

Supporting Patient-Centered Care in Medical Groups

With Information Technology

Thomas R. Prince, PhD, CPA

Thomas R. Prince, PhD, CPA, Professor of Health Industry Management, Professor of Accounting Information and Management, Kellogg School of Management, Northwestern University, Evanston, Illinois.

Corporate purchasers of healthcare benefits for employees and their dependents are beginning to demand the use of information technology in healthcare for purposes of improving quality. Level of investment in information technology is directly related to net income for hospitals. The proper choice of investments in information technology is associated with financial stability and supporting patient-centered care in medical groups. Empirical studies of healthcare services in outpatient facilities and clinics indicate the opportunity for significant improvements in quality by focusing a very small set of treatment protocols. Key words: *computer-based medical record, Internet, information technology, financial viability, investment decisions, patient-centered care*

The Internet is changing the delivery of healthcare services and the demand for services by informed consumers. The committee in *Crossing the Quality Chasm: A New Health System for the 21st Century* emphasized that 41.5 percent of households in the United States had Internet access in August 2000 (Institute of Medicine, 2001). Major improvements occur as consumers use the Internet for healthcare information. A recent study reported that 40.9 million American adults or 54 percent of the online adult population have turned to the Internet for healthcare

services and information (Mefford & Bard, 2000). In some marketplaces, informed consumers are selecting the healthcare facility, physician or physician team, and may participate in discussions on their medical treatment of selected diseases. The traditional physician-patient model is being replaced by a consumer-centered world (Prince, 2000).

In the context of a connected world, five parts of assessing patient-centered care in medical groups are examined. The first part reviews the information technology efforts by major corporate purchasers of healthcare benefits for employees and their dependents. Second part summarizes empirical studies of the financial relationship between information technology investments and net income for the healthcare entity over four years. Third part focuses on hospital closures and information technology investments. Fourth part examines the progress in specifying profiles of patient episodes of care for improving quality while enhancing the financial viability of the healthcare entity. The fifth and final part considers the impact that investments in enterprise-wide information networks within a connected world may have on patient-center care in medical groups.

Major Corporate Purchasers

Investments in information technology supporting **physician order entry in hospitals** are receiving strong encouragement from major purchasers of healthcare benefits for employees and their dependents. Major coalitions of healthcare purchasers have tried various approaches over the past ten years in efforts to improve the quality of care provided to their employees and dependents. These efforts include posting quality-of-care measures (10 or more factors with a composite ranking) on the Internet for health plans and healthcare providers. Payments by employees for healthcare services vary by the composite ranking on the Internet for a given plan

or facility. Some employees are willing to pay a premium so they can continue to be treated by a given physician associated with a low-quality facility based on multiple measures.

A new approach is being implemented by a major coalition of healthcare purchasers to improve patient safety through process measures, staffing, and volumes of selected services performed by a given healthcare provider. This major coalition is called the **Leapfrog Group** and is sponsored by the Business Roundtable. This voluntary program is aimed at mobilizing large purchasers to inform the healthcare industry that major leaps in patient safety and customer value will be better recognized and rewarded with preferential use and other market reinforcement (The Leapfrog Group, 2000). Currently, there are 78 corporate members in the Leapfrog Group representing purchasers providing healthcare benefits for 25 million American beneficiaries (Sarudi, 2001).

Key members of the Leapfrog Group were brought together because of the lack of substantial action on the published report that preventable mistakes in hospitals are the nation's eighth-leading cause of death (Institute of Medicine, 2000; Lovern, 2001). To quantify the impact of these initiatives, a study was commissioned on the national benefits if urban hospitals were to adopt the Leapfrog Safety Standards. The detailed report indicates that 522,000 of serious medication errors would be avoided by computer-physician order entry (**CPOE**) system outlined by the Leapfrog Group. These calculations for urban hospitals are based on 32 percent of hospitals having a **CPOE**, but with only 5 percent requiring physicians to enter medication orders via computers linked to prescribing error prevention software (Birkmeyer, Birkmeyer et al., 2000). The commissioned study also examined evidence-based hospital referrals and intensive-care unit physician staffing.

