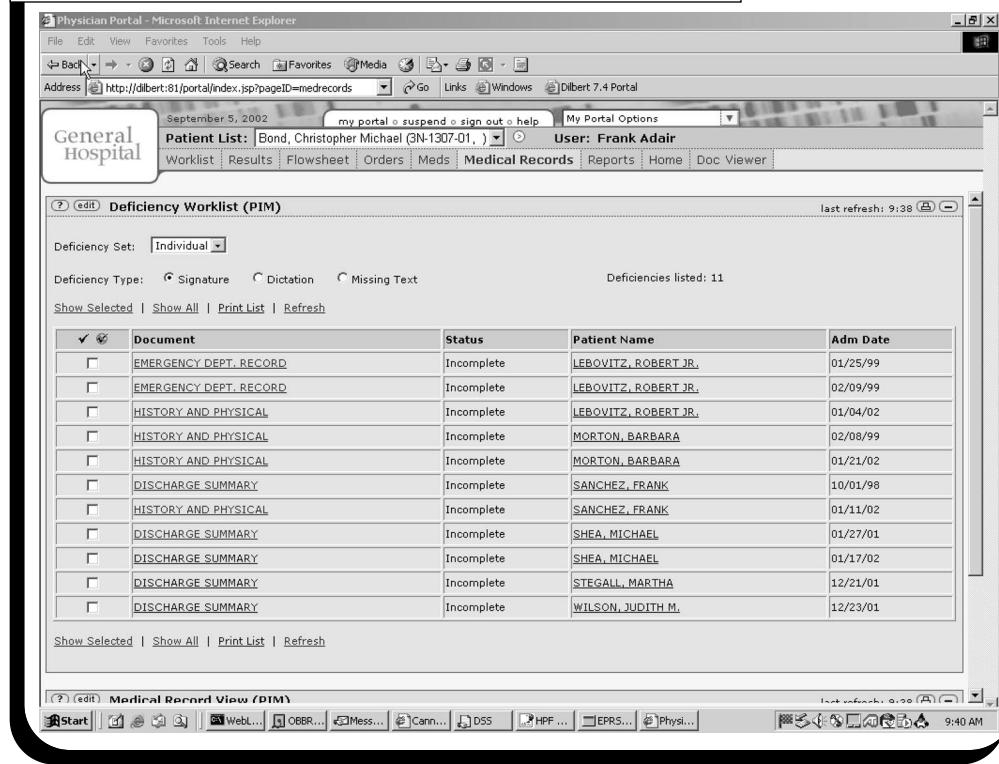
The same applies to healthcare. Today, patients of equal morbidity are generally brought to a state of wellness with better outcomes (e.g., functionality, less discomfort, etc.) much more quickly than 20 years ago. This is especially true over the past decade due to the introduction of very powerful and effective medications, which replaced invasive therapies that delivered lesser outcomes. Therefore, what we pay for healthcare today, although higher than

20 years ago, is not really comparable to what we "purchased" 20 years ago. The value of care today exceeds what we received in the past. It is open to much debate how much greater that value is, although almost everyone would agree that there is greater value.

#### **Scitovsky, Barzel, and Feldstein**

More than 40 years ago, economist Anne Scitovsky recognized that all inputs in healthcare were not equal and that calculating healthcare costs by adding up the costs of the inputs (e.g., hospital days, physician visits, drugs, etc.) did not take into account the fluctuating number of illnesses that occurred each year and how those illnesses were treated.<sup>3</sup> Inherently, some illnesses cost more money to treat than others. Scitovsky proposed the development of separate indexes of the treatment costs for specific illnesses, and the combining of those indexes into a composite index. The composite index would be constructed by weighting each illness's specific index using a base year for the weighting. This process is similar to that which is used to construct the CPI.

Assuming a base year, this approach also takes into account changes in the quality of inputs. To illustrate, let us consider the average inpatient cost of treating a disease.

**Figure 1. Example of a physician portal providing patient data**

This is simply calculated by multiplying the average lengths of stay (LOS) by the average cost per inpatient day. With advances in treatment and technology, a disease may have its average LOS decrease by, for example, 10 percent. If at the same time the cost per average inpatient day increases by 25 percent, traditional calculation of medical care inflation would report an inflation rate of 25 percent, ignoring the savings that accrue from a decrease in the average LOS for that disease. Said another way, we would see that the total cost for those inpatient days increased even though the total number of inpatient days decreased.

