Health care quality improvement across the Baylor Health Care System: the first century

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> So I am called eccentric for saying in public: that Hospitals, if they wish to be sure of improvement, (1) must find out what their results are; (2) must analyse their results, to find out their strong and weak points; (3) must compare their results with those of other hospitals; . . . and (8) must welcome publicity not only for their successes but for their errors. . . . Such opinions will not be eccentric a few years' hence. —ERNEST A. CODMAN, 1916 (1)

> The objective of medical-care-research is reduction of the time lag between advances in the laboratory and measurable improvement in the health of society's members. —KERR L. WHITE, 1961 (2)

As it begins its second century of service, Baylor Health Care System (BHCS) remains steadfastly devoted to improving the quality of health care provided to its patients, to improving the tools available to and the training standards of those who provide this medical care, and to improving the operational health of the organization itself to ensure that it will be capable of delivering superior health care to those in need for the next 100 years. As such, BHCS has been and continues to be a local, national, and global leader in commitment to improving health care quality.

The core values that define and drive BHCS are based upon a profound desire to provide medical care throughout the community and to continually improve the quality of that care. "Servanthood," "quality," and "innovation" are 3 BHCS values that reflect the effort to serve with an attitude of unselfish concern, to meet the needs and to strive to exceed the expectations of those served through continuous improvement, and to constantly explore, study, and research new concepts and opportunities for health care improvement throughout the community. To ensure that the level of this care meets or exceeds the highest national standards, BHCS has embraced the evidence-based standards of excellence defined by federal governmental and national quality organizations and by the conceptual framework of the US Institute of Medicine's (IOM) 2001 quality aims of care that is safe, timely, effective, efficient, equitable, and patient centered (3). More than just a mantra, the BHCS vision of "best care" is a promise to deliver the best and safest care available, focusing on wellness, prevention, early detection, and acute and subacute care, and is supported at every point by education, research, and improvement.

HISTORY OF HEALTH CARE QUALITY AS A FOCUSED DISCIPLINE

The application of quality measurement and analytic tools to medical issues is first attributed to Briton Florence Nightingale (4, 5). Best known for her tireless efforts to treat the wounded of the Crimean War and her influence on the respectability of the nursing profession, Nightingale made major contributions to the statistical analysis of surgical outcomes (6). Beginning in the 1850s and continuing through the end of the 19th century, she earned considerable attention for her mathematical and analytic work that measured postoperative complications and morbidity and mortality and for her "Scheme for Uniform Hospital Statistics" (4, 5). Her understanding of these issues went beyond mere descriptive studies and focused on interpreting the data in a legitimate and meaningful way (5).

Twentieth-century efforts to address quality in medicine began, interestingly enough, with challenges to quality in medical education. In 1908 the American Medical Association Council on Medical Education asked the Carnegie Foundation—known for its commitment to improve higher education—to evaluate the quality of medical schools in the USA with an eye toward closing those of poor quality. Kentucky high school principal Abraham Flexner had recently joined the foundation, and it fell to him to produce *Medical Education in the United States and Canada*, published in 1910. Flexner traveled to nearly every medical school in the USA and Canada to conduct extensive on-site analyses of the school's facilities, faculty, curriculum, and students. Given this hectic schedule, Flexner spent, at best, less than a day at some schools and, according to more than a few medical school directors, "too much time" at others (7).

In 1909, Flexner visited Baylor University College of Medicine (then located in Dallas), which listed 29 faculty members and 53 students. He noted the presence of a dissecting room, chemical laboratory, and a "meagerly equipped" laboratory for pathology and bacteriology, but nothing else and "no assurance of funds with which to provide additional laboratories or to maintain those already in part provided." The school's clinical facilities included access to the 32 patients in the "free wards" of the adjoining 200-bed hospital, with no infectious disease and little obstetrical work available. "The clinical opportunities," Flexner wrote about Baylor, "are thus decidedly inadequate" (8–10).

What quickly became known as the Flexner Report recommended a drastic decrease in the number of medical schools.

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Those that remained, Flexner argued, should be affiliated with universities, admit students with at least 2 years of college (most at the time—including Baylor—required only 3 years of high school study), and have a broad curriculum based on the German tradition in biological and anatomical sciences followed by hands-on clinical practice (11). The Flexner Report was highly influential, as donors quickly followed the report's recommendations of which medical schools merited philanthropic dollars. Moreover, medical education shifted from a largely privately run vocational business to an academic educational enterprise affiliated with a university or other institute of higher learning, a situation that remains to this day (7). Despite Flexner's harsh words and a concurrent "class B" rating from the American Medical Association Council on Medical Education, by the end of 1910 Baylor University College of Medicine "would be the only surviving [medical] school in Dallas" (12). Flexner went on to found the Institute for Advanced Study at Princeton University and hired Albert Einstein to join its faculty.

To say that physicians at the beginning of the 20th century were not concerned about quality of care is inaccurate. Each took pride in his work and expected no less of his peers. There was, however, no formal organizational or conceptual commitment among physicians, hospital directors, public figures, or government agencies for the identification and advancement of quality of care. Instead, it was believed that such efforts were inherently part of the physician's commitment to the Hippocratic Oath and its admonishment of "first, do no harm." Any public expression of concern about quality might be construed as casting doubt on the integrity of the profession, even accounting for the foibles of human error and chance.

It is hardly surprising, then, that a young Boston physician encountered resistance when he began keeping and sharing detailed records of his successes—and failures (13–16). Ernest Avery Codman, MD *(Figure 1)*, was an innovative orthopedic surgeon who took the first x-ray in Boston and created a form of anesthesia chart used today. Beginning in 1900, he undertook the systematic follow-up of surgical patients. By 1910 Codman championed the general adoption of his "End Results Idea,"

> which was merely the common sense notion that every hospital should follow every patient it treats, long enough to determine whether or not the treatment has been successful, and then to inquire "if not, why not" with a view to preventing similar failures in the future (17).

The following year he opened his own hospital, where the End Results were both monitored and published for all to see (1, 17, 18).

Over the next 3 years, however, Codman earned the opprobrium of the Boston medical community for his "vigorous and undiplomatic" advocacy of what is now called evidence-based medicine, encouraging academic promotion based on medical merit, avoiding expensive and needless procedures, and addressing other lightning-rod issues of the day (19). (Indeed, both Codman and his wife championed unpopular causes. In 1927 she visited and corresponded with Nicola Sacco, who waited in a Boston jail for his execution along with Bartolomeo Vanzetti, both of whom she believed were innocent.) Codman resigned from Massachusetts General Hospital in 1914, resigned in 1915 as chairman of surgical oversight committees of the Boston Medical Society after unveiling an 8-foot cartoon lampooning his "greedy" peers, soon thereafter lost his faculty position as a Harvard instructor, and saw his own hospital close in 1918 (5, 13, 14, 19).

