

Final Report to the Robert Wood Johnson Foundation

**HOSPITAL CAPITAL FINANCING IN THE ERA OF
QUALITY AND SAFETY: STRATEGIES AND
PRIORITIES FOR THE FUTURE – A SURVEY OF
CEOs**

GRANT ID: #050047

Bonnie Blanchfield, CPA, ScD
Cheryl Fahlman, MBA, PhD
Mary Pittman, DrPH
HRET, Chicago, IL

July 2005

Final Report to the Robert Wood Johnson Foundation

HOSPITAL CAPITAL FINANCING IN THE ERA OF QUALITY AND SAFETY: STRATEGIES AND PRIORITIES FOR THE FUTURE – A SURVEY OF CEOs

INTRODUCTION

Hospital decision-makers have always faced difficult trade-offs in capital financing decisions, attempting to balance the introduction of new technologies, organizational growth, maintenance of existing facilities, and support of essential community programs. In recent years, these capital spending challenges have been compounded by new challenges obtaining the necessary capital resources to fund expenditures. These challenges include historically low profit margins, decreasing internal financial resources, increased leverage resulting in decreasing debt capacity, and an increasingly competitive, expensive, and scrutinizing bond market. Into this mix, a new and currently poorly understood phenomenon is poised to make hospital capital decision-making increasingly difficult: widespread demand for capital-intensive, systems-based measurement and improvement activities to enhance health care quality and safety.

Recent policy papers recommending investment in hospital information technology have been limited by a lack of estimates of the level of need as well as lack of plans for investment in hospitals. This report discusses the results of a survey of senior hospital decision-makers with the intent to identify and understand the strategic processes used to make hospital capital investment decisions in this new era of patient safety and quality improvement.

The nature and magnitude of capital investments required for demonstrable improvements in quality and safety could rapidly result in the segmentation of American hospitals. In this study, characteristics of hospitals that can afford these improvements, those that may struggle to make modest investments in quality and safety at significant costs to the maintenance of existing facilities and programs, and those left behind are examined. Also identified are the quality enhancing technologies (QETs) that hospitals are prioritizing for purchase.

In this report, we summarize our findings that we intend to publish in a series of three papers. The final manuscripts will be segmented into (1) estimation of the magnitude of the quality and safety infrastructure demands on capital, (2) identification of current and near-future hospital-spending priorities given the competing needs within hospitals, and (3) analysis of how hospitals make these capital investment decisions. The policy significance of this work is that understanding current and future capital financing strategies in an era of increasing demands for capital investments to enhance quality and safety will assist policy decision-makers in their efforts to ensure that all Americans have access to quality health care at reasonable cost.

Background

During the 1990s, hospital strategy seemed to be a “medical arms race,” with hospitals intent on purchasing high-tech assets and building facilities that increased revenue. Focus on high-tech investments resulted in the neglect of maintenance of the basic bricks and mortar of many hospitals. However, this focus seemed appropriate at the time, as it created healthy operating margins in the early and mid-1990s.¹

With revised payment methodologies of government and private payers, hospitals are experiencing historically low profit margins, while also facing heightened financial challenges. These challenges include aging of facilities,² decreasing hospital inpatient capacity,³ and increasing hospital admissions.⁴ Decreasing operating margins are likely to continue, with declining reimbursement from private payers and government payers with Medicare payment reductions, and many state Medicaid programs in crisis. Declining non-operating income mirrors the soft investment market⁵ and overall economic conditions that threaten philanthropic giving. Both the debt capacity and margins of hospitals have decreased, leading to growing long term debt-to-capital ratios⁶ and less financial flexibility to service new debt as a result of declining hospital bond ratings.⁷

New Challenges to Hospital Capital Planning

This relatively hostile hospital capital financing climate has been compounded in the wake of the Institute of Medicine’s (IOM) landmark 1999 report on patient safety, *To Err Is Human*,⁸ and a subsequent report on health care quality, *Crossing the Quality Chasm*.⁹ These reports have led to increasing demands from purchasers, payers, patients, and policymakers for hospitals to address the urgent need to improve quality. *To Err Is Human* noted that lapses in safety are the eighth leading cause of death, result in substantial expense (up to \$29 billion annually for the American hospital system), and must be addressed with systems-based approaches. For example, computerized physician order entry (CPOE) systems have reduced serious medication error rates by 55 percent for inpatient settings but are not widely in use across all hospitals. Both IOM reports focused on increasing transparency by collecting and disseminating comparative information on quality and adopting information technology to improve the quality and safety of health care.

The dramatic findings in these reports, and the public resonance with their message, have resulted in focused efforts by government, regulators, and purchasers to promote the adoption of some of their key recommendations. For example, the Centers for Medicare and Medicaid Services have begun an ambitious effort to provide a broad array of comparative quality information to patients and their families. The Joint Commission for the Accreditation of Healthcare Organizations has already introduced safety standards and core quality measures into its survey process. On the purchaser side, The Leapfrog Group, a collection of Fortune 500 companies and government purchasers, has

begun a voluntary program of public reporting by hospitals regarding three safety “leaps”: use of CPOE; referrals based on volume/performance relationships for selected surgical procedures; and the availability of critical care specialists in intensive care units. Some pay-for-performance contracting schemes have incorporated performance on the Leapfrog “leaps,” which raises the stakes even further for adoption.¹⁰

Meeting new mandates for data collection for quality measurement, computerized order entry, and electronic medical record systems (EMR) is an enormous challenge for hospitals. While some hospital systems are already making substantial investments in IT, others are struggling with the decision and the lack of capital to move forward. There is an urgent need to capture the variety of strategies being considered in order to inform hospital decision-makers of the options available and the extant best hospital capital strategies. For example, the experiences of health systems such as Kaiser Permanente and the Department of Veterans Affairs, which have spent billions to automate their patient files,¹¹ may provide insights for other hospitals. Earlier studies also make clear that successful implementation of a QET requires substantial resources beyond that committed to the initial purchase.¹² As a result, it is important to consider not just the decision to purchase a QET and the ability to do so, but also its implementation, when exploring the ramifications of this challenge to hospitals.

Given the compounding challenges of a relative paucity of access to capital and new demands for increased capacity and a broader array of capital-intensive projects and programs, hospitals are no longer facing business as usual. Earlier work that focused on the effect of state regulatory policies and the effect of managed care on hospital capital financing indicates that there will be much to learn from a detailed analysis of the current capital environment.¹³ It is highly probable that not all hospitals will be able to obtain their future capital financing needs and may not be able to make capital investments needed to survive in the end. The impact of this capital crisis will have varying effects on patient care and access to care in local communities. A continuation of these trends coupled with an older population¹⁴ could result in a future capacity problem, disproportionately affecting vulnerable populations and rural areas.

Taken together, projected capacity shortages and these quality and information technology investment imperatives may erode financial reserves, take money from program and facility development and maintenance, and most importantly, drive the need to discuss new ways to think about capital financing. Other operating challenges such as nursing shortages and physician contractual relations also contribute to the complex financial environment challenging hospital leaders. Because of the vulnerability of hospitals on these issues, it is important to identify the capital investments and risk management strategies required of hospitals. New capital requirements require new financing strategies; we must gain a better understanding of the current landscape to better understand, and avert, an impending capital crisis.

