THE BUSINESS CASE FOR CLINICAL PATHWAYS AND OUTCOMES MANAGEMENT: A CASE STUDY OF CHILDREN'S HOSPITAL AND HEALTH CENTER OF SAN DIEGO

Artemis March
The Quantum Lens

FIELD REPORT

April 2003

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Artemis March, Ph.D., M.B.A., is a change agent who expands and reframes organizational dialogue, enables needed public conversations to take place, and facilitates paradigm shifts in thought and practice. She has designed about 79 diagnostic/learning/change projects for corporate clients, consultancies, universities, health care organizations, foundations, and consortia. Her work often reveals underlying systemic, structural, cultural, and perceptual issues whose interactions are the source of visible problems and block expensive change or improvement efforts or, alternately, enable creativity, innovation, and success. Prior to founding her own practice, The Quantum Lens, Dr. March worked extensively with the Harvard Business School, with consultancies in executive education, and with the MIT Commission on Industrial Productivity. She graduated with honors from Vassar College, received her M.B.A. with distinction from the Simmons School of Management, and her Ph.D. in sociology from the University of California. She can be reached at **March@thequantumlens.com.**

ACKNOWLEDGMENTS

The author would like to thank the staff of Children's Hospital for their graciousness and responsiveness in developing this study. She especially appreciates the time and thoughtfulness given by Blair Sadler, Paul Kurtin, Paul van Dolah, Meg Norton, Glenn Billman, and Pat Richardson.

EXECUTIVE SUMMARY

Hospitals are attempting to increase their market share by achieving measurable improvements in the quality of care. Although these improvements can significantly lower a hospital's cost structure for treating patients, they may be costly to implement, and may not add revenue—indeed, they may even lower it. The Children's Hospital and Health Center of San Diego (CHSD) has significantly lowered the cost of providing care and slashed the length of hospitalization through measurably increasing its quality outcomes. Yet, under the current business model of per diem payment, those savings have accrued mostly to insurers and other payers, and the hospital has actually forfeited millions of dollars in annual revenue. The per diem payment structure typical for children's hospitals (where Medicaid typically becomes the primary payer for chronic conditions) contrasts with the per discharge basis for Medicare; reducing length of stay thereby gives adult hospitals a financial gain, but gives children's hospitals a financial loss.

Background

During the 1990s, Children's differentiated itself and gained market share by achieving excellence in clinical outcomes, communicating its outcomes data to multiple stakeholders, and building clinical partnerships and a more collaborative style of working. Yet 76 percent of Children's patient revenues are paid on a per diem basis, half of its patient revenue is from Medicaid, and Medicaid payments are notoriously low in California. Now, in FY 2002, CHSD is working to parlay its data-based conversations with its stakeholders into a new partnering business model and new payment methodologies through which it would share in the substantial cost-savings that currently flow only to payers from its investments in quality improvements and innovative approaches to delivery of care.

An Institute of Medicine study released in the winter of 1999–2000 shocked the health care industry with its estimates of the numbers of people being killed annually by hospitals, a third of them through medication errors. Medication safety is especially critical for children because their small body mass/surface is much less forgiving of medication and anesthesia errors than that of adults. Vendors of computerized physician order entry (CPOE) systems focus on the high-volume adult market, however, and their systems do not yet make weight-based, unit dose calculations. Children's staff administers 800,000 doses of medication annually to inpatients.

Program Design

This case study describes the processes through which an Outcomes Center and data-based decision-making developed credibility among CHSD clinicians during the middle-90s.

The core initiative was the development of clinical pathways (now numbering over 50) by physicians, nurses, pharmacists and others. Pathways are standardized processes of care designed to increase the likelihood of positive outcomes for a particular condition. Paced by algorithms, a patient moves onto the next step when they reach a key indicator value. By skillfully feeding back outcomes data to clinicians, CHSD soon had its independent physician network using the pathways for 95 percent of their care. Pathways became the backbone of how CHSD delivers care, and the Outcomes Center became the principal improvement engine for the hospital.

At the end of the decade, Children's expanded its approach to quality even further by focusing on developing a comprehensive approach to patient, employee, and visitor safety. It created a high-level reporting structure that knits together hospital administration, physicians, nurses, and the Board of Directors, and changed the cultural role of Pharmacy to one of partnering with physicians and providing leadership on pharmaceuticals. To reduce medication errors, it developed several methods of making errors visible, analyzing their patterns, and laying an evidence-based foundation for interventions and change. As most prescribing errors are trivial, CHSD then shifted its focus to the small number of errors having the potential to cause real harm, using total quality management approaches to identify and correct problems. Change was institutionalized by incorporating this information into pathways, and defining product requirements for a computerized, physician order entry (CPOE) system. By the fall of 2001, an internally developed, customized, CPOE system for anesthesiology had been piloted for over a year, and planning was well along for a vendor-based, CPOE system that would eventually be rolled out housewide.

Health Benefits of Intervention

Pathways dramatically reduced variation in the cost of care per child, and enabled a far larger proportion to be cared for at lower cost levels. The first clinical pathway addressed asthma, the chief cause of pediatric hospital admissions. Length of stay fell from 4.4 days to 2.2 days in the first year (FY 95), and eventually to 1.7 days. Readmission rates and use of oxygen dropped sharply. CHSD anticipates that the CPOE system will greatly reduce the number of errors committed in the first place, and reduce the errors that make it all the way through the hospital system.

Potential Savings and Costs

Clinical pathways permanently removed $5.4 million in annual direct costs from the cost structure. A business case cannot be made for reducing the variance in cost and quality through pathways because the outcome benefits are disconnected from rates and payment methods.

The $100,000 costs of the CPOE module itself are a minor part of the total CPOE budget, and will quickly pay for themselves. Although little data are yet available, CPOE lends itself to something that approximates a business case *because its calculus is purely internal:* the *avoided costs* of doing harm versus the *costs* of investing in CPOE and changing over to a computerized system. Other expected cost reductions are in fewer interventions to prevent potential harm, shrinkage of the huge infrastructure required for paper orders, and the benefits of decision-making support for the CPOE system.

Conclusions

A conventional business case cannot be made for quality innovations that are not rewarded by the payer system. However, a conventional business analysis is too narrow a lens through which to assess the economic impact of pathways and outcomes. On a larger scale:

- Pathways reduced length of stay, increased CHSD's organizational capacity, and moved business to Children's. More care is delivered to more kids with the same resources.

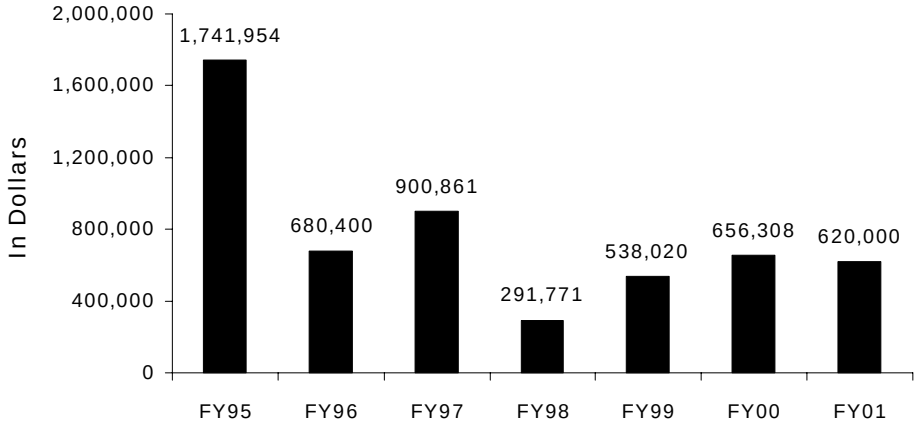
- Outcomes and quality data, presented in an open, sharing way with brokers and payers, have generated a new kind of dialogue, which has opened the door to partnering relationships with diverse stakeholders; exploring payment methodologies that include sharing of savings or gain-sharing among the hospital, physicians, and payers; and creating the basis for a new business model that repositions Children's for the 21st century.

CPOE will be adopted, viable, and effective at CHSD because it is deeply grounded in pathways and safety work. Therefore, it is likely to have the anticipated effect on reducing medication errors, avoiding costs of harm and intervention, and eliminating inefficiencies of the paper system.