Figure 1. Ernest A. Codman, MD. Photo by Notman.

Still there were some bright spots, although they were not in Massachusetts. At the 1912 Clinical Congress, Codman proposed a national effort to provide common standards among hospitals, resulting in the 1917 American College of Surgeons Minimum Standard for Hospitals (20, 21). In 1952 this served as the basis for the Joint Commission on Accreditation of Hospitals, which in 1987 was renamed the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). An independent, not-for-profit organization, JCAHO is the nation's predominant standards-setting and accrediting body in health care; it evaluates and accredits >16,000 health care organizations and programs in the USA (22).

Codman and his End Results methods were also emulated by other medical pioneers, notably Charles and William Mayo, who included Codman not only among their professional associates but also among their friends. Like Codman, the Mayo brothers, who in 1914 established the famous clinic that bears their name in Rochester, Minnesota, shared a passion for articulating the importance of health care quality improvement. Writing to Codman in 1916, William Mayo noted that "no man can bring out a new and important idea without opposition." He added that Codman's "career as a hospital re-organizer has been vivid, to say the least, in spots. It has already accomplished a great deal of good." Mayo urged Codman to "keep at it, because you are right" (19). That same year Charles Mayo admonished Codman to "remember you have had the most active part in this work [hospital standards and quality] and such things are appreciated by the professionals in general but not by those in your own city" (19).

By the time of his death in 1940, however, Codman—in contrast to the local and international success and acclaim that the Mayo brothers enjoyed—was still considered a pariah who tried to reform what was thought to be sacrosanct, the Boston medical community. Broken professionally and financially, he was not widely missed by his peers or Boston's upper crust. In death, however, Codman's name and his End Results approach became synonymous with quality improvement efforts throughout the medical community in the latter half of the 20th century (5). He is recognized as the founding spirit behind the 1956 Commission of Professional and Hospital Activities, which served "to collect hospital case records for machine analysis to determine the incidence of diseases in hospitals, the frequency of surgical procedures, and other valuable data to allow comparison of individual performance with national norms" (20, 21).

Quality efforts through the 1920s and 1930s focused on the nascent field of epidemiological research and on health services costs and distribution. The Committee on the Costs of Medical Care, a major health services research group of this era, published 27 reports based on studies of the economics of disease prevention

and medical care. The committee contributed to quality methodology, using chart review studies, for example, and emphasizing the need for reliable, valid data. The Great Depression and the federalization of many health services under the rubric of public health led to the use of economic analytic tools to measure disparities in health status and access to quality medical care, most significantly the 1935–1936 National Health Survey (23).

Perhaps the most significant health care quality–related event during the 1920s and 1930s was the hospital care prepayment plan—the genesis of modern health care insurance—born at Baylor University Hospital. During 1929 Justin Ford Kimball, PhD, vice president of the Baylor University institutions in Dallas, grappled with the need to "shore up the shaky finances of University Hospital" and find ways for patients to pay their bills. Almost concurrent with the stock market crash of October 1929, Kimball proposed a plan that would guarantee Dallas school teachers 21 days of hospital care in a semiprivate room for 50¢ a month. Despite widespread skepticism, 1356 teachers signed up the first day. Within 5 years the "Baylor Plan" covered >408 employee groups totaling 23,000 members. By 1932 community-wide plans appeared, allowing patients to choose their hospital. The following year the American Hospital Association began to encourage, regulate, and approve similar prepayment plans (24). Thus, the "Baylor Plan" was a landmark achievement in providing improved access to health care services, thereby enhancing health care equity.

The Second World War eclipsed health care quality efforts during the early 1940s, and quality efforts suffered under the postwar budget tightening of the Truman and Eisenhower administrations. In 1960, however, the National Institutes of Health began a series of study section discussions to articulate the field of "patient care research." Led by Kerr L. White, MD, the Health Services Research Study Section provided early definitions of the scope, methods, standards, and application of health services research (25, 26). In his seminal 1961 *New England Journal of Medicine* article, White described health services research as

> concerned with the problems of assessing needs and of delivering medical care; more specifically, it is concerned with problems of implementing the advances achieved by medical science. Its concerns are not the characteristics, prevalence and mechanisms of disease, but the social, psychologic, cultural, economic, informational, administrative and organizational factors that inhibit and facilitate access to and delivery of the best contemporary health care to individuals and communities. It is concerned with the identification and measurement of medical-care needs, demands and resources, and the evaluation of the qualitative and quantitative aspects of programs, personnel, services and facilities, and their utilization in the provision of preventive, diagnostic and therapeutic care and rehabilitation. It is concerned with the health of those who do not use medical-care resources as with the health of those who do. In essence, it is concerned with medicine as a social institution (2).

By 1964 White was one of the champions for a new field of health research that combined the tools of both public health and clinical medicine, including methodology from economics, social survey research, epidemiology, biostatistics, and systems analysis (20, 27). In 1996 he received the Baxter Health Services Research Prize, which characterized White as "perhaps the most influential figure in the field of health services research, a discipline that emerged from his study of health care delivery" (25).

DEVELOPING A BHCS HEALTH CARE IMPROVEMENT FOCUS AND RESOURCE

Although Baylor institutions over the past century have shown a strong commitment to quality in terms of medical care and business excellence, the health care system did not have an institutional entity or organization devoted to pursing Codman's End Results or other measures of health care improvement until the 1990s. At that time, quality of care and enhanced clinical effectiveness became an integral part of the BHCS improvement effort that included business process redesign and issues related to becoming an integrated health care delivery system.

Nevertheless, at Baylor University Medical Center (BUMC) and other hospitals, efforts to improve quality were in place. No history of quality at Baylor would be complete without mentioning Dr. Charles Jarrett, a pulmonary care physician at BUMC who in effect was the first medical director of the BUMC quality department, at the time referred to as the Center for Quality Resource Management. Using limited administrative data, Dr. Jarrett began the arduous task of meeting with physicians, analyzing data, and trying to evoke change for the sake of improvement.

Figure 2. John F. Anderson, MD.

In 1991, BHCS formed a Leadership Center, which oversaw organizational improvements based on total quality management principles. The following year saw the initiation of a clinical continuous quality improvement task force. Boone Powell, Jr., then president and chief executive officer of BHCS, endorsed a systemwide quality initiative that linked a commitment to quality to BHCS's mission, vision, and values. During early 1994, BHCS formed its first systemwide clinical committee, the Quality Council, which was chaired by John Anderson, MD *(Figure 2)*, and offered a vision to incorporate quality into BHCS on an organizational and process level. The council's quality improvement plan was intended

> to provide a planned systematic, integrated continuous quality improvement program to design, measure, evaluate and improve performance of integrated clinical quality, processes, outcomes and the effective use of resources for the benefit of patients and health system members (28).