While hospital capital expenditures have been the focus of recent research conducted by the Healthcare Financial Management Association (HFMA), their focus was the state of capital and capital access to it. In a series of reports, they have recently explored key principles of better practice financial management, capital structure and management, capital planning and allocation, joint ventures with physicians and other partners, strategies for financially struggling hospitals, and the outlook for capital access.¹⁵ These reports, however, fail to document the impact of the quality and safety imperative on hospital capital financing. After a thorough literature review, we concluded that understanding the impact of quality and safety on hospital capital financing would require primary data collection. Because such information is not available in standard cost reports nor publicly reported, the only venue available for increasing the information base regarding investment in QETs is through a comprehensive survey of capital investments and the strategies behind them.

The information and results obtained from this survey are consolidated in this report and will be subsequently reported in a series of three manuscripts and submitted for publication. The first manuscript, **Quality Enhancing Assets: Where Are Hospitals Investing Their Limited Capital Resources in This Era of Patient Safety and Quality?** describes the who, what, and where of investments in quality and safety. Why and how these investment decisions are being made are discussed in the second manuscript, **Decisions to invest in Quality Enhancing Assets**. Finally, the last manuscript focuses on access to quality and safe health care in rural communities. Rural hospitals have traditionally had a difficult time remaining financially viable, and investment in many of these expensive quality-driven assets is improbable if not impossible. The resulting two-tiered “quality” system is discussed and characterized in the third paper, **Safety and Quality: Plight of the Rural Hospital**.

DATA AND METHODS

Data for this study was collected through a national survey of non-governmental acute care hospitals across the United States. Statistical analyses were then performed to describe the relationship between the (presence of) QETs, hospital characteristics, financing mechanisms, and use of financial tools, and to explore reasons for investing. For this study, we defined the term Quality Enhancing Technology (QET) as medical informatics technology used to improve patient safety, quality of care, and clinical outcomes. We chose to focus on information technology related investments since these can be differentiated from routine capital expenditures. Traditional brick-and-mortar investments, such as expanding operating room or emergency room capacity, have a definite but indirect effect on quality and safety and are not included under our definition.

Survey Design

The survey design process included establishing and using a 10-person expert advisory panel to provide feedback on the design and content of the

survey. The expert panel provided advice on which QETs should be included in the survey, domains for questions concerning access to capital and capital strategy, and overall survey design. The study team subsequently worked with members of the expert panel to refine the list of QETs to those most relevant to meeting the quality and safety imperative. A list of the QETs surveyed and their definitions are included in Appendix I.

The study team then tested the draft survey with focus groups of key senior hospital leaders. The focus groups consisted of eight participants who were CEOs, COOs, or CIOs of large non-profit hospital groups and were attending the Annual Non-Profit Health Care Investor Conference in New York, from May 19–21, 2004. The team pilot tested the survey instrument for content validity and ease of implementation with this group.

Based upon the input of the expert panel and focus groups, the study team developed a final survey consisting of three sections asking questions about 20 different QETs. The first section was an inventory of the QETs a hospital currently owns, plans on purchasing in the next year, would like to purchase, or has no plans of purchasing. The second section of the survey addressed specific issues for each QET a hospital planned to purchase within the next year, including financing mechanisms, reason for investing, and analysis of extra costs associated with the purchase. The final section examined QETs already owned and implemented, asking questions similar to section two, but also including questions about the success of implementation. A copy of the survey is available upon request from the authors.

In September 2004, the survey was distributed to all acute-care non-governmental hospital members of the American Hospital Association (AHA) (n=4896). The survey was sent to all hospital CEOs, but was designed to be completed by the hospital leader or a small team most knowledgeable about capital budgets and investment strategies. Respondents had the opportunity to respond through a secure Web site or on paper. Up to three e-mail reminders with the questionnaire attached were sent to those who failed to respond. Telephone reminders were conducted for those participants without an e-mail address. Survey participation was closed at the end of November 2004. To facilitate the analysis of the characteristics of hospitals and their QET capital strategies, study hospitals were linked to the 2004 American Hospital Association's annual survey, which includes information such as utilization, bed size, and payer mix.

Statistical Analysis

The focus of the study and the survey is the ownership of a QET so the unit of analysis is the hospital. Hospitals are classified as having a QET already implemented, budgeted for purchase in the next year (demonstrating an unequivocal commitment to obtaining the QET), not wanting to purchase it, and other. The "other" category represents a hospital's desire to purchase the technology but with no plans to do so for a number of reasons including a lack of internal or external funding, and non-financial reasons.

AHA hospital characteristics merged into the survey data set provide a better understanding of other factors that may influence ability and desire to invest in QETs and include bed size, teaching status, geographic location, region, ownership status, payer mix, inpatient admissions, average length of stay, emergency room visits, and other outpatient visits. We also used the AHA hospital characteristics to help explore possible biases among the survey respondents. Statistical analyses (descriptive and univariate analyses) appropriate to the data characteristics were performed using the SAS v8.02 statistical software package.¹⁶

RESULTS

Response Rate

Of the 4,896 AHA members eligible to participate in the survey, contact information was available on 3,893. Of those, 417 (11%) hospitals completed responses and are included in our analyses.

Characteristics of Respondents

Because of the response rate, we performed a systematic analysis to identify potential biases among the respondents and examine their potential impact on our findings. Characteristics of survey responders and non-responders were examined to determine whether the responding hospitals were significantly different from those who did not respond. We found the characteristics that we hypothesized to have the greatest impact on hospital capital financing of QETs—namely bed size, urban location, teaching status, and public ownership—were not significantly different between responders and non-responding hospitals. Selected characteristics of the responding hospitals are displayed in Table 1.

Responding hospitals were more likely to be from the South and were less likely to be for profit. In further analyses, we did not find any significant differences between responders and non-responders in number of admissions, inpatient days, outpatient visits, gross patient revenue, percent Medicare, percent Medicaid, and percent HMO. Operating margin, total margin, bad debt, net patient revenue, non-operating revenue, and proportion of salaried physicians were all significantly higher in responding hospitals than they were in non-responding hospitals.

Investment in QETs

We found that 86% of responding hospitals own or have budgeted to purchase one or more QETs in the next year. Only 14% of responding hospitals reported owning no QETs, with no immediate plans to purchase at least one. There were significantly more (88%) not-for-profit hospitals ($p < .0001$) investing in one or more QETs than other hospitals. More than half of those hospitals

investing in one or more QETs were not-for profit (68.6%), located in an urban area (56.3%), and non-teaching (81.3%). Forty-three percent of those hospitals owning or budgeting at least one QET had fewer than 100 beds.

While those hospitals that invested were primarily small hospitals, the majority of hospitals that did not invest were also small, with fewer than 100 beds. The majority of hospitals that did not invest were located in the South and the Midwest, and two-thirds of them were also located in rural areas. Hospitals that were part of larger hospital systems, part of an integrated network, or had higher than average managed care penetration were no more or less likely to invest in at least one QET. Selected characteristics of those hospitals that own or have budgeted for at least one QET are displayed in Table 2.