A subsequent examination of information system modules of 44 healthcare entities representing 576 hospitals found that more than 60 percent of the hospitals had CPOE systems. This study, however, did not examine the quality of the prescribing error prevention software (Prince & Sullivan, 2000).

Approximately 900 hospitals in seven pilot regions of the country are being asked by the Leapfrog Group to complete a lengthy set of questions on (1) how they process medication orders, (2) how they staff their intensive-care units and (3) how many open-heart surgeries they perform each year (Lovern, 2001). These findings can then be used by major corporate purchasers of healthcare services in structuring agreements with health plans.

Bruce E. Bradley, Director of Managed Care at General Motors is one of the leaders in the Leapfrog Group. He seeks to make compliant hospitals less expensive for General Motors employees. This can be achieved as either a “carrot or stick” in getting action by hospitals (Lovern, 2001).

Professionals in healthcare associations have emphasized that no “off the shelf” CPOE systems are available for processing medication orders and meeting the requirements that experts think are necessary (Lovern, 2001; Sarudi, 2001). With more than 60 percent of hospitals having CPOE systems, it is expected that major progress will be made over the next two years in implementing prescribing error prevention software in selected marketplaces.

The report on medical errors highlighted the need for increased attention to quality of care and patient safety (Institute of Medicine, 2000). These serious issues were initially addressed by 21 of the nation’s largest health plans that serve a combined total of more than 100 million Americans (CAQH, Coalition for Affordable Quality Healthcare, 2000). There are now 25 health plans participating in CAQH along with two principal health plan associations. Teams of senior

executives from the participating health plans are focused on (1) improving access to quality healthcare coverage, (2) working with doctors and other healthcare professionals to help improve care quality, and (3) making administration and information easier for doctors and consumers. CAQH is partnering with the U. S. Centers for Disease Control and Prevention in addressing the growing health crisis in antibiotic resistance. The next program is in cardiovascular disease (CAQH, 2001).

Administrative simplification initiatives by CAQH will have a significant impact on information systems in healthcare. A common database of formularies listing prescription drugs that CAQH plans cover is being developed. The power of the Internet is being used to improve consumer access to health plan information. Standard terms are being developed for all companies, when possible, so there is more continuity and simplicity when a consumer changes plans (CAQH, 2001).

Some of these participating health plans have joined with others in establishing an Internet-based healthcare information service company called MedUnite, Inc. This new entity will permit physicians to submit claims to many different health insurers through a single Internet portal. Physicians can also check on their patient's medical coverage and can seek insurer's approval before referring patients to medical specialists (MedUnite, 2001).

Another development for improving quality in healthcare services is through online medical communities. MedBiquitous Consortium is an international group of nonprofit, commercial and governmental members who share an interest in creating technical and operational standards for high-quality online medical communities. Johns Hopkins School of Medicine has assumed a leadership role in this group for the purpose of supporting education and collaboration in online medical communities (MedBiquitous Consortium, 2001).

Financial Assessment of Information Technology Investments

There is a close association between levels of information technology investments in hospitals and their financial performance. Donations, contributions and governmental grants used in purchasing information technology can temporarily upset these findings, but over a four-year period there is a return to the general relationship. This analysis will use a four-year period so that unusual financial transactions and benefits in a given year are examined in the context of major financial measures. Cash flow to net patient revenue for the four years is used in this paper to illustrate this general relationship.

CPOE systems with prescribing error prevention software are related to other application modules within the healthcare entity. There is a general sequence to which information technology systems have been implemented in hospitals over the past 25 years because of many regulatory, administrative and legal requirements. Using the 1979 American Hospital Association's (**AHA**) survey of hospital information systems as a baseline, a general eight-step framework of information systems, modules and capabilities can be specified. The first step is an electronic medical record (**EMR**) interfaced with all application modules, medical devices and the hospital information system. The eighth step represents an enterprise-wide scheduling and patient monitoring system (Prince & Sullivan, 2000).