Policy Recommendations

For quality innovations to be viable in a children's care setting, policymakers and insurers must come to the table, sit on the same side of the table with providers, and bring a mindset of dialogue rather than confrontation. They must change their payment methods, increase reimbursement rates, co-develop innovative models in which providers share in the gains they generate, and extend coverage beyond the hospital location.

Exhibit ES-1. $5.4 Million Total Estimated Cost Savings Due to Pathways, FY95 to FY01



Source: CHSD

THE BUSINESS CASE FOR CLINICAL PATHWAYS AND OUTCOMES MANAGEMENT: A CASE STUDY OF CHILDREN'S HOSPITAL AND HEALTH CENTER OF SAN DIEGO

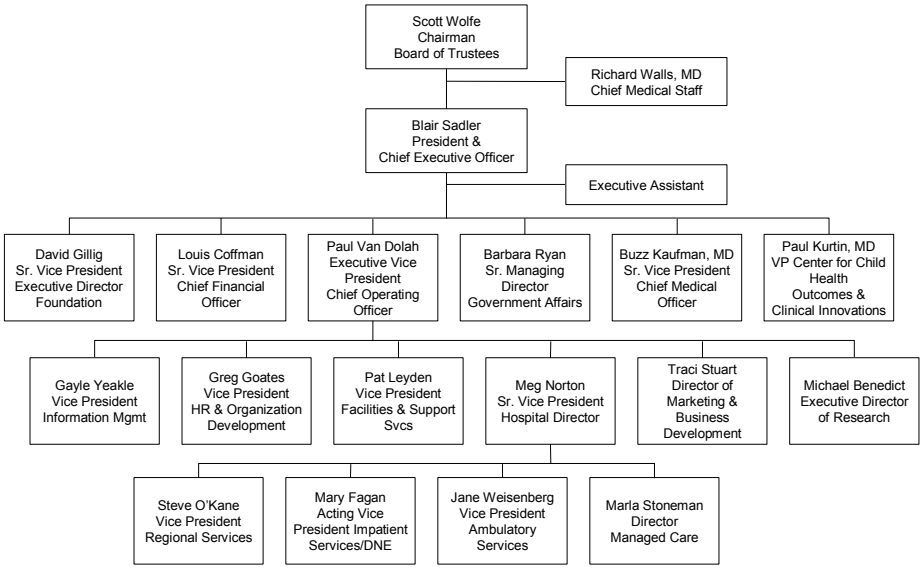
INTRODUCTION

Children's Hospital and Health Center of San Diego is an integrated pediatric health care system composed of a hospital and satellite operations, a network of specialists, a primary care medical group, and a growing number of partners and collaborators. The only children's hospital in the 2,000-mile border region from Texas to California, its mission is "to restore, sustain, and enhance the health and developmental potential of children." Its considerable success in the late 1990s was recognized with many awards, high ratings and rankings, and excellent Joint Commission on Accreditation of Healthcare Organizations (JCAHO) scores.

Under the leadership of Blair L. Sadler as president and CEO since 1980, Children's progressed through what Sadler called "a decade of surviving" in the 1980s (building capacity, a trauma center, and acquiring new technology), followed by "a decade of thriving," in which Children's had set out to differentiate itself from other hospitals by establishing excellence in clinical outcomes, building clinical partnerships and a more collaborative style of working, and making the transition from a stand-alone hospital to an integrated delivery system, as well as spearheading community, regional, and even national initiatives in child health (Exhibit 1).[1] Children's strategy of the 1990s was built around Sadler's belief that "the leading healthcare organizations of the 21st century will be those that are passionately committed to providing optimal experiences for their patients, staff, and visitors through relentless and measurable quality improvement in direct care as well as in the environment."

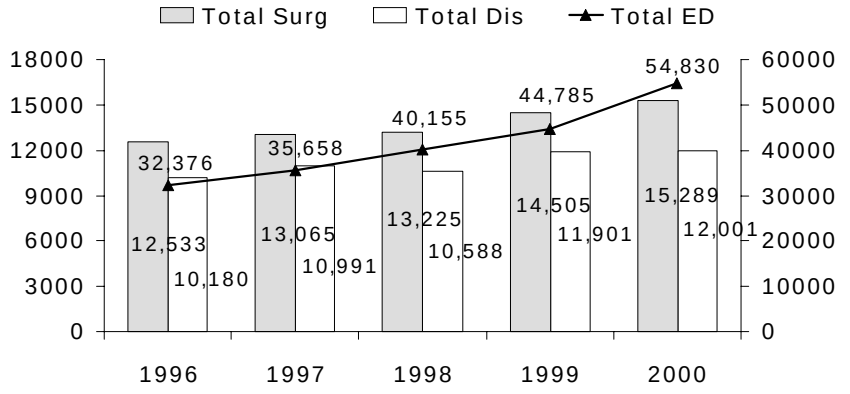
[1] All quotations from interviews conducted by the author from July 2001 to February 2002.

Exhibit 1. Children's Hospital and Health Center Organization chart



Source: CHSD

Exhibit 2. Growth in Patient Volume



Sources: 1) Surgeries - OR Dept., 2) Discharges - Accounting, 3) ED/Urgent Care Dept.

During the 1990s, Children's increased its organizational capacity to deliver both a great deal more health care (including an increasing percentage of high-acuity days) and an ever-improving quality of care. It did this without undergoing physical expansion because

of dramatic changes in how it delivered care (Exhibit 2). It shortened inpatient length of stay, expanded services in outlying neighborhoods, and developed a continuum of care that made it possible to shift more care to an outpatient basis and the home. This was accomplished through the use of evidence-based clinical pathways, measurement of outcomes, the continuous pursuit of quality improvement, and feedback of information to clinicians. Clinical pathways became the backbone of delivering care.

Children's quality-based, outcomes-focused, differentiation strategy of the 1990s significantly transformed how the organization worked as well as how it was perceived by physicians, health insurance brokers, and health plans. Mike Madigan, a 10-year veteran of Children's Board, member of its Executive Committee, and past chairman, pointed out that, "we have worked at repositioning the kind of institution this is, and we have a relationship with gatekeepers now that we didn't have a few years ago, a time during which gatekeepers (such as pediatricians) have emerged as key players." Matt Niedzwiecki, senior director of quality management, noted, "There is no one else but Children's that people now think of for [pediatrics], and it hasn't always been like that." Meg Norton, senior vice president/hospital director elaborated, "A few years ago, Children's had a track record of being one of the harder-to-negotiate-with institutions, and some business had shifted away from us. I would say that the focus on outcomes, our good results, and focus on building relationships have had a positive impact on our turning virtually every one of those relationships around to the point that, today, we are the facility of choice for virtually every medical group and every health plan."

Based upon the organizational platform built by the quality/outcomes work of the 1990s, Sadler envisioned "a decade of soaring" that would be realized by the next jump in measurable quality improvement: "pursuing perfection." Sadler's vision was put into practice by his ambitious "Children's Agenda" for fiscal years 2001–04, which focused on ensuring patient safety, continually and relentlessly improving best practices of care, achieving new levels and dimensions of patient and family satisfaction, undertaking innovative recruitment and retention techniques, and negotiating effective cost recovery and payment methodologies. The latter was enabled by Children's partnering approach to its external relationships, an approach that was itself fostered by the outcomes and quality work of the 1990s and that required all payers to work together. Sadler posed the central challenge for the next decade:

> We believe that our outcomes work has moved market share to us, and differentiated us in San Diego. What we have not been able to do—and what I think the next chapter is—is to get payers to agree to new business models that reward investment in quality improvement. Right now, it's

> Mars (payers) and Venus (providers). With Medi-Cal, which is half of our revenue, the word "quality" never comes on the tape at all, let alone how you would compensate for it. The mindset is all ratcheting down, ratcheting down, spend less than last year.
>
> We as a country are not going to get providers to make the kind of research and development investments and quality improvements that are needed unless we reward them. We do it in industry all the time, but we are not doing it in health care. There is not the awareness out there in the body politic that payers, be they government or commercial, must reward improvement rather than banking it themselves. To bring major commercial payers, Medicare, and Medicaid to the table, and to come up with straightforward, easily auditable, business-quality models, would be transformational. It would be the shot heard around the world.