QETs Invested in by Respondent Hospitals

We found that among our responding hospitals all of the QETs we studied are currently owned by some, ranging from just 12 hospitals for high fidelity simulation training to 193 hospitals that own systems to allow remote access to patient data. Our results allow us to discriminate among three broad categories of QETs. The first is a group of QETs that are primarily related to infrastructure rather than a specific quality or safety intervention and were most often owned in our respondent hospitals; more than 90% of hospitals either owned the system, had it in their budget, or planned to purchase it in the future. QETs in that category include wireless networks, Picture Archiving and Communication Systems (PACS), remote access to patient data, and IT systems for clinical performance data. The second category of QETs is more directly related to quality and safety in general and specifically addresses medication safety. Between 15% to 34% of responding hospitals own these types of systems, and with the exception of anonymous online incident reporting (25% will not buy) and smart pumps (19% will not buy), more than 90% of hospitals either owned the system, had it in their budget, or planned to purchase it in the future. QETs in this category include inpatient EMR, anonymous online incident reporting, smart pumps, outpatient EMR, inpatient CPOE, bar coding, and outpatient CPOE. QETs in the third category are those which are viewed to be more nascent technologies, are owned by 10% or fewer hospitals; 24% to 66% of our responding hospitals have no interest in purchasing them in the future. QETs in this final category include informatics based disease management, robotics, electronic ICUs, e-prescribing (which is mainly an outpatient phenomenon and may not be considered as a hospital capital expenditure), radio frequency patient ID bracelets, and high fidelity simulation training. The ownership status for the QETs we studied is portrayed in Figure 1.

We found that among our respondents 218 (61%) owned or have budgeted for more than one QET with 45 (11%) owning 2 to 4 QETs (usually in the first category above), 111 (27%) owning 5 to 10 QETs, and 62 (15%) owning more than 10 of the 18 QETs we studied. Most hospitals owning more than 10 QETs were located in an urban setting (94.4% compared with urban hospitals making up 53% of our sample), were large (43.8% compared with hospitals

- 300 beds making up 16% of our sample), and were often part of a larger hospital system (55.6%).

QETs Prioritized for Initial Investment

Among the QETs we studied, a small number have clearly been prioritized for investment. PACS and Radiology Information Systems (RIS) are the technology most likely to be owned, budgeted, or in the planning stages (69% of responded). Computerized Physician Order Entry (CPOE) (66%) and inpatient Electronic Medical Records (EMR) (65%) were the next most likely to be owned, budgeted, or in the planning stages. Inpatient QETs were more likely to be owned, budgeted, or in the planning stages than outpatient QETs. At the time of this survey, infrastructure investments, such as a wireless network (34%) and a basic clinical Information Technology (IT) system (33%) were the most likely to be already owned. The distribution of detailed ownership status for the seven QETs given the highest priority by responding hospitals is illustrated in Figure 2.

Motivation for QET Investment

Among the seven QETs most likely to be owned, budgeted, or in the planning stages, the most important motivator for current ownership was patient safety, with over half of respondents citing this as the most important reason for ownership in four of those QETs; patient safety was the most frequent reason for ownership for two of the remaining three QETs. The one exception is that the prime motivator for ownership of wireless networks was to improve efficiency. Incentives from payers or the Leapfrog Group played a relatively minor role in motivating ownership. The motivation for ownership of the seven QETs given the highest priority by responding hospitals is illustrated in Figure 3. For those institutions that do not currently own a particular QET but have made the commitment to purchase it in their capital budget, patient safety remains an important motivator, with efficiency playing the most important role for investments in wireless networks and clinical IT infrastructure. Incentives from payers or the Leapfrog Group play a minor but potentially very important role for motivating investments in targeted QETs (CPOE and EMR). The motivation for investment in the seven QETs given the highest priority by responding hospitals is illustrated in Figure 4.

Capital Finance Decision-making for QETs

The decision to own or invest in a QET is usually outside of the usual capital framework decision-making process. Only between 2% to 12% of hospitals used any financial tools to help with their decisions about any particular QET. When a tool was used, the most common was a Return on Investment (ROI) analysis. External consultants and cost-benefit analysis were the other decision-making tools applied to QET investments. For those QETs where ROI was applied, the rate of return varied from 0 to 30% among those who owned the

QET and 0 to 100% for those who were investing in a QET. In both cases, a payback period of up to 10 years was projected. Among hospitals that owned a QET, most felt that the QET they purchased and implemented had not paid for itself, underscoring the non-financial motivations for these investments. CPOE was the one QET most likely to be subject to a formal financial analysis, but only 15% of hospitals performed any analyses at the time CPOE was purchased or budgeted. The capital finance decision-making for the seven QETs given the highest priority by responding hospitals is illustrated in Figure 5.

Mechanisms for QET Ownership and Investment

For those who own or are investing in a QET, the primary mechanism for financing the capital for purchase and implementation is through internal reserves. Significant other sources of capital, such as an equity issue, gifts, or research grants, were uncommon mechanisms for financing the capital for QETs. The mechanism for financing the capital for ownership of QETs (Figure 4) and investment in QETs (Figure 6) illustrate the importance of internal reserves in meeting the hospital quality and safety imperative.

DISCUSSION

Our survey results complement earlier studies on hospital capital financing by providing special focus on the quality and safety imperative, which is sure to have a major impact on hospital capital financing decisions in coming years. Our focus on QETs that are most directly linked to efforts to enhance quality and safety is a unique contribution to the extant literature on the subject and has implications for champions of clinical systems, hospital decision-makers, the hospital capital finance community, and policymakers.

Generalizability of Our Findings

Although our response rate of 11% was modest, we did achieve a sufficient sample size to ensure that meaningful differences in our univariate analyses would be detected.¹⁷ It is also important to note that this relatively low response rate is in keeping with similar surveys on information technology reported in 2003.¹⁸

Our sample was representative of U.S. non-governmental, acute-care hospitals in many important characteristics, such as bed size, urban location, teaching status, and public ownership, which could influence a given hospital's approach to capital financing. Nevertheless, there were important differences between our respondents and U.S. non-governmental, acute-care hospitals, differences that would likely influence their approach to hospital capital spending. These include a relative paucity of for-profit hospitals, which would be hypothesized to have tighter spending plans than other institutions due to their need to post positive margins and leading to a shorter-term capital focus. In addition, we found that those hospitals responding to our survey were more likely

to have resources for quality and safety investments than most U.S. non-governmental, acute-care hospitals. Respondents had higher operating margins, total margins, net patient revenue, and non-operating revenue (which can be a key factor in hospital capital decision-making). Our respondents also differed from U.S. non-governmental, acute-care hospitals in another important respect, which would likely impact the acceptance and adoption of some quality and safety systems such as information technology in general and CPOE in particular.¹⁹ They had a higher proportion of salaried physicians.

Although our principal variables of interest did not differ among responders and non-responders, we must keep in mind the more robust financial position of those who responded when interpreting our results. Given this finding, it is plausible that those hospitals that have already made investments in QETs or have the capacity for future investments in QETs were more likely to respond to our survey. Even if such a respondent bias was at play in our survey findings, our results still provide important insights into hospital capital decision-making in response to the quality and safety imperative. Our respondents may be on the leading edge of this phenomenon, but their experiences to date provide useful information as to how this challenge is engaged, the priorities that will be set, and the financing mechanisms employed to acquire QETs that should be generalizable to other U.S. hospitals.