Before addressing the general status of information technology in hospitals, consideration is given to the financial status of community hospitals in 1992-1995. Table 1 presents cash flow to net patient revenue ratios for 514 hospitals that are members of AHA's National Panel Survey. The general experience of 30.7 percent of these hospitals classified as distressed in 1992-1995

Table 1. Critical Levels – Cash Flow to Net Patient Revenue

	Reacting Phase		Strategic Planning Phase	
Status	“Distressed”	“Struggling”	“Implementing”	“Proactive”
Range	9.55% or less	9.56% to 12.31%	12.32% to 15.58%	15.59% or more
Profiles	Cash shortages on a daily basis	Working capital pressures	Reasonable cash reserves	Strong cash Reserves
Distribution Of 514 Hospitals 1992-1995	30.7%	25.3%	25.5%	18.5%
Distribution Of 312 Hospitals 1996-1999	24.7%	24.7%	22.7%	27.9%
Distribution Of 563 Hospitals 1996-1999	32.2%	21.3%	21.3%	25.2%

Notes: Data for the three distributions of hospitals are from certified financial statements provided by the Merritt System®, a national database containing over 1,600 hospitals and 160 healthcare systems. The Merritt System® is the product of Van Kampen American Capital Management, Inc. and its affiliates, a division of Morgan Stanley located in Oakbrook Terrace, Illinois. Copyright® 1990 by Van Kampen Merritt Investment Advisory Corp: All rights reserved.

The 514 hospitals for 1992-1995 are from the American Hospital Association’s National Panel Survey. Other financial measures of these 514 hospitals are presented in a recent book (Prince, 1998).

The 312 hospitals for 1996-1999 are from the American Hospital Association’s National Panel Survey.

The 563 hospitals for 1996-1999 are not from the American Hospital Association’s National Panel Survey.

This research study defines cash flow as the summation of revenue-over-expenses plus depreciation and amortization expenses. The “standard” Statement of Cash Flows was not mandated by the American Institute of Certified Public Accountants for hospitals until 1996.

was cash shortages on a daily basis. Unless there were contributions, donations or government grants, distressed hospitals in 1992-1995 will not have integrated application modules that are a prerequisite for the eight-step framework discussed above. Merger, closure or alternative financial activities will remove 190 of the 514 hospitals from the research database by 1998. Some of the distressed hospitals in 1992-1995 per Table 1 are still in operation in 2001; in fact, two of these distressed hospitals are distinguished academic medical centers.

The proactive hospitals in 1992-1995 per Table 1 (18.5 percent) had strong cash reserves and tended to make major investments in both medical technology and information technology. External financial sources were available to these proactive hospitals so many could issue tax-exempt securities for procurement of technology while investing internal financial resources in the stock market.

Hospitals in the Implementing Group per Table 1 (25.5 percent for 1992-1995) have reasonable cash reserves, but they must depend on investment bankers for assistance in financing medical technology and information technology. Some hospitals near the cusp of the Proactive Group in 1992-1995 are able to progress to this next category by 1996-1999. A few hospitals in the Struggling Group per Table 1 (25.3 percent for 1992-1995) are able to move to the Implementing Group by 1996-1999; the financial returns of some others may be such that will be classified in the Distressed Group by 1996-1999.

Recent merger activities by Ascension Health, Banner Health System, Catholic Health East, Catholic Health Initiatives, Catholic Healthcare West, Trinity Health, and others have impacted the availability of certified financial statements in 1996-1999 for some hospitals included in the 1992-1995 study. In addition, closure and alternative financial arrangements meant that 190 of the 514 hospitals were no longer in the active research database by 1998. The

1996 or 1997 certified financial statements for these 190 AHA National Panel Survey Hospitals indicated that 41.0 percent were classified in the Distressed Group based on cash flow to new patient revenue. There were 12 other hospitals that were dropped from the active research database between 1995 and 1996 (514 hospitals - 190 - 312 continuing = 12 missing hospitals).