The first of Sadler's seven strategic goals, "optimal care of the child," identified safety as a key component, for which planning and implementation would include the creation of a blameless reporting culture and reduction of medical and medication errors and employee injuries. Prescribing errors make up a huge percentage of medication errors in pediatrics; by contrast, incorrect administration of medication is the primary source of errors in adult care. Children's small size makes them unforgiving of prescription errors that can be tolerated by adults. Thus, pediatricians have a narrower zone within which to get children's unit dose right. In diagnosing drugs for children, they often have to perform calculations and work with fractional amounts, leaving room for error.

Computerized physician order entry (CPOE) systems were thus viewed by Children's as critical new tools for ensuring patient safety. By the fall of 2001, an internally developed, customized system for anesthesiology had been piloted for over a year, and planning was well along for introducing a vendor-based CPOE system that would eventually be rolled out throughout the hospital. Although technology often fails to live up to its expectations, it was likely that the CPOE system at Children's would realize its potential because of the solid foundation that had been built over the past seven years. The steady development of a quality improvement and safety context that informed and shaped significant cultural shifts provided fertile ground for the acceptability, viability, and effectiveness of such a system.

QUALITY IMPROVEMENT PROCESS AND OUTCOMES CENTER: CREATING A CONTEXT THAT ENABLES PATIENT AND MEDICATION SAFETY

The concept of an Outcomes Center had begun percolating in Sadler's mind during 1993–94. It was given impetus by two ideas gaining currency in health care circles: providers would become accountable to insurers for documenting results of care, and clinical guidelines and pathways might be an appropriate vehicle for improving quality of care while decreasing costs. Further spurred by a JCAHO visit, which had not given the hospital particularly high marks, Sadler hired Dr. Paul Kurtin in mid-1994 (FY 1995) as vice president of quality management. Kurtin is a nephrologist who had migrated into pediatric nephrology and done nationally recognized work in outcomes and quality of life for renal patients. Sadler asked Kurtin to redirect Children's approach to quality, with the intention that he would build a Center for Child Health Outcomes.

Kurtin inherited a Quality Department that collected, aggregated, analyzed, and reported data needed to meet Children's regulatory responsibilities and supported medical staff affairs. Children's also had a small group, Practice Pattern Analysis (PPA), which reported to an administrative vice president. Over the previous 12 to 18 months, it had attempted to streamline care from a financial perspective, but had met with little success. Kurtin recalled, "It did not have a physician champion, and its being led by an administrative person, talented as she was, was not going over well with the medical staff." The Quality Department and PPA were small units that had little communication with each other or the medical staff. Though staff did not regard these reengineering efforts as having been especially successful, some credited them with laying the groundwork for a new idea: that the health care field might not be unique, that it can adopt ideas about process improvement from other industries.

Shifting Perspectives. As vice president of quality management, Kurtin shifted the department's goals away from quality assurance—an approach that is punitive in nature, and emphasizes corrective actions to get rid of "bad apples"— to quality improvement, a problem-solving approach that targets overall improvements that will be long-lasting. He also decided to measure the success of his department using clinical measures, rather than only financial ones. He began building links between people and their organizational affiliations by emphasizing the linkages in their work and later, cross-training people. He spent a good deal of time talking with clinicians about quality improvement, including at the Department of Pediatrics' meetings, which Kurtin regularly attended.

> I started taking a more clinical perspective: let us talk about improving quality and being evidence-based. I put on my flak jacket and started going

> to Pediatric Department meetings, talking about unnecessary variation in care, the gap between what we know we should be doing with kids who have asthma and what is actually done. My mantra was, "If we can't manage asthma better than anyone else in San Diego, what are we doing as a children's hospital?" That was my challenge to them. Rather than driving out waste from a financial standpoint, I talked about developing idealized care and reducing variation, and as a consequence, saving money. The physicians responded much better to that.

That response was neither immediate nor unanimous, however. When Kurtin began talking about creating clinical pathways, beginning with asthma (the leading cause of hospital admissions, and the leading chronic disease problem in children), many physicians thought this smacked of "cookbook medicine," and asked, "Who are you to tell me how to practice medicine?" Although a clinician, Kurtin had never practiced at Children's. He was able to get a full hearing among clinicians only after two highly respected, senior clinicians became champions of his proposed program.

Clinical Pathways. During FY 1995, a multidisciplinary team developed an asthma pathway, facilitated by a skilled member of the PPA group, Pat Richardson. Other teams developed pathways for a few other diagnoses and procedures during FY 1996. Clinical pathways were "processes of care designed to increase the likelihood of positive outcomes based upon the effective and efficient use of resources utilizing evidence, best practices, and clinical expertise." Each pathway was developed by a team of physicians, nurses, pharmacists, and others who were involved in the admission for a given diagnosis, the care of the patient, or who otherwise impacted the patients on their path through the hospital, including those who worked in the Emergency Department, laboratory, medical records, radiology, Quality Management, and administration.

Richardson, who had begun her career as a respiratory therapist and later received degrees in business, organization management, and quality management, developed the process for creating pathways. She conducted or supervised literature reviews, identified physician and nursing champions to drive the process, discussed the literature with them, and sent out a sampling to the team prior to the first meeting. After learning the ground rules, the team usually developed a template within two or three meetings, an implementation date was set for everyone who would be impacted by the new pathway, and all members of the team engaged in educating their peers. Richardson described the process as making extensive use of the "Why?' methodology, which asked for evidence. "Why are you doing that? Because you have always done that? Because it is the best way for the patient? If a lot of tests are being ordered, we ask, can you show us the data that

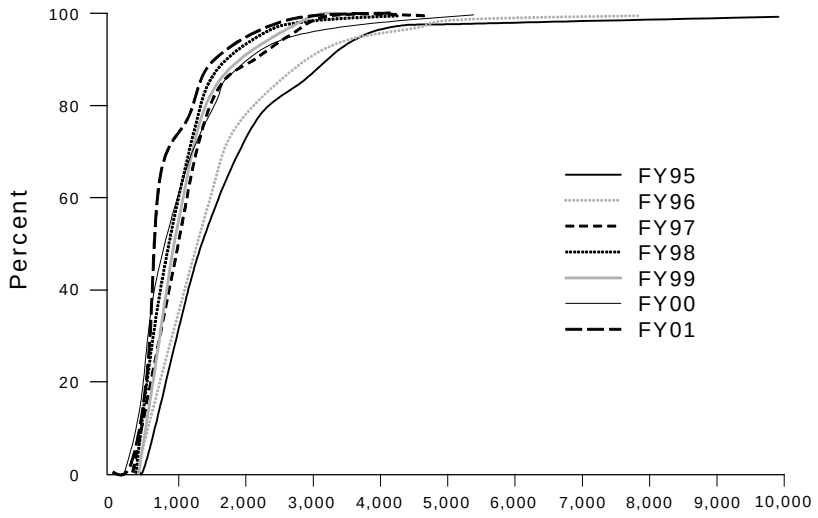
says these are the best tests to order? Do they need to be done with this frequency?" At the same time, she continued,

> We want to make sure that while we are driving out costs and time, we are not compromising anything about the patient's care. We don't want to see them being readmitted. We look at oxygen use, for example. When we first started, the average number of oxygen hours was 33, now it's 11. One of the ways we know that is okay is that we use a certain standard of oxygen saturation; on the pathway, they realize that level more quickly.

Richardson would, over the next six years, facilitate all the pathways (about 50 by the fall of 2001), conduct or supervise all of the pathway analyses, feed information back to clinicians, work with each team to revise their pathway every six months based on the newest research literature, and streamline the pathway process, as well as perform other developmental and analytical work. She thus herself embodied the entire cycle of planning, acting, studying, and doing. Richardson estimated that it now costs roughly $10,000 to develop a pathway, and that it cost somewhat more in the early years, when participants were new to the process.