Hospital Investment of Limited Capital Resources in This Era of Patient Safety and Quality

Among our respondents, the majority have already made an investment in a QET. Among the QETs we studied, our respondents have initially invested in those that help build an infrastructure for future QETs. Those initial investments—in wireless networks, IT system backbones, remote access to patient data, and PACS—can meet multiple operational needs and are not as directly related to quality and safety as some of the other QETs we studied such as CPOE. Nevertheless, these investments in requisite infrastructure seem to serve as an obligate step in capital investing to meet the quality and safety imperative and can be used as markers of future more specific investments in QETs.

Our findings indicate that after these initial infrastructure investments, inpatient CPOE and EMR ranked as the most common purchases planned over the next five years for those who don't already own such a system. In our respondent population, the potential growth of CPOE in coming years is telling. Among our respondents, 18% owned a CPOE system (which is comparable to national surveys where that proportion was 16% in 2002²⁰). An additional 48% had it either in their capital budget or were in the planning stages of a CPOE purchase, indicating that we should expect a dramatic increase in availability of CPOE in coming years among hospitals similar to our respondents. Inpatient EMR and other medication safety related QETs, such as smart pumps and bar coding, are likely to show similar, albeit lagged, growth among the population of responding hospitals. For those technologies, a higher proportion of respondents

are still in the capital planning phase, but there is clearly an interest in a future investment.

We also found a number of QETs for which respondents had a greater ambivalence to capital investment. Informatics based disease management, robotics, electronic ICUs, radio frequency patient ID bracelets, and high fidelity simulation training have all been shown to have a positive influence on quality and safety in select academic or government-owned hospital settings. Our results indicate that their level of acceptance has not yet risen to where they are being considered in most hospital capital financial plans. These QETs can be thought of as not quite ready for prime time for hospital capital decision-makers, but the fact that at least some of the respondents own or have budgeted for these QETs indicates that they warrant watching over time.

A closer look at those hospitals that have managed to invest in multiple QETs has important implications for the growth in the adoption of QETs as well as insights into potential barriers. Large urban hospitals that were part of larger health care systems were far more likely than other hospitals to have invested in 10 or more of the QETs. This interest and ability to invest in QETs will position such institutions for leadership in quality and safety. The converse—that small rural hospitals are likely to be the most challenged in obtaining the array of QETs and over time have a more difficult time enhancing quality and safety—is an important finding for policymakers.

Barriers to QET Investment

Across all of the QETs, for the majority of hospitals that did not own, have budgeted, or planned on purchasing a QET, the primary reasons for not doing so were financial. Across the seven QETs we have focused on in this report, between 17% and 22% of respondents were not investing in the QET for financial reasons. This finding is particularly disturbing in light of the recent Healthcare Financial Management Association studies on access to capital.¹⁵ In those reports it appears that hospitals can be divided into two broad categories, capital “haves” and “have-nots.” The former are characterized by government or not-for-profit ownership, are larger institutions with at least 100 beds, and are teaching hospitals. The latter category consists of smaller for-profit hospitals as well as many rural hospitals.

The mechanism used to finance QETs also has important implications for hospital capital financing in the era of quality and safety. As noted earlier, our respondent population was in a relatively advantaged financial position compared with other hospitals. The fact that the majority of QET capital assets were being financed through internal reserves could be due to respondent bias. Thus, the reason why these hospitals used internal reserves was because they were available. A more plausible explanation, however, is that the availability of internal reserves is enabling for hospital capital investment in QETs. If the latter is true, then it is likely that hospitals that have been capital “have-nots” will lack a mechanism to finance QETs, even when they recognize the imperative to do so.

Based on our survey results, it does not appear that other mechanisms of capital financing, such as issuing equities, taking on other forms of debt, or using gifts, are readily available for those institutions wishing to purchase a QET. This finding is not surprising since investor comfort with a brick-and-mortar asset is likely to be far higher than one based on software or evolving technologies. Even if debt were available, many of the hospital capital “have-nots” will not have the debt rating to make taking on such a burden feasible. It is also likely that philanthropic donors would prefer to have their names emblazoned on a new physical structure rather than contribute to a less visible QET purchase. As a result, the doors for financing QETs through traditional mechanisms outside of internal reserves are largely closed.

Taken together, our findings and the earlier studies of access to capital indicate that the capital “divide” separating distinct groups of hospitals may well be translated into a quality and safety divide. Without access to adequate capital, those hospitals that currently do not own QETs will face challenges in obtaining them. As a result, we will find the current digital divide between hospitals that have been able to invest in information technology and those that have not will likely be manifested in measurable differences in quality and safety. That dynamic would likely lead to a decompensating spiral where future capital investments would less likely be available to an institution due to its relatively weaker performance on core clinical missions.

Decision-making on Investments in QETs

Our survey indicates that the decisions to purchase QETs are often made outside the traditional capital decision-making frameworks that are applied to brick-and-mortar investments. We found that patient safety, rather than market prestige, financial efficiencies, or insurer incentives, was the most prevalent motivator for making a QET purchase.

The emphasis on safety as a motivator results in a paucity of traditional financials tools, such as ROI, being applied to the purchasing decision. It is likely that the safety motivator is driven by board and leadership concerns about being behind the quality and safety curve. In the current environment, the value of avoiding being above the fold in a negative safety or quality story in the local newspaper is truly “priceless.” This is in keeping with other studies that have found that leadership and focus on overcoming physician acceptance are key factors in increasing the adoption of information technology in general and CPOE in particular.^{21, 22}

Our findings indicate that to date the impact of insurer incentives, mediated through the work of the Leapfrog Group²³ and others, have been modest. For those hospitals that have already invested in a Leapfrog-focused QET (CPOE and EMR), such incentives played a very small role in their decisions (being an important factor for 4% or less). For those hospitals that have recently put capital for CPOE and EMR into their budgets, 5% to 7% noted that such incentives were important. This indicates that the influence of these programs may be growing over time and that they may play an important

marginal role in influencing these decisions in the future. It is unlikely, however, that the magnitude of these incentives will allow the capital “have-nots” to purchase QETs.

CONCLUSIONS AND POLICY IMPLICATIONS

Our survey has documented the growth of capital investments by hospitals in QETs and suggests that certain QETs, mainly those focused on medication safety, will be adopted by an increasing number of hospitals over the next few years. We also found significant indicators that suggest the dissemination of QETs is likely to be relegated to financially robust institutions that can fund such capital investments for safety’s sake through internal reserves.

Without intervention the digital divide will translate into a quality and safety divide with financially struggling, small, and rural hospitals being stranded on the wrong side. Although insurer incentives, prestige, physician recruitment, and an opportunity to play a leadership role all figure into hospital capital decision-making about QET investments, it appears that none of these factors will be able to overcome current barriers to capital financing. Grants, loans, enhanced payments, and other mechanisms have all been considered as potential means to promote investment in QETs by hospitals, but no significant action has been taken to date. Federal and state policymakers must remain cognizant of these developments, take these challenges into account when creating policy related to quality and safety in hospitals, and consider new programs or policies that would facilitate hospital capital investment—similar to the Hill-Burton program’s impact on brick-and-mortar investments—to prevent a deepening and widening quality and safety chasm among U.S. hospitals.

The authors wish to thank the Robert Wood Johnson Foundation for their support of this work, participating survey respondents, the survey design expert panel, and the hospital executives who provided input on the survey design, execution, and analysis.