Table 1 shows that the 312 AHA National Panel Survey Hospitals in 1996-1999 had stronger financial returns than the composite profile for 1992-1995. The Proactive Group for 1996-1999 per Table 1 was now 27.9 percent for these AHA National Panel Survey Hospitals.

A sample of 563 hospitals that were not included in the AHA National Panel Survey reported a Proactive Group of 25.2 percent for 1996-1999. The overall distribution for the 563 continuing hospitals indicates a higher proportion in the Distressed Group for those entities in the research database for 1996-1999.

A 1999 field study of 44 healthcare entities containing 576 hospitals indicated a close relationship between information technology investments and the financial measure of cash flow to net income for four years. Senior executives in the participating healthcare facilities completed a seven-page survey instrument. Certified financial statements were obtained for the two entities not in the research database (Prince & Sullivan, 2000).

An area of inquiry within the field study was preparation for Y2K issues by healthcare entities. A 300-bed hospital has around 3,500 medical devices; a large academic medical center may have 7,000 medical devices. Medical devices and healthcare software that were designed and distributed to the public by May 31, 1997, are exempt from the rigorous Food and Drug Administration requirements for correction of Y2K issues. Each of these devices has to be tested for Y2K issues, and new upgrades must also be tested and monitored by the healthcare system's Information Systems Department. Proactive hospitals in the 1999 field study had completed Y2K

studies by May 1998. Most implementing hospitals finished Y2K projects by March 1999. Many struggling and most distressed hospitals cannot complete the Y2K studies by 2000 (Prince & Sullivan, 1999; Prince & Sullivan, 2000).

Proactive hospitals in the 1999 field study have an electronic medical record (**EMR**) (the first step in the eight-step framework of information systems) and decision-support systems for treatment protocols and activities (the second step in the eight-step framework). Some proactive hospitals have an enhanced EMR with order management capabilities (the fourth step) and were in the process of installing physician office clinical connectivity (the fifth step) in 1999-2000 (Prince & Sullivan, 1999). Proactive healthcare systems in the study were expanding the locations where patients could receive healthcare services without acquiring other hospitals. These expanded locations included mammography services in a major upscale department store, occupational health and wellness services in a local health club, and a comprehensive specialty pediatric unit in a suburban community hospital (Bodel, Kowal & Prince, 1999).

Many implementing and struggling hospitals had an EMR by 1998 and were in the process of installing a common person (patient) identifier for the enterprise (step three). Step one requires the EMR to be interfaced with **all** application modules and medical devices; few of the distressed hospitals had fully implemented step one. Most of the distressed hospitals and some of the struggling hospitals were attempting to interface the EMR with selective application modules (Prince & Sullivan, 2000).

Hospital Closures

Between 1998 and 1999, there were 190 deletions in AHA's annual survey of registered hospitals. There were 105 hospitals that closed; 57 hospitals merged resulting in 26 additions; 12 hospitals shifted to outpatient facilities; 4 hospitals shifted to inpatient care other than a hospital;

and 12 hospitals changed from registered to nonregistered. Besides the 26 additions from merger, 13 hospitals were newly added to the registered file (Health Forum, LLC, 2001a).

It was projected in 1999 that 800 distressed hospitals would cease to exist within 60 months because of merger and closure activities. These projections were based on the impact of the Balanced Budget Act of 1997, fraud and abuse activities, Y2K issues, and the lack of information systems support for physicians (Prince & Sullivan, 2000). The projected deletions of 160 per year were achieved in 1999 even though the federal government modified some of the restrictions in the Balanced Budget Act of 1997.

As these deletions occur, there has been a slight increase in the percent of rural community hospitals from 43.8 percent in 1998 to 44.2 percent in 1999 (Health Forum, LLC, 2001b). It is expected that 80 percent of 160 deletions per year will be urban hospitals and that the federal government will continue to provide special payments to rural hospitals.