Winning with Data. What began to capture the attention of Children's medical staff and the Board were the clinical and financial data comparing patients on a pathway with those not on a pathway. The differences were dramatic: patients of a pathway program incurred lower direct costs, had shorter hospital stays, and had improved quality of care on all sorts of measurements. The asthma pathway cut length of stay from 4.4 days to 2.2 days in the first year and later to 1.7 days, began to move numerous key indicators (e.g., oxygen use, steroid use, readmission rates) in desired directions, and produced significant reductions in direct costs. Pathways dramatically reduced variation in the cost of care per child, and enabled a far larger proportion to be cared for at lower cost levels (Exhibit 3). Kurtin reported, "We started winning it on data."

Exhibit 3. Asthma Pathway - FY95 to FY01



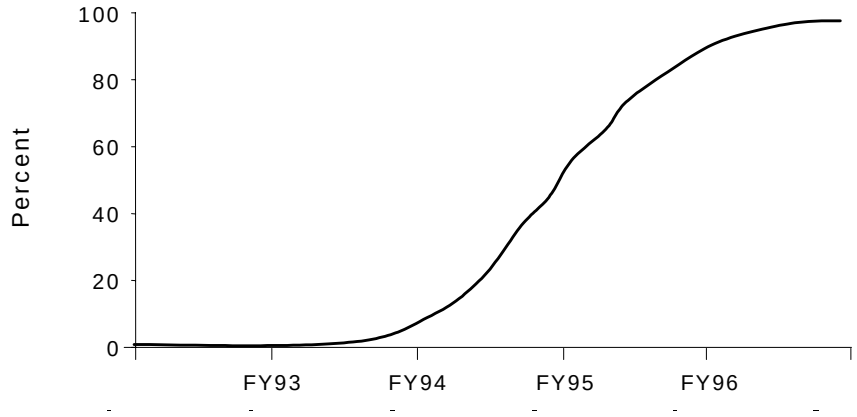
Source: CHSD

Kurtin recalled one form of the dialogue. A pediatrician would stand up in the back of the room, "I have been managing asthma for 20 years, why should I follow this?" "Great," Kurtin replied, "you are probably very good at it, what are your results? Let me show you the 400 kids we set on the pathway and how they are doing. Why don't we compare your results to these?" Richardson described Kurtin as "incredible at making this process work. He pushes the agenda with everyone, and if there are issues in a certain area, he is great at explaining and using the data, and using the literature at his level."

As new pathways were developed, not only did clinicians receive outcomes data, but variation among physicians was analyzed. Pediatricians wanted such feedback to be publicly blinded by a letter code, while surgeons wanted everyone's name on the board. Richardson emphasized the role of rapid feedback in effecting a cultural evolution in which, "we moved from forcing or pushing people to do pathways to their calling us." Over the next several years, Richardson would conduct many presentations with clinicians, making sure to include the naysayers who did not want to do a pathway. She often profiled all the doctors, showing the variation among them. She found that, "No one wants to be an outlier. Everybody wants to fix it." One pediatrician, who was late to a presentation, was extremely vocal and negative about a certain doctor who was an outlier. "At the end he came up to me and said, 'Who is that?' . . . I gave him his slip of paper and it turned out to be him. It was the best lesson. He had no idea he was so out of line with everyone else, and now he wants to improve. That is the beauty of feedback."

Initially, physicians had to write an order to put a patient on a pathway, and only 30 percent of all patients were on pathways. As the data built credibility for this approach to care, Kurtin proposed that pathways become the default method of care for most patients. Physicians would then have to write an order to take patients off of the program. When the pediatricians voted yes, compliance shot up into the mid-90th percentile within a year, which still left space for the atypical patient to be treated in a customized way (Exhibit 4). It also left room to bring more physicians into the process and for further improvement. Richardson described her response to exceptions, "If you tell us you don't want this child on a pathway, we would like to know why. If we need to change something [in how the pathway works], great. Or if we need to do some more education, great."

Exhibit 4. Pathway Compliance: FY94–95 Voted by Department of Pediatrics



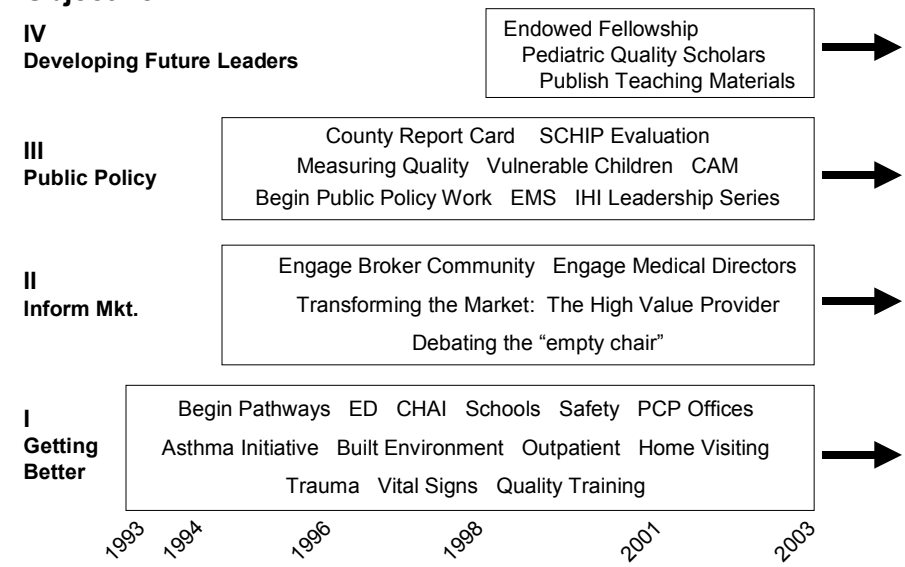
Source: CHSD

Clinical pathways became the default mode of practice and were woven into clinical operations by the hospital's documentation system. When a patient was admitted, a packet of documentation built around the pathway was generated to document the patient's care and progress through the system. The progression of pathways was determined by algorithms so that, when a patient reached certain key indicator values, they moved to the next step.

Forming an Outcomes Center. The Board of Directors became so excited about the early quality and outcomes data that Sadler was able to secure Board funding ($150,000 annually for three years) beginning in mid-1996 (FY 1997) for a Center on Child Health

Outcomes. From the beginning, the Outcomes Center had three objectives: (1) to improve organizational performance; (2) to inform the market; (3) to influence public policy. Later, it would add a fourth objective: education, research, and training (Exhibits 5 and 6).

Exhibit 5. Outcomes Center Objectives: 1993–2003



Source: CHSD

Exhibit 6. Outcomes Center Objectives: FY01–02

I. Relentlessly Improve Organizational Performance

A. Ongoing Major Initiatives
   1. Vital Signs - ensure it is part of day-to-day decision making throughout the organization
   2. Patient Safety – reduce risk of harm by eliminating overuse, underuse, and misuse of therapeutic interventions
   3. Clinical Pathways – help UCSD and Children's faculty become knowledgeable in their use and effectiveness
   4. Disease Management programs – expand to new locations and conditions
   5. Trauma – build research in collaboration with UCSD
   6. Child Health Accountability Initiative (CHAI) – optimize medication safety and pain management
   7. Physical Environment/Gardens – evaluate and optimize impact and use of major building projects including the CCH, the Rose Pavilion, and operating rooms
   8. Innovation – facilitate widespread use of improvement and innovation methodologies

B. New Programs
   1. Pursuing Perfection – extend improvement activities to the asthma and cancer pilots and beyond
   2. Quality and Performance Improvement – 120 management and medical leaders complete classes and projects
   3. Develop and introduce method of technology assessment

II. Inform the Marketplace, Build Relationships, and Develop a Business Case for Quality

A. Participate in and support the development of the national business case for quality with the Institute for Healthcare Improvement (IHI)
B. Support business development, marketing, managed care, and communications activities with targeted presentations and information
C. HealthLink – extend asthma project to three new school districts
D. Prop 10- continue technical support to local Prop 10 Commission
E. City Heights – undertake school evaluation project with Price Charities
F. Teach community based organizations to use data (Alliance Healthcare Foundation)

III. Influence Public Policy and the Practice of Pediatrics

A. Produce 4th County Report Card and Special Focus on vulnerable children
B. Evaluate state Prop 10 asthma grant to improve care to children 0-5
C. Continue statewide evaluation of Healthy Families
D. Introduce improvement methodologies to the U.S.-Mexico Border Health Commission
E. Evaluate National City collaboratives
F. Continue evaluation of statewide RWJ Covering Kids program
G. Develop a region-wide Pediatric Center of Excellence concept