Table 1. Characteristics of Survey Respondents

Hospital Characteristic	Responders N (%)	Non-Responders N (%)
Total	417 (11)	3476 (89)
Bed Size		
Fewer than 100 beds	197 (48)	1491 (43)
100-300 beds	152 (36)	1345 (39)
300 or more beds	68 (16)	640 (18)
Region*		
Midwest	123 (29)	990 (29)
Northeast	56 (13)	464 (13)
South	161 (40)	1331 (39)
West	77 (18)	646 (19)
Location		
Urban	222 (53)	2006 (58)
Rural	195 (47)	1470 (42)
Ownership		
Public	107 (26)	780 (22)
For profit*	32 (8)	435 (13)
Not-for profit	278 (66)	2261 (65)
Teaching Status⁽¹⁾		
Teaching	71 (16)	658 (19)
Non-teaching	346 (84)	2818 (81)
(1) As defined by membership on the Council of Teaching Hospitals * Responders v non-responders difference is significant at p<0.05 level.		

Table 2. Characteristics of Hospitals Investing in QETs

Hospital Characteristic	Own/Budget at least 1 QET N (%) (% of own/budget)	No QETs N (%) (% of no QET)
Total	359 (86%) (100%)	58 (14%) (100%)
Bed Size**		
Fewer than 100 beds	156 (79) (43.4)	41 (21) (71.1)
100-300 beds	136 (89) (37.9)	16 (11) (27.8)
300 or more beds	67 (99) (18.7)	1 (1) (1.1)
Region		
Midwest	104 (85) (28.9)	19 (15) (32.3)
Northeast	51 (91) (14.1)	5 (9) (8.1)
South	139 (86) (38.6)	22 (14) (39.0)
West	65 (84) (18.3)	12 (16) (20.6)
Location		
Urban**	202 (91) (56.3)	20 (9) (34.5)
Rural	157 (81) (43.7)	38 (19) (65.5)
Ownership		
Public*	85 (79) (23.6)	22 (21) (37.8)
For profit	28 (87) (7.8)	4 (13) (7.8)
Not-for-profit**	246 (88) (68.6)	32 (12) (54.4)
Teaching Status^{1*}		
Teaching	67 (94) (18.7)	4 (6) (7.5)
Non-teaching	292 (84) (81.3)	54 (16) (92.5)
¹ As defined by membership on the Council of Teaching Hospitals *Significant at p<0.05 level.; **Significant at p<0.01 level.		