Under the leadership of Jill Schilp, the quality improvement plan at BUMC involved multidisciplinary task forces composed of clinical and medical staff, business process redesign teams, quality assurance committees, professional standards and credentialing committees, the management council, and the board of trustees.

Quality improvement was driven by continuous process improvement methodology, based on the plan, do, study, act strategy. First came the need to find an opportunity to improve and to identify an expert team with understanding about that process. This team clarified the current state of knowledge about the process and examined the process for variation from the norm or ideal. The team then selected one or more process improvements and planned their implementation. Once the change was in place, the team studied the new carepath and looked for

improvements, weaknesses, and unexpected results. Finally, the team consolidated their accomplishment in the form of an effective new, redesigned quality carepath (28). BUMC chose to focus on high-volume and high-risk categories, especially those that were prone to problems or had high visibility and had the greatest potential benefit to the patient and the organization as well as a reasonable probability of success.

By the end of 1995, the continuous quality improvement leaders noted in their annual report that there were 19 clinical teams, 10 new clinical carepaths or guidelines, and 18 carepaths or guidelines in development or pending approval. There were 98 physician members focusing on reducing variation and costs related to cardiovascular care, vascular surgery, orthopaedics, internal medicine, and primary care. The report concluded by noting: "Total estimated reduction in direct costs = $4,042,834. No reduction in quality based on indicators measured" (29). While BUMC/BHCS leaders were genuinely committed to improving health care quality in 1995, the cost-savings benefits were certainly powerful motives to undertake these improvement initiatives. In retrospect—based on the 2000 IOM report, *To Err is Human* (30); the 2003 RAND study reported in the *New England Journal of Medicine* that indicated that adults in the USA received only 55% of clinically recommended care (31); and other national reports that championed the need for specific, measurable health care quality improvement initiatives to provide for better patient care—the results achieved through these early continuous quality improvement efforts without reducing quality, let alone improving quality, were dubious at best.

To some participants in the overall BHCS business redesign effort, the cost savings obscured the real value of these clinical improvement efforts: the ability to measure scientifically the quantitative improvements achieved by these teams. A significant step toward providing measurable improvement took place in 1998, when BHCS formed a dedicated Quality Management Coordinating Council, later renamed the Quality Improvement Coordinating Council. With John Anderson, MD, BHCS senior vice president for clinical integration, as executive champion, the council served as the authority for the operational and organizational decisions related to coordinating, communicating, integrating, and providing education in BHCS quality initiatives. The council included the quality directors from each BHCS hospital as well as medical directors from BUMC and other hospitals, ensuring a consistent systemwide approach to quality. The Quality Improvement Coordinating Council was supported by a Quality Improvement Communication Forum, which was responsible for communicating with and educating BHCS personnel about the integration of quality, resource, and outcomes management.

During 1996 and 1997, the clinical integration process headed by Anderson and Phyllis Walk, RN, defined as an organizational priority the recruitment of a dedicated quality leader, a senior vice president who would also serve as the executive director of a new BHCS resource to improve health care quality. The person chosen for the position would provide "leadership for the development and implementation of the clinical quality improvement initiatives of the BHCS." This included directly participating in clinical quality improvement efforts, using evidence-based medicine to ensure clinical effectiveness, using appropriate metrics to determine success, securing external funding for health services research studies, educating BHCS personnel and community leaders on the value and state of the art of quality improvement theory and methodology, representing BHCS at national forums on quality, reporting results to the BHCS board of trustees, ensuring the appropriate availability of clinical information technology, and—perhaps most importantly—creating and sustaining alignment of the 16,000 BHCS employees and 4000 physicians toward improving quality throughout the system. The successful candidate would also be a nationally, if not internationally, recognized quality leader with a "high degree of clinical and administrative expertise in the area of outcomes or health service research" (32). During the summer of 1999—after a nationwide search—BHCS hired David J. Ballard, MD, PhD, a Mayo-trained internist who was at the time the president of the Kerr L. White Institute for Health Services Research, professor of medicine at the Emory University School of Medicine, and professor of epidemiology in Emory's Rollins School of Public Health *(Figure 3)*.

Figure 3. David J. Ballard, MD, PhD.

Shortly after Ballard's arrival in Dallas, BHCS defined new long-term goals. It was a time to refocus on internal activities, following an unsuccessful 1997 effort by Tenet Healthcare Corporation to buy BHCS and the related separation of BHCS from Baylor University and following a November 1999 decision to reject a merger plan with another not-for-profit health care organization in the Dallas–Fort Worth area. BHCS Chief Executive Officer Joel Allison focused the new strategic planning effort around a vision to "become the most trusted source of comprehensive health services" by 2010 and, as one of its 10 strategic objectives, "to deliver the best and safest care available." At the same time, the Dallas–Fort Worth Business Group on Health launched a significant commitment to health care quality and pledged in 2002 to be one of the 12 "second-wave" Leapfrog Group roll-out regions in the USA (33–35).

THE BHCS BOARD OF TRUSTEES AD HOC QUALITY COMMITTEE AND RESOLUTION

Related to the BHCS strategic refocusing effort, Dale Jones, the chair of the BHCS board of trustees, established on January 27, 2000, an Ad Hoc Quality Measurement Review Committee to identify key health care quality indicators and to recommend the implementation of processes to measure and improve the quality of care. The board charged the group chaired by Ballard to define health care quality for BHCS and to recommend areas of BHCS operations for health care quality measurement and improvement. The committee would also identify and recommend minimal quality measures and benchmarks for these measures, consider and recommend further quality measures and benchmarks for these additional measures, and establish a regular frequency of measuring and reporting these data. The BHCS measures and benchmarks would then be compared with those of health care quality leaders throughout the USA. The committee's recommendations would also include an implementation plan

to measure and improve BHCS quality of care. The final report would be due to the BHCS board by July 1, 2000.

In its early deliberations, the ad hoc committee chose to define quality of care with the language from the 1990 IOM report as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (36). In keeping with this commitment to align BHCS quality efforts with those on a national level, the ad hoc committee incorporated IOM and RAND perspectives by defining a health care strategy as one that was considered necessary "to the extent that it would be improper care not to recommend the strategy, that [it] had a reasonable chance of benefiting the patient, and that the potential benefit was not small" (31). The committee also elected to adopt definitions for health care underuse, overuse, and misuse, key approaches later advocated by the IOM (3). The committee defined underuse as the failure to recommend clinically necessary care. Overuse was the delivery of clinically inappropriate care. Appropriate care refers to the expected health benefits relative to the expected negative consequences of a particular health care strategy. A health care strategy in which the expected negative consequences outweigh the expected benefits is clinically inappropriate and constitutes overuse of health care services. Misuse is the failure of a planned action to be completed as intended (35).