Most of the hospitals classified in Table 1 as “proactive” or “implementing” currently meet the quality and patient safety standards advocated by the Leapfrog Group. The remaining proactive and implementing hospitals are expected to aggressively accomplish those goals and then to disseminate information about quality and patient safety to current and prospective patients. Some of CAQH’s activities are closely related to the Leapfrog Group’s safety standards and will serve to expedite information technology advancements in healthcare. Other marketing and information initiatives to prospective patients by these financially strong hospitals with EMRs and integrated information systems may accelerate the 800 projected hospital closures.

Most of the distressed hospitals do not have access to financial resources to correct deficiencies in medical technology, information technology, evidence-based medicine, professional staff and executive management. While some patients in urban areas may have to

travel further for healthcare services, there will be an overall improvement in the marketplace from these expected closures and mergers. This excess capacity in urban areas will have been removed, hopefully, with minimum governmental interference.

Current activities in many struggling hospitals will be adversely impacted by the Leapfrog Group's safety standards and CAQH's activities. It is expected that a restructuring of the medical and surgical services offered by these urban hospitals may result in a new type of "community hospital" that is associated with an academic medical center for neonatal, cardiovascular surgery and intensive care services. It is projected that the distressed hospitals in 2003 will consist of the current struggling hospitals that attempt to provide full services to all patients.

Hospital closures versus dynamic growth of healthcare services can be viewed through a new framework in the capital market. A new financial volume entitled **Intangibles: Management, Measurement and Reporting** addresses the important task of assessing innovation capabilities, intellectual property, human resources, and organizational capital as the keys to survival and growth (Lev, 2001). Proactive and implementing hospitals create these intangible assets through investments in medical technology, medical practice and information technology that are adopted and used by physicians and healthcare professionals.

The enhanced computer-based medical records with order management features that provide enterprise-wide clinical connectivity for physicians represent a significant intangible asset for proactive and implementing hospitals. The resulting intellectual properties from these integration and interface efforts should not be valued based on the expenditures incurred in their creation. Instead, these enhanced information technology capabilities should be assessed by the "value chain scoreboard" of healthcare in the changing marketplace (Lev, 2001).

Struggling hospitals, on the other hand, do not have the foundation of investments in medical technology, medical practice and information technology that are currently demanded in the marketplace. Thus, struggling hospitals have only limited amounts of intangible assets that are the keys to survival and growth.

Profiles of Patient Episodes for Medical Groups

Physicians are experienced with benchmarking of medical group practices using claims data (Dove & Greene, 2000). With databases being created by new information systems modules, physicians and administrators are beginning to perform benchmark analyses on both monthly and quarterly basis. These profiles of episodes permit comparisons across physicians for similar types of patients by zip code, payer and medical condition or complications. Resource value units (RVUs) are annually specified by the Centers for Medicare & Medicaid Services (CMS) by type of episode of care, and these RVUs can be used in comparisons of effort by physician within a medical group. These RVUs can also be used in staffing and administrative assessments.

The federal government attempted to develop for several years a diagnostic-related grouping for outpatient and clinical services (Prince, 1998). Instead, CMS implemented in August 2000 an Ambulatory Payment System (APS) where episodes of care with similar “payments” were grouped together. It is hoped that CMS continues with the APS framework where similar payments are the prime criteria for classifying services.

There are over 10,000 possible codes that CMS has approved for classifying episodes of care for Medicare patients. But a very small subset of these codes represent most of the reasons for a patient visit. The Institute of Medicine Report calls for directed action on not fewer than 15 priority conditions for patients, taking into account frequency of occurrence, health burden and resource use. These conditions include cancer, diabetes, emphysema, high cholesterol,

HIV/AIDS, hypertension, ischemic heart disease, stroke, arthritis, asthma, gall bladder disease, stomach ulcers, back problems, depression and Alzheimer's disease (Institute of Medicine, 2001).

There are several hundred CMS approved codes that relate to these 15 priority conditions.

Medical groups have areas of specialization and do not attempt to cover all of these priority conditions. With recent advancements in medical technology and medical practice, many procedures can now be performed in an outpatient setting. An April 2000 study of outpatient facilities, clinics, and ambulatory care centers in six states indicated that less than 300 CMS approved codes represented more than 90 percent of patient episodes classified by both visits and charges. Table 2 lists the 20 dominant procedure codes from this six-state study of outpatient facilities, clinics and ambulatory care centers based on required reports by these healthcare entities for 1999. Please note that 99XXX procedure codes for a patient visit were not included in the list.