IV. Education, Research, and Training

A. Develop national Quality Scholars Program
B. Complete book on applied child health services research
C. Actively involve nurses in quality improvement work

Source: CHSD

Funding in hand, planning and hiring went forward, and PPA was folded into the Outcomes Center. Kurtin hired a child psychologist who was an excellent methodologist and had become well regarded during a clinical internship at Children's. He also hired a clinical analyst whom, he said, "knew hospital databases better than anyone I had ever met. She could crunch huge amounts of data seemingly instantaneously." In order to derive clinical outcomes data and measures from a Hospital Administration Information

System (HIS) geared to generating charges, she and Richardson did an enormous amount of work massaging the data and pulling it into their decision-support system. Oxygen, for example, was charged for by the hour, and lent itself fairly readily to becoming a quality measure. Over time, asthmatic children on the pathway required fewer hours of oxygen, yet they were reaching optimal saturation more quickly, got well faster, and could go home sooner. As Kurtin noted, developing clinical measurements was critical for engaging physicians in dialogue: "If your whole conversation with physicians is around money, it ends very quickly. We worked on the HIS barrier for quite a while to make data usable and useful for clinical process improvement."

Evolution. The Outcomes Center became the principal improvement engine for the organization. Increasingly, the demand for new pathways came from physicians, who were also using the Center's rapid cycle improvement methodology to make, test, and refine improvements on their own. The Center facilitated the development of disease-management programs (in asthma, diabetes, and other areas) to bridge all phases of care for chronically ill children. Over the next five years, it grew to house 24 full time equivalents, most of whom were supported by grants and outside contracts. Eighty percent of the Center's operating budget was devoted to improving organizational performance and informing the market, while the Center's third public policy, research, and education activities were supported predominantly by external funding.

The Center's data could be organized in a matrix. Clinical, financial, and patient-based data could be studied for a single patient, defined groups (e.g., 1,700 asthma patients treated by Children's), designated populations (e.g., 150,000 children for whom Children's had contracted to care), or the community (Exhibit 7). The heart of this matrix was the second column ("disease groups"), in which the units of analysis were the pathways of care for each disease group. The pathways data were the most important quality data shown to brokers and payers.

Exhibit 7. The Health Care Matrix

	Individual	Disease Group	Defined Population	Community	Employees/ Staff
Financial					
Clinical					
Patient-Based*					

From individual patients to the community at large.

*Satisfaction, access, Health-related Quality of Life. Source: CHSD

Board support, which Kurtin described as having been "incredible" from the outset, was exemplified during a presentation to the Board and hospital leaders, medical groups, and administration regarding the outcomes of the asthma disease-management pilot. By keeping kids healthy, out of the emergency room, and out of the hospital, the new approach, as one administrator pointed out, was driving millions of dollars out of the hospital. The chairman of the Board at the time, John Gilchrist, ended that discussion and gave Kurtin a green light to continue by stating, "Dr. Kurtin, you do what's best for the kids; we will worry about the money." Noting that the current Board believed strongly in what Kurtin was doing, Mike Madigan alleged that, "Paul's operation, pathways, and clinical outcomes may be as important as anything we have done around here during my 10 years because they are really making a difference."

In FY 2001, the Board granted the Outcomes Center one million dollars, and gave Kurtin great latitude in how to use it. Kurtin chose to endow a fellowship program. The first fellow was Glenn Billman, a natural teacher and a senior Children's physician with a strong interest in quality research and outcomes. Billman became medical safety officer.

Quality Management. Most of the data used to develop and measure clinical pathways and outcomes were actually collected by the Quality Management Department, which was headed by Matt Niedzwiecki, who reported to Kurtin. The Quality Department continued to carry its traditional responsibilities for regulatory activities and reporting to the Joint Commission and added three new responsibilities. It facilitated the

quality improvement planning and reporting activities required of all units, provided all of Children's training and education regarding quality or productivity improvement, and conducted root cause analyses regarding errors and harm. As Jane Weisenberg, vice president of ambulatory services, noted, "If there is an adverse event, they will convene a group of people to do an analysis of what happened, and lead an effort for change. Such reviews used to be more like a court martial, but now we look at the system together."

Under Kurtin, who was appointed vice president of clinical innovations in 1997, the work of quality management in identifying and handling problems and errors had become tightly linked with the work of the Outcomes Center, which Billman described as "plotting the future" and being the "effector arm to make change." The two entities shared common directors, common team leaders, and had two weekly conferences together, one of which focused on work in progress. When Billman discussed safety issues, for example, others chipped in, and Richardson found ways to incorporate this safety issue or alert into the relevant pathways. Beginning in FY 2001, Kurtin reported directly to Sadler, because Sadler was so keenly interested in Children's work on innovation, improvement, quality, and safety.

Like the Outcomes Center, the Quality Department considered its role to that of process expert rather than content expert. The Quality Department worked with process owners (e.g., operating room, blood bank, and laboratory) to improve the safety of their systems and help them design pilots to test innovations. Interwoven with its analyses and suggestions, it communicated its philosophy: that most errors were system-based rather than the fault of any one individual.

MEDICATION ERRORS, HARM, AND PATIENT SAFETY

When the first Institute of Medicine report (*To Err Is Human: Building a Safer Health System*) startled the country in the winter of 1999–2000 with its finding that hospitals were killing between 44,000 and 98,000 people a year, a third of them through medication errors, patient safety came into the spotlight at health systems all over the country. At Children's, some groundwork in safety had been laid through its participation in the Child Health Accountability Initiative (see below). Wanting to put safety on a whole new plane at Children's, Sadler asked Billman, Niedzwiecki, and Chris Abe, the children's administrative safety officer who had migrated to Occupational Safety and Health Administration work and epidemiology from a nursing background, to develop a comprehensive approach to patient, employee, and visitor safety. The three men created a high-level reporting structure unlike any at Children's. Cochaired by Billman and Abe, the members of the new Safety Coordination Council included Sadler, Madigan, Kurtin, Weisenberg, Niedzwiecki, Paul Van Dolah (executive vice president/chief operating

officer), Dr. Buzz Kaufman (senior vice president/chief medical officer), Dr. Herb Kimmons (director of inpatient services), and Marj Peck (nursing director).

The Safety Council thus knit together hospital administration, physicians, nursing, and the Board, giving them shared responsibility for guiding and coordinating safety activities and serving as a highly visible rallying point for championing safety. During FY 2001, Billman undertook several initiatives in error detection and shifted the focus from errors to harm, while Weisenberg and Niedzwiecki began a process of transforming the role of Pharmacy. A physician order entry pilot was launched, while planning for a house-wide physician order entry system got underway early in calendar year 2001.

Child Health Accountability Initiative. Medication safety had first come into focus for Children's in 1997 through the formation of the Child Health Accountability Initiative (CHAI). The impetus behind the project was to create a voice to articulate the needs, problems, interests, and goals of research for child health care, which has been given much less attention than adult health, which consumes 90 percent of health care dollars. Led by Sadler and Kurtin, a consortium of 14 children's hospitals had banded together to focus on a number of projects and use rapid cycle process improvement methodology. Nine of the hospitals' CEOs went through an Institute for Healthcare Improvement (IHI) series on leadership and quality improvement.

CHAI worked on three parallel tracks: improving performance, building bridges with organizations trying to improve care for children, and advocating policy change. Clinically oriented and committed to sharing information about performance, CHAI aimed to identify and benchmark best practices. Medication safety was high on its agenda, because children's small size makes them vulnerable to medication and anesthesia errors. CHAI members had deepened their dialogue on this subject and developed ideas about approaches to safety by participating in an IHI learning series regarding reduction of medication errors and prevention of patient harm.