Table 1. A resolution for quality endorsed by the board of trustees of each BHCS operating unit

WHEREAS, Baylor Health Care System's vision statement includes "the most trusted source of comprehensive health services"; and

WHEREAS, Baylor Health Care System's mission statement includes "serve all people through exemplary health care"; and

WHEREAS, one of the primary responsibilities we have as trustees of Baylor University Medical Center is continuous improvements in quality patient care and safety; and

WHEREAS, maintaining the status quo or achieving quality and safety levels only equal to or slightly better than national, regional, or local norms is not compatible with the BHCS vision and mission statements; and

WHEREAS, regulatory and legislative changes and a growing number of more informed patients support better quality patient care and safety;

THEREFORE, BE IT RESOLVED, that the board of trustees of Baylor University Medical Center hereby challenges itself and everyone involved in providing health care at the medical center to give patient safety and continuous improvement in the quality of patient care the highest priority in the planning, budgeting, and execution of all activities in order to achieve significant, demonstrable, and measurable positive improvement in the quality of patient care and safety; and

FURTHER RESOLVED, that the board requests that periodic reports be made to the board on planning, budgeting, execution, and results of activities to improve patient safety and quality of patient care at the medical center.

Figure 4. W. W. (Bill) Aston.

Three key recommendations of the ad hoc quality committee

The Ad Hoc Quality Measurement Review Committee identified 3 crucial elements to implementing a plan to measure and improve quality of care throughout BHCS hospitals, primary care facilities, and senior centers. These included 1) the alignment of every board member across BHCS, as well as the BHCS senior administrative and medical leadership, toward making quality of care a top priority; 2) the creation of a multidisciplinary health care improvement operations team across all BHCS operating units; and 3) the introduction of performance management incentives linked to clinical indicators.

A key part of the committee's work toward prioritizing quality improvement was an initiative undertaken by Bill Aston, a committee member who concurrently served as chair of the BUMC board of trustees *(Figure 4)*. Aston drafted a resolution that publicly reaffirmed the board's commitment to improve quality throughout BHCS, and the resolution was ultimately endorsed by board members of each BHCS operating unit, including the HealthTexas Provider Network (HTPN), the BHCS-employed physician group *(Table 1)*. The Baylor boards of trustees have continued their interest in quality issues; quality and safety have a preeminent place on their meeting agendas, and quality experts have been invited to speak at retreats for board members and BHCS leaders.

The ad hoc committee also argued for a dedicated BHCS entity to focus on systemwide implementation of health care improvement initiatives. This led to the formation of the BHCS Best Care Committee, which is responsible for developing project concepts, designs, and budgets; coordinating the implementation of quality projects throughout BHCS; and reporting project results to accountable leaders. The vice president for health care improvement chairs the Best Care Committee. Other members include the quality directors from each BHCS hospital and HTPN, physician quality leaders and nursing leadership council members, the BHCS vice president for risk management, representatives of the BHCS chief information officer and chief financial officer, and the physician and pharmacist leaders of the BHCS Pharmacy and Therapeutics Committee. The BHCS chief executive officer, senior vice president for clinical integration, and senior vice president for health care research and improvement/chief quality officer are invited to attend the committee meetings and receive all committee materials (35).

In 2004 the Best Care Committee used national standards of quality from the IOM, the National Quality Forum, and the Centers for Medicare and Medicaid Services (CMS) as the gold standard for meeting or exceeding expectations of quality medical care. BHCS uses 3 broad categories of indicators: 1) fiscal, which addresses economic issues; 2) service, which focuses on satisfaction topics such as cafeteria food; and 3) clinical, which evaluates the relationship of specific processes of care and their patient health outcomes in both a primary care and hospital setting (34, 37).

Each month the Best Care Committee measures dozens of indicators and reports their "snapshot" and trend status in a best care report to the board, chief executive officer, senior leadership, and ultimately to front-line health care providers and even current and prospective patients through participation in the CMS Public Domain project. BHCS was an early leader in this national-level transparency effort to make quality performance data in 10 critical areas (including 5 indicators in acute myocardial infarction [AMI] care, 2 indicators in heart failure care, and

Table 2. The STEEEP™ climb to quality at BHCS*

Safe—Avoiding injuries to patients from care that is intended to help them.
Timely—Reducing waits and sometimes harmful delays for both those who receive care and those who give care.
Effective—Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively).
Efficient—Avoiding waste, including waste of equipment, supplies, ideas, and energy.
Equitable—Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.
Patient centered—Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.

*STEEEP is a service mark of Baylor Health Care System.

3 indicators in pneumonia care) available to the public via the CMS website (38).

The ad hoc committee next recommended establishing incentives to encourage the expedient adoption of best care objectives, linking management compensation strategies to specific clinical indicators. Thus, BHCS holds its leaders accountable for identifying and implementing best practices throughout the system at national levels of excellence. The board of trustees Nominating and Governance Committee approved this recommendation and, beginning with the 2001 fiscal year, performance incentives included meeting or exceeding 4 topic areas of the CMS health care quality improvement program sixth scope of work, specifically those for AMI. During the following year, the incentives became linked to a composite index based on specific thresholds determined by components of the JCAHO hospital core measure program for AMI and community-acquired pneumonia (34, 39). In BHCS fiscal year 2004, this index expanded to include the 10 CMS public-domain process of care measures for AMI, congestive heart failure, and community-acquired pneumonia.

For the first time in the nearly 20-year history of the BHCS performance award program, senior leaders and managers began to be evaluated on their ability to fulfill best care quality improvement expectations and motivate their teams to do the same. Salary growth, bonuses, incentives, and advancement are tied to success in health care quality improvements. The formula for executive compensation incentives and bonuses is based equally on meeting key thresholds in measures of clinical effectiveness as well as financial performance and patient satisfaction. In a related model being developed by HTPN for primary care physicians, 5% of a physician's salary is planned to be withheld for quality targets. These targets are based upon preventive health services (70%) and patient satisfaction (30%). The threshold for meeting the quality parameters is to meet or exceed 25% of the overall group performance from the previous year. Quality performance money will be awarded at the group level, with 10% of the total performance fund pool awarded to the group staff.