It is not usual for a medical group of 20 physicians to have less than 30 CPT codes (including the 99XXX procedure codes for patient visits) that represent more than 90 percent of the episodes of care for a given year, measured in both charges and visits. Using the benchmarking procedures for claims data, this information can be sorted to create treatment profiles based on a given physician's practice (Dove & Greene, 2000). While no names or identification are displayed in any of these charts, graphs and displays, physicians who are outliers are immediately aware of their situation.

Consulting experience with some medical groups suggest that by the end of the seventh month, most of the outliers have been eliminated. A distinguished surgeon in an academic medical center, for example, was surprised to see from these displays that he was the sole user of certain supplies and techniques. There was no particular medical reason for his choice of

Table 2. Principal Procedure Performed on a Patient in an Outpatient, Clinic or Physician Office Setting*

Rank Order	Current Procedural Terminology (CPT) Code Number	Description
1	66984	Extracapsular Cataract Removal With Insertion of Intraocular Lens Prosthesis
2	47562	Laparoscopy Cholecystectomy [Formerly 56340]
3	93510	Left Heart Catheterization, Retrograde, From The Brachial Artery, Axillary, Artery or Femoral Artery; Percutaneous
4	45378	Colonoscopy, Flexible, Proximal To Splenic Flexure; Diagnostic
5	45384	Colonoscopy With Removal Of Tumor(s), Polyp(s), Or Other Lesion(s) By Hot Biopsy Forceps or Bipolar Cautery
6	29877	Arthroscopy of the Knee, Debridement/Shaving of Articular Cartilage (Chondroplasty)
7	43235	Upper Gastrointestinal Endoscopy including Esophagus, Stomach, Duodenum, Jejunum
8	19125	Excision Of Breast Lesion Identified by Preoperative Placement of Radiological Marker
9	45380	Colonoscopy With Biopsy, Single Or Multiple
10	64721	Neuroplasty, Median Nerve at Carpal Tunnel
11	69420	Myringotomy Including Aspiration And/Or Eustachian Tube Inflation
12	58120	Dilation and Curettage, Diagnostic and/or Therapeutic
13	49650	Laparoscopy, Surgical, Repair Initial Inguinal Hernia [Formerly 56316]
14	43239	Upper Gastrointestinal Endoscopy With Biopsy Including Esophagus, Stomach, and Either The Duodenum And/Or Jejunum as Appropriate
15	42820	Tonsillectomy and Adenoidectomy; Under Age 12
16	58671	Laparoscopy, Surgical; With Occlusion of Oviducts By Device
17	93526	Combined Right Heart Catheterization and Retrograde Left Heart Catheterization
18	23470	Arthroplasty, Glenohumeral Joint; Hemiarthroplasty
19	27442	Arthroplasty, Femoral Condyles Or Tibial Plateau(s), Knee
20	17000	Destruction By Any Method, Including Laser, With Or Without Surgical Curettement

Notes: *This listing is based on a six-state analysis of data for 1999 provided by the respective State Hospital Associations in conjunction with the State Departments of Public Health. The CPT 99XXX procedures for patient visits are excluded in this ranking.

supplies; he immediately shifted to the “standard” package of items resulting in a significant savings to the institution. The same type of change has been seen in medical groups with 15 or less physicians.

Evidence-center care is based on an extensive database of carefully controlled patient episodes for a lengthy period of time that are analyzed by healthcare professionals. “Patient-centered care” is based on simple treatment profiles of existing professional practice that are assessed by physicians and medical professionals for improving quality. Information in claims and EMR databases for a minimum of thirteen months are the sources for these charts, graphs and displays. Patient-centered care can result in immediate quality improvements in treatment protocols after the medical staff assesses the information for the prior month in the context of the previous 12 months of data for similar patient episodes partitioned by related procedure codes, medical condition, age, sex, marital status, zip code, and other personal characteristics.