Figure 1: Distribution of QETs by Decision to Own

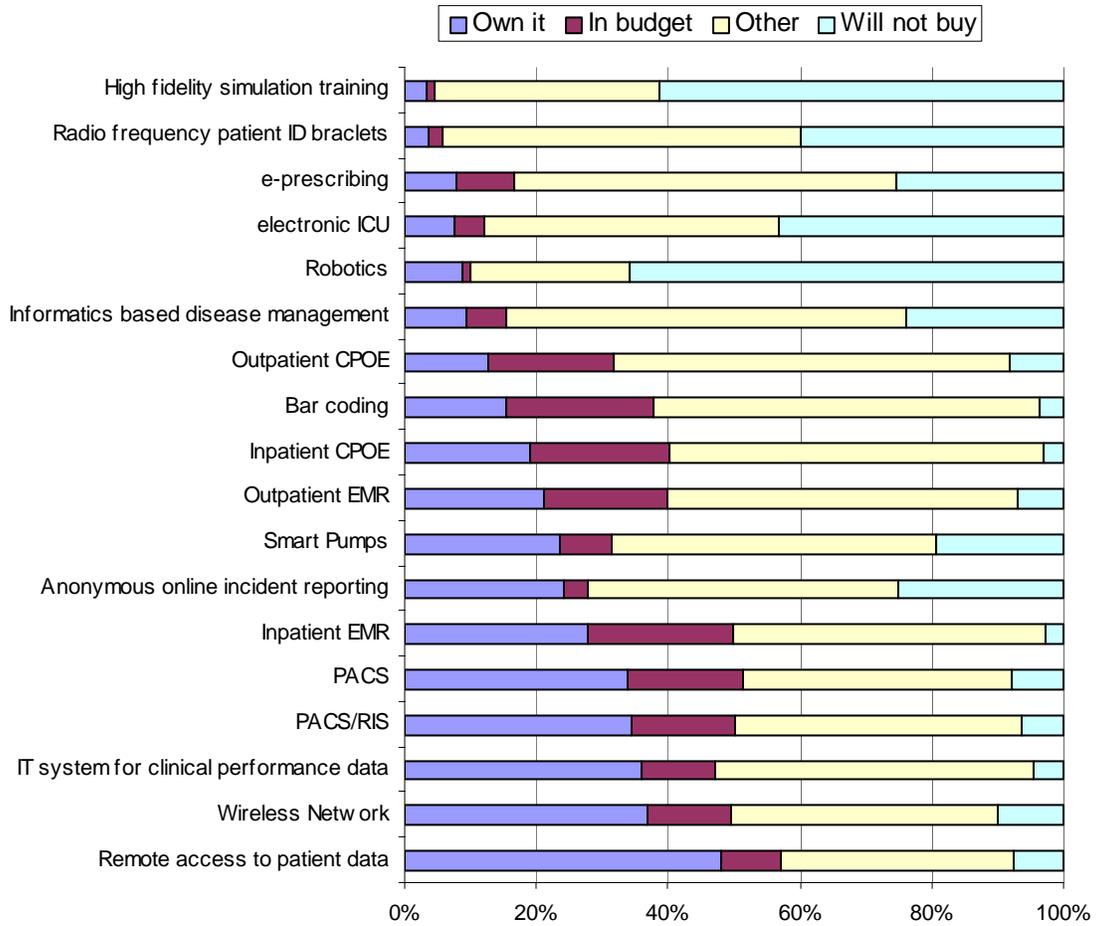


Figure 2: Distribution of Selected QETs by Decision to Own

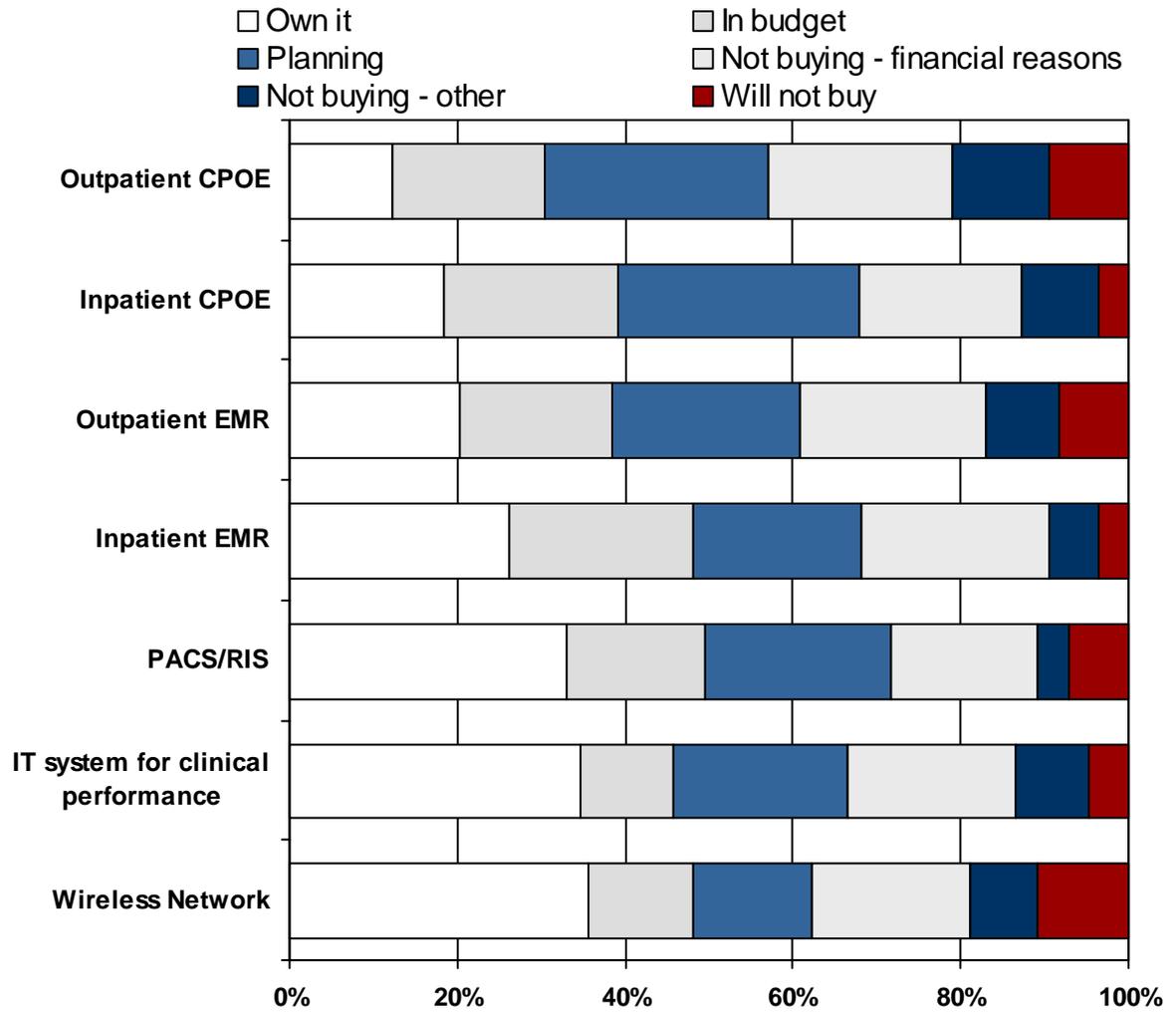


Figure 3: Top Reasons for Investing in Currently Owned Systems

- Adequate cash flow/financing capabilities
- Market Driven
- HIPAA/other government regulation
- Insurer/LeapFrog incentive
- Recruitment/desirability for physicians
- Asset price decreased
- Efficiencies
- Patient safety & quality
- National Leadership Recognition