The influence of CHAI on Children's was considerable and highly beneficial. For example, the concept and particulars of trigger systems for critical laboratory values as well as for certain rescue drugs to counteract medication errors came from a CHAI project that had adapted adult work to pediatrics. As a consortium, members could afford to hire outstanding expertise: experienced consultants who had been working for years on computerized safety, trigger systems, and physician order entry systems. Kurtin said, "By exposing us to people we might not be able to afford by ourselves or who we might not even have heard of, we get jumpstarted on a lot of stuff." Because CHAI had virtually the only data (and, given its 14 members, a substantial body of data) on medication safety in

pediatrics, the National Institutes of Health invited Kurtin, as CHAI's medical director, to make presentations. The Food and Drug Administration (FDA) wanted the consortium's medication use histories with pharmaceuticals which, although routinely prescribed for children, had never been formally tested for children prior to FDA approval. Kurtin noted, "CHAI is working to become a national resource on safety in hospitalized children."

Making Errors Visible. Children's staff gave 800,000 doses of medication annually to their inpatients. The Quality Management Department had always collected medication errors that had been reported, and conducted root cause analyses for significant events. Kurtin, Niedzwiecki, and Billman recognized that Children's, like other hospitals, was capturing only a fraction of what was happening, however. The first step in error reduction was to actually detect the errors and then analyze their patterns.

The challenge was how to make errors visible. The safety literature revealed that big breakthroughs in safety were made when an organization made a transition to "blameless reporting," but a survey at Children's indicated that its reporting culture was still experienced as punitive. While enlisting the Safety Council to begin sending signals of a cultural shift to blameless reporting, and giving floor nurses a hot button to easily report an event, Billman relied primarily on creating algorithms and database linkages that would report on errors automatically, and collect them into an overnight report for Quality Management.

One of his first projects was to link a stand-alone Pharmacy database with the medication error database in Quality Management. Pharmacy had already begun to document pharmacists' interventions, but the errors it recorded were invisible to the rest of the organization. An algorithm was developed to take stock at midnight of all Pharmacy interventions taken during the previous 24 hours, and to feed these into the quality management database. Building on the work of CHAI and IHI, Billman investigated and deployed a trigger system to facilitate the identification of possible adverse drug events or patient harm. Triggers included drug concentrations that were out of range, prescription of counteractive drugs, and transfers of patients to higher levels of care. Because the information was collected and assembled electronically, the identification process did not exclusively rely on voluntary or spontaneous reporting. Data could be easily reviewed, shared, and queried. That the data was available nearly immediately was deemed key to the program's success. The ability to conduct accurate investigation and analysis and the effectiveness of staff feedback and training could be dramatically improved when the time between an incident's occurrence and its review was short.

Concurrent with Billman's initiatives, Kurtin began preparing the Board for a sharp spike in the error rate. The Board became comfortable with the idea, recognizing that it did not represent an increase in errors themselves but rather an increase in their reporting. During FY 2001, the incidence report of errors at Children's shot up 500 percent. Making errors visible was, in Billman's words, an important wake-up call as well as the first step in the process of change.

Feedback and Prevention. Analysis of the data began to reveal the kinds of mistakes that were being made, where they were occurring, and whether certain drugs were particularly problematic. This analysis laid an evidence-based foundation for interventions and change, including remedial learning modules and training, new safeguards (some of which were computerized), the development or expansion of policies and procedures, and involvement of families and patients. Such changes were institutionalized through pathways and through the formulation of product requirements for the computerized physician order entry system.

Pathways were the backbone of Children's living system of caregiving. The rapidly accumulating knowledge about patterns in medication errors was incorporated into the pathways at two levels: by adding medical safety arms to them, and by making safety issues integral to the biannual process of revising and updating pathways. Wherever there was a procedure, a piece of technology, a step in a process with identifiable hazards, or the potential for medication errors, alerts and warnings were added to the pathways. For example, the pain management pathway added a large safety arm. Safety was designed into the pathways, and safety measurements added to outcomes research.

From Error to Harm. While it was essential to begin the analysis of medication safety by building a database of errors, it became clear that many prescribing errors were trivial (e.g., omission of date or time), most were screened out and never reached the patient, and fewer yet caused harm. In the spring of 2001, Billman and Niedzwiecki shifted their focus to methodically triaging those errors that had gotten through all the screens and caused harm or had the potential for causing harm, concentrating on inpatient drugs, which were more likely than outpatient medications to be toxic. As Kurtin put it, "At the end of the day, the issue is how much harm did we drive out of the organization?" Focusing on the most harmful drug events was also a practical endeavor: the effort marshaled physician interest in ways that a focus on mundane errors did not, and it could potentially avoid the high price tag for adverse outcomes.

Billman and Niedzwiecki searched for errors that had a higher likelihood of reaching and/or hurting patients. They undertook detailed analyses to identify causal and

contributing factors in harmful events. They found that harmful events invariably represented a confluence of multiple errors and therefore concluded that programs for intervention had to be equally multifaceted.

Changing Role of Pharmacy. Toward the end of FY 2001, Jane Weisenberg, vice president of ambulatory services, took charge of the Pharmacy, and medication errors were at or near the top of her agenda. She found she now had more interaction with the Quality Management Department than did any other operating unit of the hospital. She and Niedzwieki had initiated what they called the Pharmacy Improvement Process. "We are looking globally at everything: how is the Pharmacy structured, what positions does it have, how are people taking ownership and accountability?" Deciding that they needed an outside perspective, they hosted a three-day visit from the Institute for Safe Medical Practice in mid-2001, and received many practical suggestions. Weisenberg anticipated the resulting report would play a significant role in her department's priorities and implementation process.

The heart of the Pharmacy project was to redefine its role and relationships. Weisenberg viewed Pharmacy as a hub that should provide leadership on pharmaceuticals to the rest of the organization:

> I am working with them to more fully develop the role of the clinical pharmacist. The pharmacist has the clinical training and background to be working in partnership with the physician, not [to] just take orders and dispense medications. Recently we reorganized Pharmacy into teams—a couple of them dedicated for the most part to critical care, or to hematology/oncology—because we are trying to get them more attached to the patient population and service. That is where I see a lot of potential for change as that role develops. Transforming the culture of Pharmacy does take time.

One of the reasons it took time is that the Pharmacy culture was intertwined with the pharmacist–physician relationship. The first step, in Weisenberg's view, was to change this relationship. She began by working with the chief medical officer and making the chief pharmacist report to him to facilitate their dialogue. "When we did teams, I made sure the team leader for each area is a pharmacist who is very well respected by the doctors in that area. We have a Pharmacy and Therapeutics Committee led by a physician and there are other physicians on it, and we are also trying to strengthen that group."

COMPUTERIZED PHYSICIAN ORDER ENTRY SYSTEMS

Niedzwiecki described physician order entry as the ability of a physician "to go directly into the ordering system and type in what they want. A true order entry system has automatic alerts and flags that warn physicians about potential drug interactions, patient allergies, prior adverse reactions, or doses that are out of range. It also suggests alternative medications that may be equally or more effective, so it introduces automation into the process" (Exhibit 8). Children's had begun a CPOE pilot in FY 2001 for anesthesiology and had taken some other steps toward CPOE, and planning had been underway since the beginning of calendar year 2001 for a vendor-based, CPOE system that would eventually be implemented throughout the hospital.

Exhibit 8. What Is CPOE?

Computerized Physician Order Entry (CPOE) systems are electronic tools for improving patient safety by reducing medication errors at the time of ordering. They not only replace the cumbersome, error-prone paper system (see Exhibit 20) for prescribing diagnostic and treatment services, but also--especially when used in conjunction with decision-support systems--assist physicians to make optimal ordering decision by giving the physician critical information at the time of ordering. The system compares the entered order against standards for dosing, checks for allergies, drug-drug interactions, availability in the hospital formulary, and alerts the physician to many other possible problems. CPOE systems can suggest alternative medications (which may also have a lower cost) or lower doses.

CPOE is a module in a clinical or hospital information system (HIS). It needs to be integrated with pharmacy, laboratory, and other departmental systems. Implementation entails not only significant software integration and interface development, but also training of all clinical staff, and management of changes in the workflow of all caregivers and ancillary departments. Change management requires careful planning because of the multiple changes in operations during the rollout. It may require additional hardware purchases in order to have terminals widely available.

Mobile access on the hospital campus are one of the attractive features of the system, and remote access is a possibility, thereby expediting care delivery and adapting to where physicians are and how they work. The efficiency of order communication means that interventions can begin sooner rather than later.