The quality of inputs, in this case advancement in treatment that makes the patient healthy faster, does not factor into these traditional inflation calculations even though it does impact total costs for treating the disease. In contrast, Scitovsky's composite index better reflects changes in quality and subsequent decreasing LOS as it takes into account new medical products and techniques.

Scitovsky also recognized that the index should reflect changes in output and those treatments that reduced morbidity and mortality must be factored into her index. She proposed that, for each index, a single objective indicator of quality be chosen, and that this indicator be used to adjust each illness index before calculation of the composite index.

Yoram Barzel built upon Scitovsky's idea by suggesting that the prevention of disease must be calculated into the

composite index as well. For example, expenditures on immunizations to prevent polio must be countered by the cost savings associated with preventing a case of polio. As the healthcare economist Paul Feldstein so simply stated: "The prevention of a case or illness clearly represents an output that is superior to the successful treatment of a similar case, but if we concentrate on the costs per case of treating specific illnesses when they occur, we ignore the influence of preventive medical care."

Scitovsky, Barzel, and Feldstein all realized that there was more to evaluating healthcare expenditures than the raw numbers presented in spreadsheets documenting utilization and its associated costs.

### Realities of ROI

While it might be useful as an academic exercise to explore the theories of healthcare inflation and the value of services, the realities of today's actual care environment must be considered. Organizations grounded in the details of providing care, while managing budgets affected by reimbursement rates, must still make critical decisions that will assuredly impact the organization's long-term viability. Morally they are driven by their belief in offering the highest quality of care possible to every patient. In addition to clinical tools such as MRI machines and completely outfitted critical care units, this means offering their clinical staff the best clinical information technology tools available.

They also must be attentive to the marketplace. Organizations are driven by the requirements of payers and their representative groups such as the Leapfrog Group. In addition, the needs of their medical staff may cause organizations to implement systems just to "keep up with the Joneses."

Lastly, financial considerations weigh heavily on organizations, dictating what initiatives they can and cannot afford to move forward. Taken together, organizations struggle mightily with these competing pressures to develop a practical plan for clinical information technology investment.

Although difficult, there are various measurements that can be used in determining a ROI on clinical information

technology solutions. Some of the measurements can be viewed as delivering hard, tangible monetary values, while others require a bit of finesse to truly measure the benefits in financial terms. Nevertheless, it is important to document both tangible and intangible benefits and use the results in the process of measuring or estimating the ROI on any clinical information system.

### Opportunities for ROI: Measurable Results

A long-time measurement of ROI has been length of stay (LOS). Whether evaluating the introduction of a new therapeutic modality, modification of a clinical process, or employment of a standardized care plan, LOS can be easily measured in monetary terms through the use of widely deployed hospital information systems, and linked to a definitive impact on hospital costs. Even fractional reductions in LOS can deliver substantial financial benefits, through both the reduction in cost per case as well as an increase in hospital capacity. In the face of the growing shortage of hospital beds, benefits accrue from the greater utilization of fixed assets and costs (e.g., hospital plant and equipment and staffing expenses). The additional patients treated with the same assets then generate additional revenue, making the entire hospital more efficient.

Hospitals that can capture the increasing demand for services with existing infrastructure will obtain a significant financial advantage over competitors. Examples of clinical information systems that can help reduce LOS include computerized physician order entry/clinical decision support (CPOE/CDS) systems and physician portals (see figure 1). CPOE/CDS can facilitate putting patients on treatment regimens that are more likely to get them well quickly. Physician portals offer physicians accurate, up-to-date patient information via the web, allowing them to react to clinical data promptly even when not in the hospital.