The STEEEP™ challenge

With these 3 recommendations—senior leadership alignment with quality initiatives, an internal entity responsible for quality improvement, and linkage of incentives to quality improvement—the board reviewed and approved the ad hoc committee's final report. As one of the BHCS board ad hoc quality committee members, Anderson improvised the acronym STEEEP™ to communicate the BHCS challenge of ascending from its status in early 2001 to achieve its objective to provide by 2010 "the best care anywhere" in terms of the IOM quality aims of care that is safe, timely, effective, efficient, equitable, and patient centered *(Table 2)*. To manage this effort, BHCS launched a search for a new vice president for health care improvement. In addition to chairing the Best Care Committee, the new vice president would provide "leadership and operational responsibility for coordination and implementation of continuous quality improvement" efforts across BHCS, including the "adoption of best practices demonstrated within BHCS, or from external organizations, to support the system's best care STEEEP™ objective" (40). BHCS chose Barbara Spreadbury, RHIA, MBA, who was corporate vice president and director of the quality resource center for SSM Healthcare in St. Louis, Missouri *(Figure 5)*. While at SSM, Spreadbury oversaw the efforts that led to that organization's becoming the first health care recipient of the Malcolm Baldrige National Quality Award.

Figure 5. Barbara Spreadbury, RHIA, MBA.

QUALITY MEASUREMENT

The 1995 quality improvement plan efforts showed that BHCS clinicians and quality personnel were undertaking improvement projects but that there was still much to be done to determine scientifically how effective those improvements were. The new vice president for health care improvement was tasked with coordinating the "identification, selection, and implementation of systemwide information systems and other data collection efforts for the measurement of clinical quality improvement processes, to be able to demonstrate current levels of performance and identification of priorities for improvement" and to report the results to the board, senior leadership, and—eventually—the public (40). The result was MIDAS$^+$, software that can be used to measure and track key quality indicators and that provides internal and external comparative data using 300 hospitals nationwide. MIDAS$^+$ can be employed to capture quality measures such as appropriate medication at discharge for AMI patients or timing for antibiotic administration for pneumonia patients, down to the physician level. Initially MIDAS$^+$ was a retrospective system, but now it is a real-time system that provides accurate up-to-the-minute information on patient care and quality. For example, MIDAS$^+$ can provide the information necessary to ensure that a patient receives beta-blocker pharmacotherapy before leaving the hospital following AMI. These data can then be analyzed by the BHCS Institute for Health Care Research and Improvement and shared accordingly through the BHCS Best Care Committee, serving as the basis for informed decisions about changes in processes of care.

SCIENCE-BASED PERFORMANCE EVALUATION AND IMPROVEMENT SYSTEM

The entire best care measurement and performance improvement system is driven by evidence-based research to identify and implement quality improvements and by evidence-based measures of success to determine the effectiveness of these new efforts. Internal accomplishments are compared with national external measures and standards, the highest objective standards of quality. For example, in the area of AMI care (5 of the 10 CMS public-domain processes of care) (41), BHCS has not only improved since its benchmark measurement, but it has consistently exceeded the national average for the 7 other participating hospitals in the VHA workgroup, all of which are considered "high-performing" facilities *(Table 3)*.

Clinical preventive services have the highest priority throughout the BHCS primary care facilities. Each month the BHCS Best Care Committee and the HTPN Quality Committee evaluate screening or counseling performance and rate improvement against standards *(Table 4)*. These figures show that although much remains to be done in meeting and exceeding all national screening standards, BHCS is working in the community to provide quality services to more people, especially those at high risk and those who might otherwise not be able to afford them. Based upon strong HTPN physician leadership and senior leadership alignment with quality improvement goals—in large measure due to the efforts of HTPN Chairman Carl E. Couch, MD, MMM *(Figure 6)*, and F. David Winter, Jr., MD, MMM, chair of the HTPN Quality Committee *(Figure 7)*—HTPN has seen its overall performance in clinical preventive services screening effectively double from 37% in 1999 to 88% in 2003 *(Figure 8)*. This 4-year journey began in 1999 with a commitment to measure these evidence-based processes of care and with the initial design of a clinical preventive services flowsheet; evolved in 2000–2001 with the training of physicians in peer-to-peer academic detailing in clinical preventive services performance and improvement opportunities; and accelerated in 2002–2003 with the education of 30 HTPN physicians, nurses, and administrators in clinical process improvement through a course at Intermountain Health Care and the championing by the HTPN Quality Committee of the use of the flowsheet by physicians and office staff. Not only did HTPN improve clinical preventive services delivery from 1999 to 2003, but these efforts also achieved favorable business and financial results and qualitative improvement in patient compliance and satisfaction with screening recommendations.

Figure 6. Carl E. Couch, MD, MMM.

Figure 7. F. David Winter, Jr., MD, MMM.

Table 3. Comparison of BHCS and VHA-CEO workgroup data for Centers of Medicare and Medicaid Services public domain quality of care measures for acute myocardial infarction, 2000–2003

Quality measure	2003 BHCS performance*	VHA-CEO network average	2003 national 50th percentile	BHCS improvement, 2000–2003
Aspirin on arrival	98%	96%	94%	5%
Aspirin on discharge	97%	96%	93%	8%
ACE inhibitor on discharge	93%	84%	77%	15%
Beta-blocker on arrival	98%	92%	67%	13%
Beta-blocker on discharge	97%	94%	89%	33%

VHA-CEO indicates VHA, Inc., Chief Executive Officer Workgroup; ACE, angiotensin-converting enzyme.

*BHCS measurement is the average from 5 participating Baylor hospitals: BUMC, Baylor Garland, Baylor Grapevine, Baylor Irving, and Baylor Waxahachie.

Table 4. Clinical preventive services quality of care measures for BHCS, December 2003

Quality of care measure	BHCS	BHCS 2003 goal	US national sample (31)
Smoking cessation for heart attack	98%	90%	n/a
Smoking cessation for pneumonia	95%	90%	n/a
Smoking cessation for congestive heart failure	96%	90%	n/a
Colorectal cancer screening	79%	81%	54%
Cervical cancer screening	81%	88%	n/a
Breast cancer screening	76%	83%	76%
Hypertension screening	98%	100%	65%
Cholesterol screening	89%	92%	49%
Diphtheria/tetanus screening/immunization	71%	63%	n/a

As one example of its success, HTPN increased colorectal cancer screening by >50% from 1999 to 2003. Concerned that patients at risk of colorectal cancer were not being referred for screening or were not making or following up with their screening appointments, HTPN physician Joyce Stroud, DO, and her colleagues devised an elegant quality improvement intervention. Through the use of simple forms to alert the physician to the need for extra attention to refer the patient for screening and a dedicated fax line between the physician's office, the screening gastroenterologist, and the screening facility, referral and screening rates at her clinic rose from 47% to 86%, far exceeding the national level of 54%, and BHCS experienced favorable financial results, both for physicians and hospitals (42).