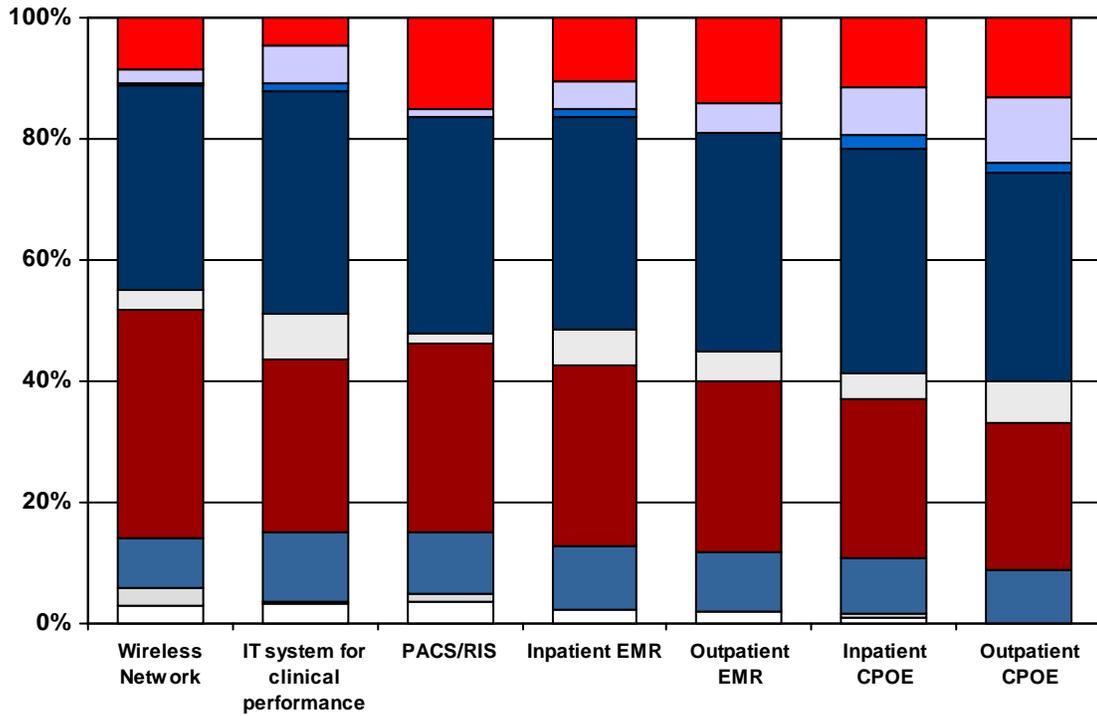


Figure 4: Top Reasons for Investing in Budgeted Systems

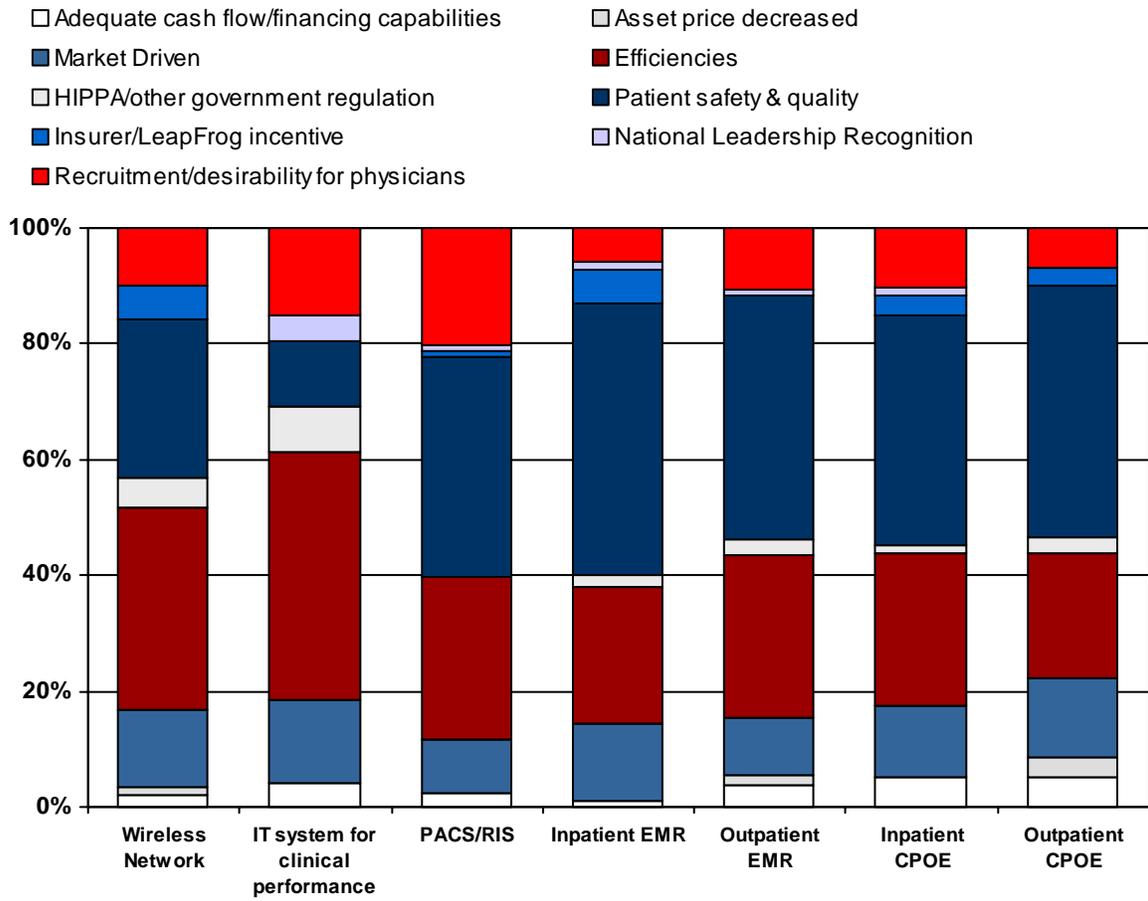


Figure 5: Financing Mechanisms for Selected QETs Currently Owned

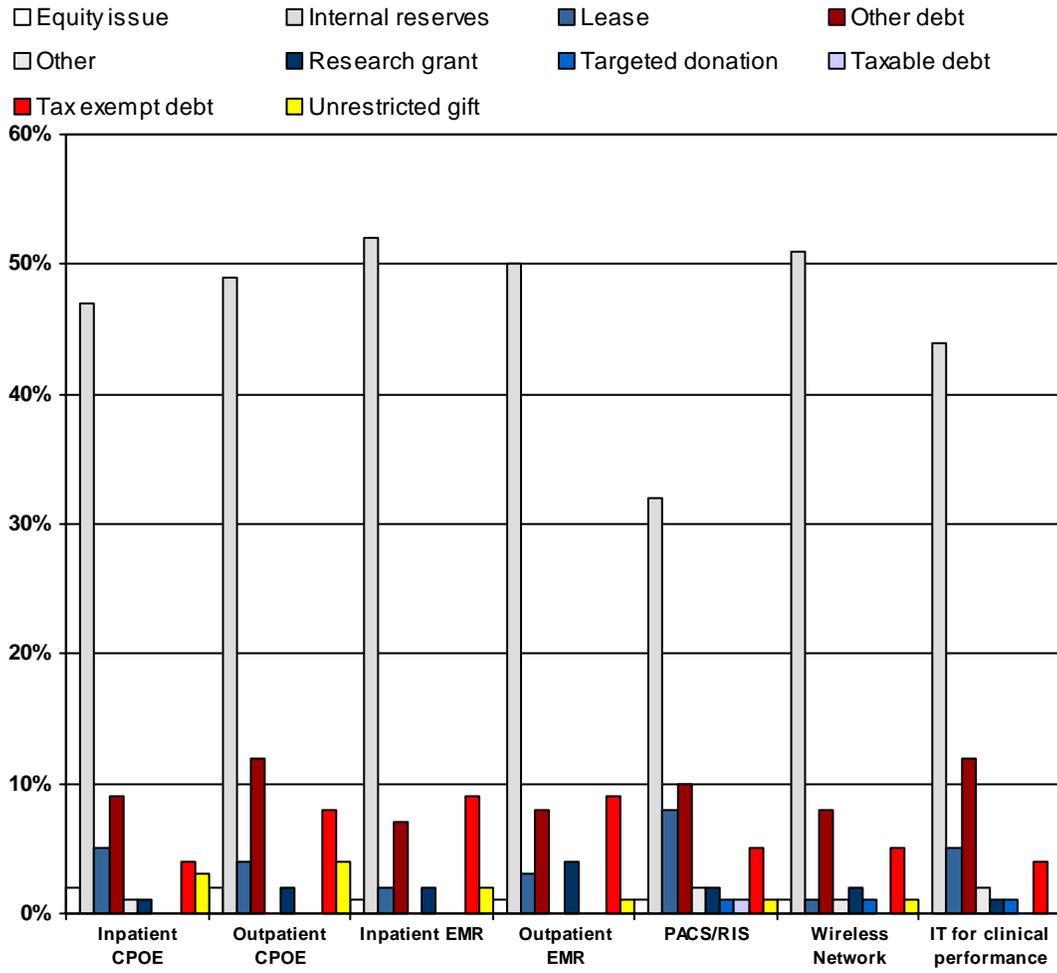
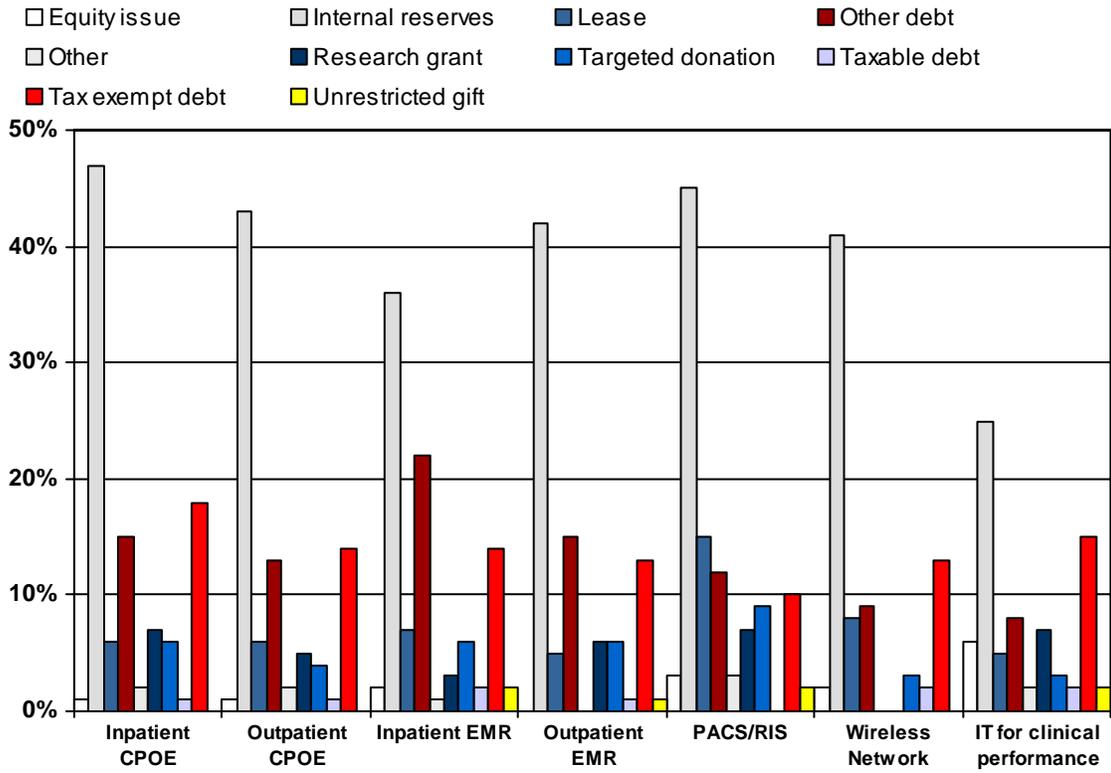


Figure 6: Financing Mechanisms for Selected or Budgeted QETs



APPENDIX I: QUALITY ENHANCING TECHNOLOGIES AND THEIR DEFINITIONS INCLUDED IN THE SURVEY

Ambulatory Care Computerized Physician Order Entry (CPOE) – Decision support information system used by clinicians to directly enter medication and other order information in an ambulatory care setting.