Properly deployed clinical information systems provide staffing efficiencies that allow a fixed number of staff members to treat a greater number of patients. Efficiencies occur through improved communication of treatment plans with less time spent clarifying orders and the elimination of unnecessary efforts. For example, CPOE/CDS delivers to each care team member the exact assignments that require completion. Each staff member can then organize the workload to maximize efficiency. In addition, managers can structure the work environment to make the overall workflow more efficient and thereby obtain the greatest level of staff productivity. As efficient processes are more

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**Figure 2. Example of Care Guidelines**

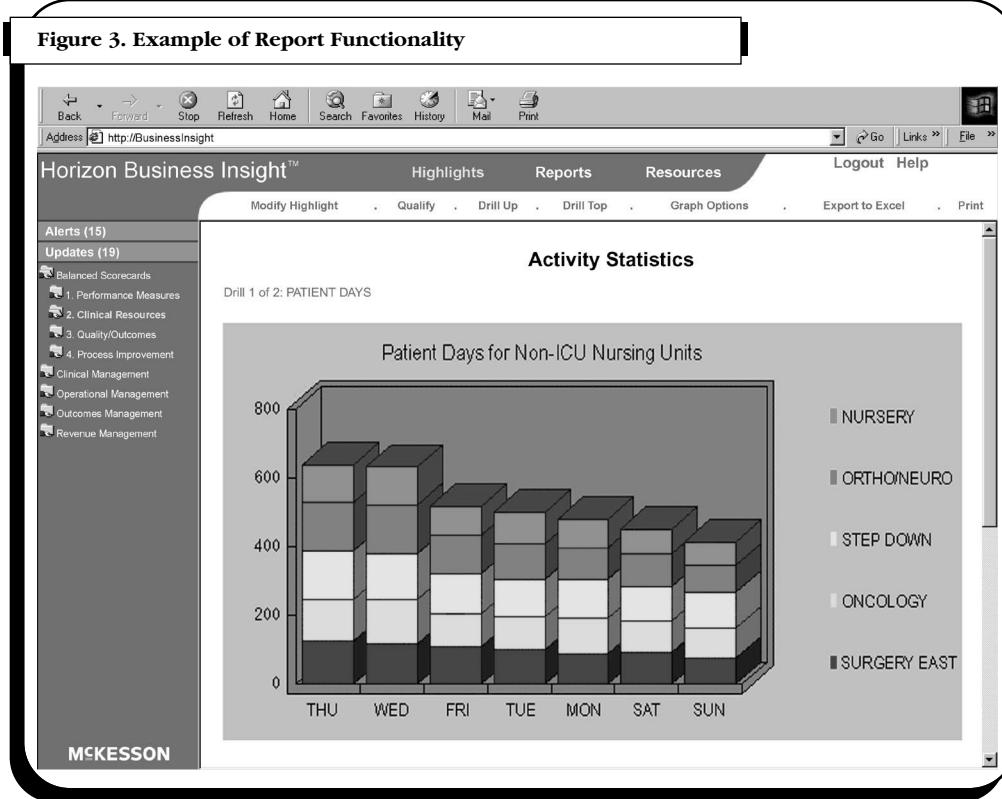
PTT (seconds)	Dose Change (U/kg/hr)	Additional Action	Next PTT (hours)	Click To Use
<50	+4 (1000 + 240 = 1280 U/hr)	Rebodus with 80 U/kg (0 x 60 kg = 480 Units)	6	A
50-64	+2 (1000 + 120 = 1000 U/hr)	Rebodus with 40 U/kg (40 x 60 kg = 2400 Units)	6	B
65-110	0	None	6	C
111-160	-2 (1000 - 120 = 880 U/hr)	None	6	D
>160	-3 (1000 - 180 = 820 U/hr)	Stop infusion one hour	6	

reliable processes, by-products of this effort include a reduction in medical errors, higher quality patient care, and enhanced patient safety.

The explosion in the introduction of effective but expensive new drugs challenges organizations to ensure the appropriate utilization of these new weapons against disease. Careful management of practice pattern changes, particularly in medication use, can dramatically decrease the cost of treatment. Several organizations successfully reduced antibiotic drug costs after deploying a CPOE/CDS system that uses evidence-based medicine guidelines at the point of care during the ordering process. Besides increasing compliance with the hospital formulary, organizations have been able to direct physicians to more appropriate, less expensive medications while preserving outcomes, with the added benefit of helping to reduce the development of “super bugs” resistant to the latest antibiotic formulations. Similar benefits from changes in physician behavior have accrued

through the increased adherence to treatment plans that have proven to deliver better outcomes at lower costs (e.g., anticoagulation protocols) (see figure 2).