In terms of hospital-based health care improvement initiatives, BHCS measured its pneumococcal vaccine screening and administration performance for patients hospitalized with community-acquired pneumonia from September 1999 to September 2002. At Baylor Medical Center at Irving, only 2 of 51 patients

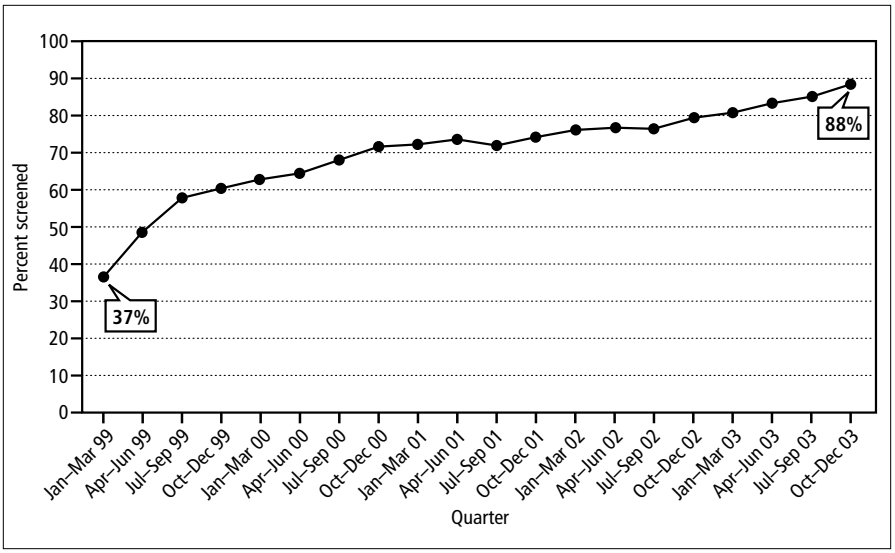

Figure 8. Overall screening performance for clinical preventive services, HealthTexas Provider Network, 1999–2003.

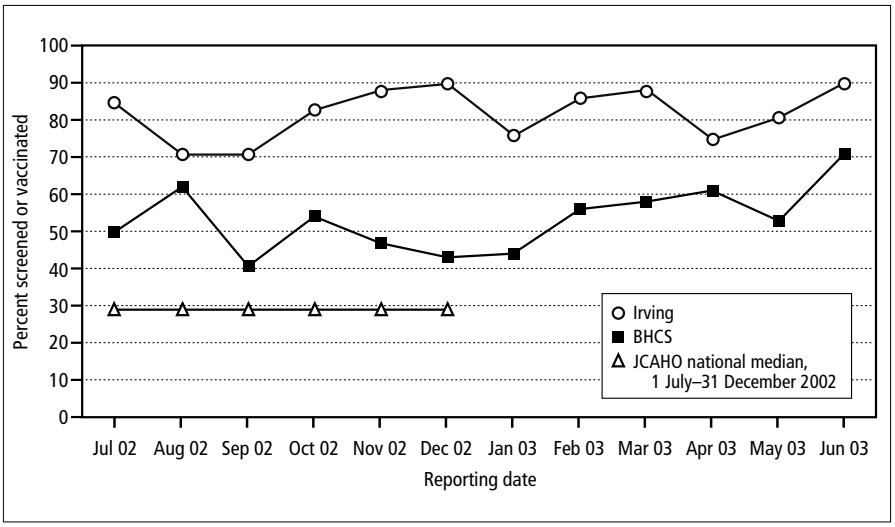

Figure 9. Pneumococcal vaccine screening and administration for patients hospitalized with community-acquired pneumonia at Baylor Medical Center at Irving and other BHCS hospitals, June 2002–June 2003.

(4%) had medical record documentation that they received these processes of care, which was substantially below the goal of 90% specified by the BHCS Best Care Committee. Initial assessments of this suboptimal performance showed a variety of causes, not the least of which was patients who confused pneumococcal vaccination with a "flu shot" and so reported false prior vaccination.

Baylor Irving began a number of improvement efforts designed to increase screening and vaccination rates. These ranged from improved physician and nurse education to better liaison with nursing homes. Although screening levels improved substantially, the immunization rate did not. The hospital staff next identified a physician champion and developed a protocol and physician order set that specifically included the pneumococcal vaccine. This 10-month process proved time-intensive, and the delay undermined the overall success of the protocol and order set, which itself proved unpopular with physicians and nurses. Immunization rates improved somewhat but then dropped due to physician and nurse resistance. Additional physician-related interventions included multiple chart-based reminders and computer-generated forms that ordered vaccination prior to discharge. Despite these efforts, there was little improvement in vaccination rates as the order was frequently overlooked or the patient was unwilling to delay leaving the hospital to await the vaccine.

Ultimately, Baylor Irving implemented a process that included insertion by a case manager of a preprinted order in the chart of all patients ≥65 years of age with no reported prior pneumococcal vaccination. This order required mandatory vaccination within 72 hours of admission unless the patient's physician specifically canceled the order and included a compelling reason for cancellation. Although there has been some fluctuation, this action led to the sustained improvement in vaccination levels at Baylor Irving.

The screening and vaccination rate at Baylor Irving rose from 4% in September 2000 to 91% in June 2003. *Figure* 9 compares Baylor Irving's average screening and vaccination rate of 84% with the 53% average at 5 other BHCS hospitals. Baylor Irving's rate exceeded the JCAHO-accredited hospitals national median rate of 29% and was substantially above the 64% rate achieved nationwide by 90% of JCAHO-accredited hospitals. Baylor Irving's performance in screening and vaccination rates was statistically different from that of the remainder of BHCS hospitals. Based on this clearly identified and positive quality improvement effort, BHCS leaders and medical staff evaluated changes to existing protocols at other BHCS hospitals to take advantage of Baylor Irving's successful experience and began implementing them systemwide. In September 2003, both Baylor Medical Center at Garland and BUMC implemented Baylor Irving's standing order protocol, demonstrating the commitment to quality improvement throughout BHCS (43).

TEACHING HEALTH CARE IMPROVEMENT

Practitioners at BHCS learn about quality enhancement not only through traditional hands-on classes and laboratories but through BHCS's own "Accelerating Best Care" (ABC) program, a cutting-edge laboratory and workshop for physician champions, in which they undertake a research project to further their knowledge and skills. This clinical process improvement educational curriculum, tailored for BHCS by Couch and Spreadbury and co-taught by them and numerous BHCS colleagues, is based on the nationally recognized Intermountain Health Care Mini-Advanced Training Program in Health Care Delivery Improvement course led by noted quality expert Brent James, MD, MS (44). The ABC course introduces physicians and administrative, clinical, and nursing leaders to the importance and background of quality improvement efforts and methods to measure and

analyze evaluations; helps them understand the relationship between quality and cost; and provides a general understanding of statistical variation, the tools of patient safety, and leadership strategies for quality improvement.