Bar Code Medication Administration System - The use of individual product codes and automated detection to document and track patient medications.

Electronic ICU – The use of ICU-specific electronic medical record systems in conjunction with tele-medical technologies to improve hospital intensivist coverage.

E- Prescribing – The use of untethered devices (mobile or portable) to enable CPOE, including pricing, formulary guidelines, dosing, drug interactions, contraindications and off-label indications of prescribed medications.

High Fidelity Simulation Training – simulation laboratories or programs for teaching new clinical techniques, use of new devices, and reviewing safety scenarios with staff. These range from full high fidelity operating room suites to a single organ simulator.

Hospital Wide Wireless Network – a wireless local area network that uses high frequency radio waves rather than wires to communicate.

Informatics-based Disease Management Program – Information technology program that uses clinical patient data from care-processes to provide close management and early intervention for chronically ill patients.

Information systems to capture, analyze, and report clinical performance data –These systems help measure and track care processes using specific clinical metrics for quality improvement. They represent the cornerstone of state-of-the-art information-based quality improvement processes.

Inpatient Computerized Physician Order Entry (CPOE) – Inpatient decision support information system used by clinicians to directly enter medication and other order information.

Inpatient Electronic Medical Record – A comprehensive database application used to document all aspects of a patient’s inpatient care.

Online Incident Reporting Systems –database applications systems used to report, acquire, store, track, and trend reportable data regarding clinical incidents.

Outpatient Electronic Medical Record – A comprehensive database application used to document all aspects of a patient’s outpatient care.

PACS with Radiology Information Systems – A system that combines the acquisition, archival and retrieval of digital images with radiology administrative information to integrate diagnosis and review processes with billing and workflow.

Picture Archiving and Communication Systems (PACS) – A system for the acquisition, archival and retrieval of digital images over a computer network for diagnosis and review.

Radio Frequency Patient ID Bracelets – a technology embedded in bracelets used to uniquely and wirelessly identify patients.

Remote Access to Patient Data for Providers – Information systems that allow providers access to patient data when outside the hospital or care setting. Access can include data retrieval and/or data entry.

Robotics – use of robots for delivery of care.

Smart Pumps -- programmable infusion pumps capable of detecting and thwarting medication errors based on hospital guidelines for medication administration.

Special thanks to Ravi Nemana at Health Tech for his assistance in identifying high impact technologies that affect quality.

REFERENCES

-
- ¹ Shastri, K and J. Guldenschuh. *International Association of Management Journal*. Volume 8, Number 2, 1996.
- ² Runy, Lee Ann. "Penny Wise?" *Health Facilities Management*, February 2003.
- ³ Green LV. "How many hospital beds?" *Inquiry*. 39(4):400-12, 2002-2003 Winter.
- ⁴ American Hospital Association. *Hospital Statistics*. 2003 edition.
- ⁵ The Cleveland Clinic, for example, reported losses in their equity portfolio due to failing high tech stocks resulting in losses of nearly \$500 million—almost a third of the assets it once had. Many large hospital systems that had been using stock market returns to cover rising costs and decreasing reimbursement have experienced similar problems. *Modern HealthCare's Daily Dose*.
- ⁶ Health Care Advisory Board. "Financing the Future. Briefing for Boards and Senior Health System Executives." 2002.
- ⁷ Moody's and Standard and Poors have downgraded more hospitals than not, especially in 2000 and 2001. STANDARD & POORS, 2002.
- ⁸ *To Err Is Human: Building a Safer Health System*. Linda T. Kohn, Janet M. Corrigan, and Molla S. Donaldson, Editors; Committee on Quality of Health Care in America, Institute of Medicine, Washington DC, 2000.
- ⁹ *Crossing the Quality Chasm: A New Health System for the 21st Century*, Committee on Quality of Health Care in America, Institute of Medicine, Washington DC 2001.
- ¹⁰ Lee TH. Meyer GS. Brennan TA. A middle ground on public accountability. *New England Journal of Medicine*. 350(23):2409-12, 2004.
- ¹¹ Rundle, Rhonda. "Kaiser to put records online." *Wall Street Journal* Article on internet site address:
<http://www.bayarea.com/ml/cctimes/business/5109718.htm?template=contentModules/printstory.jsp>
- ¹² Classen DC. Leading patient safety expert speaks on CPOE implementation strategy and success factors. Interview by Richard D. Lang. *Journal of Healthcare Information Management*. 18(1):15-7, 2004.
- ¹³ Blanchfield, B. "Hospital Capital Expenditures in the 1990's. Regulation Versus Competition," *The Future of American Health Care, Volume II*, Chapter 9, 1992
- ¹⁴ The Robert Wood Johnson Foundation, Princeton, NJ. "The 2030 problem: caring for aging baby boomers." *Health Services Research*. 37(4):849-84, 2002 Aug.
- ¹⁵ <http://www.financingthefuture.org/2/reports.htm>
- ¹⁶ SAS Institute Inc., 100 SAS Campus Drive, Cary, NC 27513-2414.
- ¹⁷ Handbook in research and evaluation: a collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences / Stephen Isaac and William B. Michael. San Diego, Calif. : EDITS Publishers, c1981.

¹⁸ Hikmet N. Chen SK. An investigation into low mail survey response rates of information technology users in health care organizations. *International Journal of Medical Informatics*. 72(1-3):29-34, 2003 Dec.

¹⁹ Jha AK. Poon EG. Bates DW. Blumenthal D. Middleton B. Kuperman GJ. Kaushal R. Defining the priorities and challenges for the adoption of Information Technology in HealthCare: opinions from an expert panel. *AMIA ... Annual Symposium Proceedings/AMIA Symposium*. :881, 2003.

²⁰ Ash JS. Gorman PN. Seshadri V. Hersh WR. Computerized physician order entry in U.S. hospitals: results of a 2002 survey. *Journal of the American Medical Informatics Association*. 11(2):95-9, 2004 Mar-Apr.

²¹ Poon EG. Blumenthal D. Jaggi T. Honour MM. Bates DW. Kaushal R. Overcoming the barriers to the implementing computerized physician order entry systems in U.S. hospitals: perspectives from senior management. *AMIA ... Annual Symposium Proceedings/AMIA Symposium*. :975, 2003.

²² Poon EG. Blumenthal D. Jaggi T. Honour MM. Bates DW. Kaushal R. Overcoming the barriers to the implementing computerized physician order entry systems in U.S. hospitals: perspectives from senior management. *AMIA ... Annual Symposium Proceedings/AMIA Symposium*. :975, 2003.

²³ <http://www.leapfroggroup.org>