CPOE systems can reduce costs in many ways. \ The most obvious are the avoided costs of dealing with adverse drug events. Research has suggested the CPOE implementation is associated with reduced length of stay, reduced utilization of services, and the use of effective lower doses. Unnecessary variation in care, reduced formulary range, decreased turnaround time for laboratory tests, reduced staff time for transcribing and transferring orders, documentation, checking, and chart review are just a few of the other ways in which hospitals can reduce costs through the use of CPOE.

Adapted from First Consulting Group, 2000, *A Primer on Physician Order Entry* (Oakland, Calif.: California HealthCare Foundation, chcf.org).

Approach

Children's approach to CPOE systems was a departure from its long-term information technology strategy. Children's created its own information systems shop in the late 1980s, when it made certain key decisions by which it had abided. It chose not to be on the cutting edge, but instead to opt for good integration and a system that Gayle Yeakle, vice president of information management, described as "very tried, true, and stable." Children's chose to go with a single Hospital Administration Information System (HIS) vendor, Meditech. Thus, individual departments could not choose their own software and leave Information Management with the problem of integration. Yeakle evaluated the single vendor choice as having been good "as far as integration is concerned because we have a single database; everyone can get access to the information. It has been cost-effective, and good from a support standpoint. The tradeoffs are at the department level, because they can't choose a niche vendor."

However, because Children's viewed CPOE systems as critical, it made two atypical choices. It devoted in-house resources to customize a CPOE system for anesthesiologists and the Physicians Advisory Committee chose to be an early adopter of a vendor-based, house-wide system. In making this more aggressive choice, the committee intended to have some input into the evolution of the product so that it would effectively address pediatric safety needs.

Children's anesthesiologists had been clamoring for CPOE in the late 1990s, while the Information Management Department had been exploring order entry needs with various physicians, assessing existing tools, and looking for a willing pilot group. (Information Management, it should be noted, was broader than Information Technology, incorporating telecommunications, decision support, medical records, e-health, and the medical library.) Discussions between Information Management and Anesthesiology made it clear that Meditech and other vendors could not meet their needs; their CPOE products did not, for example, have an error-checking process or perform unit dose calculations. The Information Management department developed a customized program for Anesthesiology that performed unit dose calculations and built in normal ranges, based on height, weight, and body surface calculations.

Begun in the summer of 2000 and still operating a year later, the anesthesiology pilot provided lessons about CPOE systems, training, and uses. It also stimulated interest in CPOE and requests from other departments for comparable programs. The latter was too resource-intensive, however, for Children's to undertake.

Vendor-Based, House-Wide CPOE System

The Physicians Advisory Committee (PAC) was a group of 20 physicians representing several disciplines and physician groups; it set clinical priorities for Children's and gave direction for clinical informatics such as electronic medical records. Early in 2001, the PAC began exploring Children's functional requirements for a CPOE system, ease of use issues, and whether Meditech's product was strong enough to meet Children's needs. They designated a CPOE core team to conduct an in-depth study and planning for the product, implementation, and rollout. They appointed two physicians, two Information Management members, and one pharmacist as the core team, and drew upon other expertise as needed. They authorized the team to go forward with discussions with Meditech for defining a CPOE system that could evolve and be rolled out to the entire Children's system. The Coordinating Council Committee, the Medical Staff Executive Committee, and the Operations Council all accepted and approved the recommendation to move forward with CPOE.

The Product. Yeakle identified the biggest problem in finding an appropriate product: "Since the IOM report, HIS vendors have been scrambling to write a physician order entry product to reduce medication errors. But when vendors develop their products, they usually start in the high-volume area, which is adult markets." The Meditech product met several of Children's requirements, but it was not focused on the needs of pediatrics. The most critical missing piece was the weight-based unit dose calculation.

The Meditech product did meet other requirements, however. It integrated easily with Children's existing database, could tie into Pharmacy data and Laboratory data in real time, give alerts to physicians when they placed an order (e.g., on adverse drug reactions and drug-to-drug or drug-to-food interactions), and indicate therapeutic dosing relative to current Lab levels for pharmaceuticals being ordered. The product was a dynamic, interactive system; by using it to check the latest digoxin level from the Lab, for example, a physician could gauge the time and dose of the next order.

While the need for integration with Pharmacy and Lab kept Children's on the Meditech path, there were strong concerns about what the product could not yet do. Meditech's Chief Medical Officer was reported to have "really listened to the unique needs of peds" early in FY 2002, following which Meditech came back with a proposal that suggested that Children's work with them to define how the product needed to evolve. Nonetheless, when the core team from Children's visited Meditech for a week in October 2001 and worked with the product, they identified unacceptable limitations in the design. The program for ordering drugs was configured for "standard" adult dosage and was still not weight-based, abbreviations were used to identify drugs, and, although

the system captured a patient's weight and other information needed to calculate recommended dosages, it did not actually perform this calculation. Meditech agreed to revise the program, shifting anticipated delivery from February to May 2002.

In his role as medical safety officer, Billman was the CPOE team member whose role was to champion safety issues. He commented on the standard approach to system design among HIS vendors: "A system designed for adults does not work for kids, yet adult-based design is the way vendors go about things. If they designed the system to handle kids, it would work for adults as well." He pointed out that a kid-based design would also be important for certain adult populations, including the geriatric population and those with renal or liver dysfunction, whose metabolisms were slower or compromised and who, like kids, would be better served by weight-based dosing. On the brighter side, Billman added, "Now we know much more about what it will do, and we can make decisions—such as where to pilot it and with whom—from a much more informed basis."

Where to Locate the Pilot. The Operational Council, composed of administrative vice presidents, set organization priorities and resources and decided where to conduct the pilot and how to roll it out. Prior to the October visit with the vendor, they had decided to focus on residents first (most of whom were young and computer literate), but it was unclear if the pilot would go unit by unit, or put all the residents on the system on simultaneously.

It was suggested that, if the program progressed from unit to unit, a good starting place would be the hematology/oncology unit. The unit was stable and semi-closed, with a core set of nurses and physicians who were good early adopters and willing to try things—highly attractive from a pilot perspective. On the other hand, the unit's intravenous drips were the most complicated of all medication orders and thus carried the highest risk for patients and were the hardest to automate. This suggested, in Yeakle's words, that "we get smarter on the application first." The surgery unit, by contrast, was more standardized in its practice and easier to automate, but it was not comprised of a core group of physicians.

Physician Buy-In. Challenging as the technical development, evolution, and rollout problems were, Yeakle saw cultural change as the biggest challenge to the implementation of CPOE. Physicians indicated in interviews that they perceived the benefits of CPOE as being worth the extra time it would take to learn the system. One incentive for physicians was the inclusion of order-sets in the program; rather than entering each item individually, a physician could create a blanket order. It was also anticipated that physicians would be able to access other resources through the CPOE system, including clinical decision-making support. Billman believed that the greatest incentive to physicians, including naysayers, would be the program's convenience:

> We can make it so that they don't have to come in and sign the medical record. Physicians hate having to come into the hospital to sign medical records or incomplete orders. With physician order entry, we can get rid of both problems. Physicians can authenticate orders from home, or anywhere else—it's flexible. Suddenly we have the ability to significantly cut down frustrating and nonessential trips into the facility. This is a win not just for the patient and the hospital, but also for the physician. That to me is a very, very powerful tool that is going to allow us to transform patient care.

Expected Impact on Safety. Once the CPOE system was up and running, Billman hoped to see two kinds of changes. "We want to truly know not only that we have reduced the ability of errors to go all the way through the system and hurt the patient, but also that the system itself is safer and fewer errors are being committed in the first place." It was essential, therefore, to have accurate measurement of errors before the system went into place, and to make financial estimates about their costs. Billman stressed the importance of baseline measurements: "You need that reference point, and everybody needs to agree that, this is our starting point. You also need to agree on how you are going to measure whether the changes have been successful or not." One of the key indications of a safer system would be a dramatic drop in pharmacy interventions.

> We see on average 1,400 significant pharmacy interventions yearly; those are interventions into situations which had the potential to cause harm. When we get to physician order entry, there will no longer be illegible handwriting, or incorrect dosages based on doing the wrong calculations at 3 A.M. My hope is that these interventions should plummet like a rock and become the rare exception.