BAYLOR'S NATIONAL AND INTERNATIONAL LEADERSHIP IN QUALITY

BHCS is equally active in national efforts to measure and improve quality. In 2000, BHCS became an early and long-standing participant in the VHA, Inc., Chief Executive Officer Workgroup for Clinical Excellence. In this nationwide program, BHCS is one of 12 progressive hospitals that measure key indicators in AMI care. Results of these measurements have not only enabled BHCS to improve its own delivery of AMI care but allowed the nationwide dissemination of best practices, including those pioneered and validated by BHCS. BHCS was also an early supporter of the Institute for Healthcare Improvement web portal at www.qualityhealthcare.org.

BHCS is a member of the National Quality Forum and the National Committee for Quality Health Care. The National Quality Forum is a private, not-for-profit membership organization created to develop and implement a national strategy for health care quality measurement and reporting. Its mission is to improve American health care through endorsement of consensus-based national standards for measurement and public reporting of health care performance data that provide meaningful information about whether care is safe, timely, beneficial, patient centered, equitable, and efficient. The National Committee for Quality Health Care is a national, independent, educational membership organization composed of senior leaders from all sectors of the health care industry sharing a common interest in quality as a foundation of health care delivery.

BHCS strategic planning for quality also includes long-term alignment with national directions in health care quality first articulated in 2001 by the US Secretary for Health and Human Services. BHCS's long- and short-term strategy and operational activities are governed by the national-level strategic commitment to empower consumers to make more informed choices and decisions about their health care and the national effort to stimulate and support providers to improve the quality of health care. As such, BHCS is an active participant in the National Voluntary Hospital Reporting Initiative (38), which supports the first of these 2 goals, and has a dedicated organizational and financial strategic commitment to ongoing quality research among BHCS practitioners and researchers.

At home, BHCS is active in community-based leadership and health care education and engages the media, the Dallas–Fort Worth Business Group on Health, and other local mechanisms to inform the public of quality issues and BHCS efforts to improve the quality of its health care (33). Anderson and Ballard have been particularly involved in the Dallas–Fort Worth Leapfrog effort, serving as chairs and hosting meetings.

BHCS is also a leader in measuring and promoting quality improvements from a global perspective. Ballard is the immediate past president of the International Society of Quality in Health Care. Under his leadership, the annual conference—held in Dallas in November 2003 and funded, in part, by a grant from the Agency for Healthcare Research and Quality—produced substantial innovative scholarship and quality improvement initiatives worldwide.

THE ROLE OF PHYSICIAN LEADERSHIP

BHCS and HTPN have many physician-level quality improvement initiatives, such as physician-physician academic detailing and participation in both the Intermountain Health Care course and the ABC course. However, much remains to be done as BHCS addresses the role of physician leadership for growth and transformation, particularly among physicians who are affiliated with but not employed by BHCS.

A key component of the 2005–2009 BHCS financial plan is the support of BHCS best care physician champions to provide the intellectual capital and leadership to teach and pioneer quality efforts throughout BHCS. Along with an overall BHCS physician best care champion, these physicians will provide the motivation, encouragement, and medical and process expertise to collaboratively design solutions to address the challenges to quality improvement. BHCS physician champions will be engaged for obstetrics, cardiology, patient safety, clinical preventive services, in-hospital care, surgery, and geriatrics, with oncology, cardiothoracic surgery, and orthopaedic surgery to follow.

Figure 10. Peter Dysert II, MD.

Another new BHCS financial commitment in 2004 is the clinical informatics effort under the direction of Peter Dysert II, MD, the BHCS chief medical information officer *(Figure 10)*. This effort will serve as the basis for perhaps the greatest quality improvement initiative at BHCS: clinical transformation, which will couple clinical process redesign with automation. Complex organizations such as BHCS are investing in the physician intellectual capital that will be necessary to conduct business in the future landscape of health care that is heavily supported by technology and focused on evidence-based best care. Physician-led activities will center on electronic medical record design and development, content development and maintenance, and implementation support.

CLINICAL TRANSFORMATION

In 2003, senior BHCS leaders recognized that paper-based approaches to health care delivery can only go so far in providing quality medical care. They developed a vision of clinical transformation, directly improving patient care and quality of care. The board of trustees approved the expenditure of $119 million over the next 7 years to implement new technologies for the seamless integration of patient care and knowledge management across the entire system by bringing real-time data and decision support tools to professionals to improve patient care. Less than half of the funds earmarked for this initiative, which is led by Dysert as chair of the clinical transformation steering committee, are for new technology and hardware. The remainder of the budget supports leaders in process redesign and information technology development and implementation and educates those who will

undertake the health care process redesign, those who will use the new information technology, and those who will need to understand and implement the new processes of care (45).

The emphasis of clinical transformation is not on computerized physician order entry per se but on using computers and innovative technology coupled with clinical care process redesign to enable efficient, scientifically based, and safe medical practices throughout the system. This new system focuses first on the patient and only secondarily on infrastructure. Clinical transformation is not about automating merely adequate or even outdated practices but about redesigning those processes to provide the best patient care, better involve patients in their own care, and provide real-time assessment of key best practice measures of patient care throughout the system. Each patient's medical record will be securely accessible from a handheld or desktop computer. Those records will seamlessly follow patients throughout their systemwide experience in BHCS, not only providing improved continuity of care but also reducing the potential for medical errors, especially drug-related errors.

Ultimately, clinical transformation is a combination of administrative and physician leadership and their commitment to quality, a real investment in information systems technology, and the redesign of processes of care and the way they are delivered to achieve the best outcomes in the safest possible way. This involves a transformation of BHCS from a financially focused and successful network of hospitals and acute care facilities to an organization that focuses on clinical processes of care, like clinical preventive services and the appropriate management and coordination of that care from the patient's perspective (46).

Moreover, thanks to the electronic medical record component of clinical transformation, physicians will have clinically meaningful data when needed so they can make decisions to improve care for patients (46).

There are substantial barriers to implementing and gaining acceptance for an electronic medical record and other components of an automated medical decision support system (47, 48). Indeed, Cedars-Sinai Hospital in Los Angeles, California, encountered physician resistance and some subtle cultural barriers to its computerized physician order entry system, and it was withdrawn from use. Technology is not the barrier to adoption, but the business rules as well as the policies and procedures of the organization will enable or inhibit success (46).