Clinical information systems can also assist in regulatory and accreditation reporting (e.g., CMS, JCAHO) by providing much of the required information through analysis of existing patient data sets (see figure 3). This can reduce staff time associated with pulling records and compiling disparate data elements. In addition, the recent announce-



ment by the Federal Department of Health and Human Services to embrace SNOMED Clinical Terms, a clinical vocabulary nomenclature, and direct the Institute of Medicine to develop a standard model for an electronic health record, provides a foundation on which systems can collect data elements. It is likely with this enriched potential for building a standardized clinical database and the expanded deployment of clinical information systems, regulatory and accreditation standards will take advantage of the available reporting capability.

Properly chosen and deployed clinical information systems help to improve medical staff relations by facilitating physician workflow and satisfying the information needs of the practicing clinician. By making it "easier" for the physician to deliver care within the hospital, the physician is motivated to refer more patients to the institution.<sup>4</sup> This leads to higher occupancy rates and better utilization of fixed assets, culminating in improved hospital cash flow and net revenue.

Each clinical information system deployed has the potential of providing some or all of the tangible benefits noted above. The actual benefits and cost savings (or increased revenue) are determined by the choice of system and method of implementation. Therefore, actual ROI is greatly impacted by the clinical processes affected by the deployed systems.

## Opportunities for ROI: Intangible Benefits

Healthcare economists have struggled for some time over the measurement of intangible benefits.

Putting a financial value on morbidity or mortality is fraught with nuances, value judgments, and arguable errors. Nevertheless, these intangible benefits have value, even though it may be difficult for everyone to agree on the precise monetary amount.

Reduction in medical errors is the primary intangible benefit that accrues from the implementation of clinical information systems. Whether it is the reduction in the 98,000 annual deaths due to medical errors as estimated in the 1999 Institute of

Medicine report *To Err Is Human*, or a reduction in the 7,000 deaths attributed to medication errors in the same report, significant and valuable savings can accrue from reduced patient morbidity and mortality.<sup>5</sup>

It is even more difficult to measure errors that are prevented or morbidity and mortality that are avoided, due to real-time alerts, enhanced tracking of errors, and the incremental improvement of clinical processes that occur from the use of clinical information systems. Data elements, never before available, can be tracked and interventions made before serious problems appear in patient care. In addition, ordering patterns of physicians can be tied to patient outcomes to identify treatment plans that deliver the best results.

A culture of medical error reporting only exists in a few institutions. Current surveillance of clinical processes and potential medical errors is inefficient and often non-existent in hospitals without clinical information systems. Irrespective of the commitment to patient care, such organizations just do not have the readily available data elements in a format that can be analyzed to optimally monitor quality of care.

Lastly, goodwill provides the most difficult intangible benefit to measure. Hospitals exist to serve their community. Boards members, senior management, and clinical staff are committed to providing the highest quality and safest patient care possible to their neighbors and community

they serve. These leaders struggle putting a monetary value on the goodwill benefits (e.g., community perceived quality of care, prestige, attraction of distinguished clinical staff) that many clinical information systems provide. Therefore, goodwill is often left off the ROI equation.

### **Conclusions**

ROI calculations for clinical information systems are driven more by the values and strategic direction of an organization than by any other considerations. Those factors determine which ROI metrics are included and which are discounted as the organization works through the decision-making process. After implementation, organizations can then utilize those same metrics to evaluate their chosen projects. Some of the available metrics are noted in this article.

Every investment decision carries an opportunity cost with it. It is important for organizations to understand both the tangible and intangible costs and lost benefits when appropriating resources in one area versus another.

Therefore, decisions to invest in clinical information systems should not be driven solely by ROI calculations, but by broader determinations on what investment best appropriates resources to meet the goals of the organization. As

resources vary greatly among organizations, program funding will reflect this reality. For example, some organizations with tight budgets may choose to continue to provide indigent care rather than make an investment in IT, while others, with greater institutional endowments, will have the luxury to do both.

Nevertheless, investing in clinical information tools to ensure quality and patient safety is, in reality, required as a cost of doing business, of functioning as a safe hospital. The real question is how resources will be mobilized to pay for the necessary systems, and what will be the timelines to make those investments. Creative senior management will work with their boards, administrative managers, and clinical leaders to build their own unique roadmap to bring the necessary systems into their institution as they continually work to address the needs of their community.

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### **About the Author**

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