Information technology connected to the Internet is being used by various clinics to monitor vital signs, medications and behavioral assessments of patients with chronic conditions. Nurses and healthcare professionals monitor the status of these chronic patients on a 24-hour basis, seven days per week using information technology that connects the patients at home to the control center. Patients with other types of chronic conditions are being monitored by nurses with disease management information systems, such as the Pfizer Health Solutions project in 25 hospitals in Maine for congestive heart failure. Monitoring patients with chronic conditions is a cost-effective program for reducing major inpatient healthcare expenditures (Tieman, 2001).

Enterprise-Wide Information Networks

Many information technology investments in healthcare result in enhanced capabilities within one or two areas of clinical services, but a “wall” is reached when required interfaces from

related areas are not compatible with the new information technology capabilities. Frustration levels have merely shifted from one or two areas of clinical services to other areas, possibly, without any major economic benefit to the healthcare entity. For example, the physician in-charge of a patient's care now has immediate information on some tests and findings but does not have access to other related patient data. If the physician responds to the "immediate" information, there is the risk that the "other" information may result in a negative finding on the appropriateness of any follow-up test based on the "immediate" information.

Enterprise-wide assessments of information technology investments are essential for relating physicians, consumers, and the marketplace to the healthcare entity's operations. The requirements imposed on information technology will change as the key parties respond to the enhanced capabilities. The *customer-centered paradigm* in this connected world will assume a larger role in reshaping the information technology capabilities in the future.

Physicians with Internet access to enhanced computer-based medical records with order entry capabilities often begin to view the patient-centered care from new perspectives. After eight to ten months with enhanced information technology, modifications are introduced by these physicians in the flow of patients within the medical group offices. Some physicians have introduced two meetings with each patient during an office visit. The second meeting is for one or two minutes when the physician hands the patient the results of the laboratory, radiology and other tests performed during this visit and briefly discusses these findings. The beneficial effects of these modifications in the flow of patients through the office can be observed in the smiles and behavior of patients with chronic conditions as they move through the medical office facility.

Conclusion

Information technology can reduce medication errors and save lives. Healthcare entities have been asked for more than 20 years to implement computer-based medical records that are interfaced with computer-physician order entry systems. The Institute of Medicine's Committee on Quality of Health Care in America is commended for taking a strong stand on pushing information technology to the next level in healthcare practice. The Leapfrog Group, CAQH and other coalitions are reinforcing the Institute of Medicine's recommendations on information technology and are trying to move healthcare entities more rapidly into supporting patient-centered care.

There is a close association between financial performance and the classification of hospitals by medical technology and information technology. Proactive hospitals have cash flow to net patient returns of 15.6 percent or higher and have the latest medical technology and information technology. Distressed hospitals are facing daily cash shortages for meeting the payroll and paying suppliers. Most distressed hospitals do not have an EMR that is interfaced to all application modules and medical devices. Some distressed hospitals are trying to provide physicians with Internet access to patient data from their medical offices without having an EMR that is interfaced with all application modules and medical devices. This arrangement may result in inappropriate decisions if physicians respond to patient inquiries without knowing certain tests and procedures were not included in the integrated database.

The lack of information systems to support physicians was an important factor in the 1999 projection that 800 hospitals would cease to exist over the next five years because of closure and merger activities (Prince & Sullivan, 2000). The 190 deletions in 1999 indicate the reasonableness of these projections; however, the time period may be reduced from five years to

four. Market forces, including members of the Leapfrog Group, CAQH, MedUnite and MedBiquitous Consortium, are expected to accelerate the rate of hospital closures by distressed facilities.

Consumers using information available through the Internet are becoming more informed about healthcare options both as to treatment and provider. Some members of the Leapfrog Group have been encouraging their employees for several years to become *informed consumers* of healthcare. The overall movement toward *patient-centered care* in the connected world has been strengthened by the Institute of Medicine's report and the supportive actions of various collations and associations.

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