Ideal patient experience

Two key performance domains that will define clinical transformation's success will be the quality of the patient experience throughout BHCS and patient safety. In 2003, BHCS initiated the ideal patient experience program, an evidence-based mechanism to assess, measure, and improve the experience of all patients throughout BHCS. This provides "personalized, high-touch care that is patient- and family-centered across the continuum" using 99th percentile national benchmarks of care. This effort is "designed for the future" by linking to the BHCS vision of clinical transformation, making the patient experience increasingly automated and expeditious. For example, the clinical transformation process has the potential to reduce the time nurses spend on paperwork from 50% to 10%, enabling them to devote more hands-on time to patients and families. Moreover, patients will have secure access to the same information about their care as their providers in order to involve patients directly in their own care. Based on the IOM's "10 Rules for the Next Generation of Health Care" (3), the BHCS ideal patient experience program is patient centered, transparent, anticipatory, and collaborative. Specific examples of this patient-centered functionality include secure web-based previsit patient self-health assessment, patient-accessible and highly secure online medical records, on-demand medical information, prescriptions, appointments, dissemination of test results, and electronic capture of patient self-care data.

Optimizing patient safety

In 2000, the IOM released *To Err Is Human*, which reflected the results of peer-reviewed medical literature indicating that an estimated 90,000 patients die each year due to hospital-related errors (30). The 2000 board of trustees resolution addressed this critical issue by giving patient safety the "highest priority" throughout BHCS. Over the next 2 years, as one example within BHCS hospitals, BUMC undertook an extensive evaluation of its patient safety effort, culminating in January 2003 with the creation of the BUMC Patient Safety and Clinical Improvement Committee. This group was charged with targeting specific processes of care most in need of safety improvements, improving the BUMC culture related to safety, and using suitable metrics, timelines, and financial assessments to evaluate progress toward safer care at BUMC.

Key objectives of the BHCS patient safety effort include both rapid implementation of improvements in evidence-based processes of care and development of a culture of patient safety, since both are needed for success. The Leapfrog Group of employers have partnered with the National Quality Forum to develop a list of 30 "Safe Practices for Better Healthcare" that are evidence-based to improve patient safety. Of these, 27 have been incorporated into a weighted survey valued at a total of 1000 points. The Leapfrog Group will encourage hospitals to participate by submitting their progress before July 1, 2004, and periodically thereafter. Points are awarded based upon progress across 4 dimensions: organizational awareness, leadership accountability, organizational ability, and actions taken. As a hospital evaluates its performance on the 27 best practices, its results will be shared publicly on the Leapfrog Group website (49).

In addition to these evidence-based goals, BHCS patient safety objectives include markedly reducing patient harm from health care errors and, as a result, improving the efficiency of care by reducing uncompensated rework created by errors. Examples included reducing medication errors and preventable complications, reductions that will be achieved through workforce development and alignment tools related to patient safety. To achieve this, BHCS will build a culture of high reliability that reports and learns from mistakes, emphasizes improved communication and teamwork, and provides quality improvement training. Key patient safety practices, such as using standardized order sets, reading back verbal orders, and using checklists, will reduce chance errors. Incorporating an electronic medical record will contribute further to patient safety by providing accurate delivery of data and decision support to the point of care.

BHCS is a participant in the Patient Safety Leadership Fellowship program offered by the National Patient Safety Foundation

and the Health Forum. Each year, up to 40 fellows throughout the country participate in 4 intensive learning sessions, have virtual conferences, and complete a patient safety learning project. At BHCS, Donald Kennerly, Linda Gerbig, Nettie Kuhn, and Elaine Nelson completed the fellowship in 2003; their projects focused on assessing the patient safety culture within different BHCS hospitals and creating a "scorecard" to help each facility direct its patient safety efforts.

Patient safety at BHCS has also benefited from the dedicated efforts of senior BHCS leaders Gary Brock and Tim Parris, BHCS executive vice presidents and chief operating officers, as they have worked to integrate and align corporate resources across BHCS. Their systemwide focus includes not only hospitals but also the 60 ambulatory care centers of HTPN, ensuring equal access to resources, standardization of processes and outcomes, and improved operating efficiencies. Given the emerging evidence that a very large component of the patient safety improvement opportunity is related to primary care (50, 51), these efforts are particularly noteworthy and serve to distinguish BHCS from other health care organizations that focus exclusively on hospital episodes of care.

THE STEEEP™ CLIMB TO SUCCESS

Quality of care has always been an integral part of the BHCS vision of and commitment to best care. Over the past century, BHCS has embraced a variety of quality initiatives, sometimes as a pioneer and other times as a dedicated follower. For the past 100 years, much of what BHCS has done to improve the quality of care was undertaken out of a sense of dedication to doing the right thing, much like Codman's End Results, rather than as the result of any specific institutional directive to fulfill explicit quality objectives.

For each success story over the past century, a future challenge remains. A strong surgical infection prevention program represents a BHCS accomplishment in patient safety, but new approaches to patient safety, as articulated in the National Quality Forum and Leapfrog "1000-Point" Patient Safety Survey, point to more work that needs be to done. The reduction in time for a patient to receive life-saving drugs after an AMI has been impressive, but timeliness spans all interventions. Through the forthcoming clinical transformation effort and innovative methods to address clinical care and activity-based costing, BHCS will become more efficient, but the automated road is difficult and challenging. The track record of effectiveness at HTPN in implementing clinical preventive services is extraordinary. However, these initial efforts remain to be duplicated in all areas and at increased levels of achievement. Access to care is the heart of the BHCS commitment to community, beginning with the founding of health care insurance and Blue Cross. HTPN physicians such as Jim Walton, DO, who leads efforts to reduce disparities in health status and related health care in the Dallas community, are working on methods to ensure equity of care for the years ahead. The ideal patient experience highlights what has been done and is being done to make each patient feel special, but there is still room to improve in terms of leadership accountability for patient satisfaction.

Ultimately, health care quality improvement at BHCS is about leadership in the drive to provide safe, timely, effective, efficient, equitable, and patient-centered medical care. An active area of work in 2004 is the formulation of physician leadership models across BHCS. Through its economic alignment of physicians, its effective committee structures, and its model of distributed resources, decision making, and accountability, HTPN has achieved remarkable success in creating a physician-led health care improvement culture across its 60 ambulatory care centers and hospitalist groups. A substantial challenge for BHCS as it moves into its multiyear clinical transformation effort and endeavors to "provide the best care available anywhere" by 2010 will be to create effective models for physician-led health care improvement initiatives across BHCS hospitals. Leaders at all levels throughout BHCS continue to build on the pioneering efforts by Codman, the Mayo brothers, White, and others who refused to settle for just adequate standards of care and, instead, embraced the greater challenge of achieving Baylor's goal of best care.

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