BUSINESS CASE FOR QUALITY AT CHILDREN'S HOSPITAL AND HEALTH CENTER OF SAN DIEGO

The benefits of quality, as Meg Norton, senior vice president and director of Children's Hospital and Health Center, stated, accrued "first and foremost to patients and their families; it's the right thing to do whether there is a business case or not." To date, there was no business case. Children's had undertaken and sustained its commitment to quality and outcomes in a financial environment in which there was tremendous pressure on insurance companies to maintain and even reduce premiums charged to employers, and in which the Medicaid rates and payment methods penalized its outcomes work. Patient revenues and premiums (including capitation contracts) covered only 78 percent of Children's operating expenses. Premiums on some of Children's contracts declined as much as 20 to 30 percent during the 1990s, while net income of physicians in the San

Diego area was dropping 30 to 50 percent. Since physicians could greatly increase or even double their income by moving to the Midwest, it was becoming increasingly difficult to maintain a stable base of specialty physicians in the community.

Exhibit 9. Consolidated Financial Statement, FY00–FY02

CHCC - Consolidated	Actual Audited FYE 6/30/00	Forecast FYE 6/30/01	Budget FYE 6/30/02
Income Statement			
Net Patient Revenue	147,380		161,535
Government	18,748		23,096
Managed Care Premiums	22,351		21,178
Philanthropy- Unrestricted	9,732		6,959
Philanthropy- Released from Restrictions	1,123		2,072
Other	21,090		40,485
Total Revenues	**220,424**		**255,325**
Salaries & Wages	91,661		107,229
Benefits	23,501		31,252
Supplies	31,427		35,190
Purchased Services	16,436		23,604
Professional Fees	21,241		18,019
Depreciation	7,867		7,911
Interest	5,223		5,130
Other	21,041		26,262
Total Expenses	**218,397**		**254,596**
Operating Income	**2,027**		**728**
Investment Income- Unrestricted	11,482		4,092
Investment Income- Restricted	814		307
Investment Income- Limited Use Assets	6,997		1,785
Support from other Sources	808		
Investment Income	**20,101**		**6,184**
Unrestricted Net Income	**22,128**		**6,913**
Restricted Revenues			
Contributions	11,255		8,041
Released from Restriction	-1,123		-2,072
Net Income	**32,260**		**12,882**

Source: CHSD

Like most children's hospitals, Children's depended upon philanthropy and government support. Its operating income had fluctuated around $2 million for several years (Exhibit 9). Because most children's hospitals had steady track records of philanthropic support and needed that support to achieve a positive bottom line, bond raters had made it a standard practice to incorporate philanthropy into their financial solvency analyses of children's hospitals. To the extent that philanthropic gifts had to be used to keep a hospital operating, they were not available for innovative and/or capital projects. Government payments were also necessary to fill the gap. Paul Van Dolah, executive vice president/chief operating officer, commented, "Virtually every children's hospital in the country has a very heavy dependence on supplemental government support of any one of a number different of kinds, including disproportionate share, special grants and appropriations, and graduate medical education." During the last three years, the enormous contribution of those teaching hospitals that, like Children's, were not part of a university system had been recognized in federal financial support for residents and fellows.

Norton was one of several leaders at Children's who believed it was important to make a business case for quality but who recognized that it was extremely challenging to do so. Implicit in any attempt to develop a business case was the question of whether a business model was appropriate or even possible in health care. Mike Madigan believed it was, and that Sadler's history of choices made a similar statement:

> Blair [Sadler] has a terrific vision of where Children's should be in this community and what kind of an institution we should be. He has gone out and recruited people with experience in business for the Board because I think he believes in the notion of a business model for a nonprofit, health care provider. You have to have a level of confidence that the business model is how you attract people who will use your services but who may not be the payer. You work backwards: you convince the people who are using the service that this is the best service, and therefore, they want to make sure their employer carries Children's as an option.

Sadler himself expressed the conviction that "now is the time for providers and payers to get on the same side of the table." He elaborated:

> It is time to have new conversations. The current conversation is 25 years old. It says, "We don't pay for education, we pay for 'health care.' We don't pay for what happens in the home, only in the hospital." Everything has to fit into their buckets or else it's not covered. One of the buckets is

location of care, another is procedures. They'll pay for a 'day' of care or an 'outpatient visit,' and they treat every day as the same day and every visit as the same visit. This is crazy. Medical care is not just about sticking a needle in, but explaining to Mom and Dad how to help manage an asthmatic child so that when it gets tricky, they don't panic and run into the ER.

The new conversation is: "Let's document and pay for the most effective and cost-efficient forms of care, and let's reward the R&D to develop new, even more effective and cost-efficient forms and locations of care. If a provider can come up with an outpatient alternative that has as high satisfaction and outcomes as inpatient but costs one-quarter as much, why shouldn't everyone want to stimulate more of that? Why shouldn't the providers share equally in the savings?

Although ideas about making a business case for quality at Children's were disparate and embryonic, they seemed to fall broadly into two levels.

- Microscopically, clinical pathways had permanently removed an estimated $5.4 million in direct costs from the cost structure, and cost accounting methods were changing in directions that would enhance Children's ability to capture costs. Quality-induced reduction in costs were not linked or aligned, however, with principal payment methodologies or reimbursement rates, so that Children's was not rewarded and often penalized financially for its quality improvements at the care level.

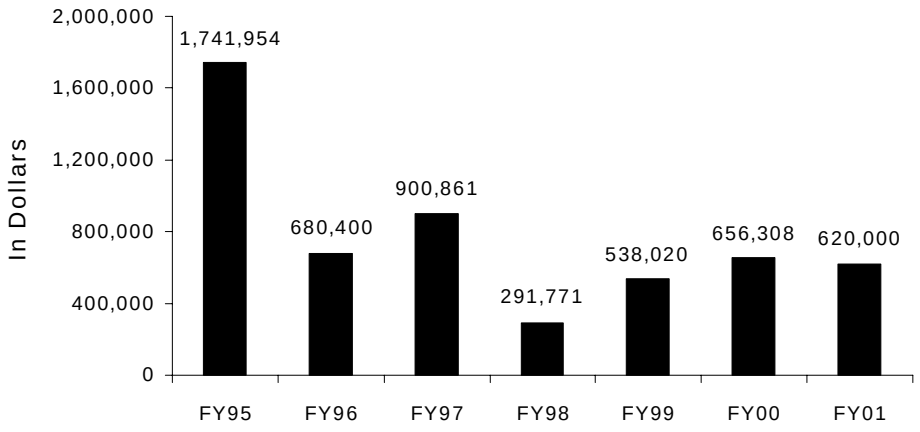
- Macroscopically, pathways had clearly increased organizational capacity and moved business to Children's. Outcomes and quality data, presented in an open, sharing way to brokers and payers, had generated a new kind of dialogue as well as types of contracts and payment methods previously deemed impossible. It had also opened the door to exploring other payment methodologies, including the sharing of savings or gain-sharing among the hospital, physicians, and payers. Outcomes data was helping to turn previously difficult or indifferent relationships into partnering relationships.

Microscopic Level: Costs and Payments

The Outcomes Center and Quality Management Department were cost centers that did not have responsibility for generating revenue. Although most of their measurements were clinical or physical, their analysts had been able to identify real, verified, direct, cost savings as a result of their work. During the seven-year period FY 1995–FY 2001, clinical pathways had generated an estimated $5.4 million in cumulative savings in the cost

structure (Exhibit 10). Although the reduction of costs via pathways was seen as opening the door to a business case for quality, the lack of a connection between cost and performance on the one hand and payment and incentives on the other more often than not worked against Children's financial interests.

Exhibit 10. $5.4 Million Total Estimated Cost Savings Due to Pathways, FY95 to FY01



Source: CHSD

Cost Savings. When did Children's actually save cash? Van Dolah explained part of the art of discerning between "dark" and "light green" dollars:

> If you can reduce number of doses of medications, then cash is saved. If you also reduce the number of respiratory therapy treatments for the child, that reduces the number of RT hours required, but did you actually either eliminate RT staff, or gain the capacity to redeploy them so that you can absorb more clinical volume growth without having to hire new staff? What is tough to do is to make a clear statement that the respiratory therapy costs saved in theory were actually saved in reality.

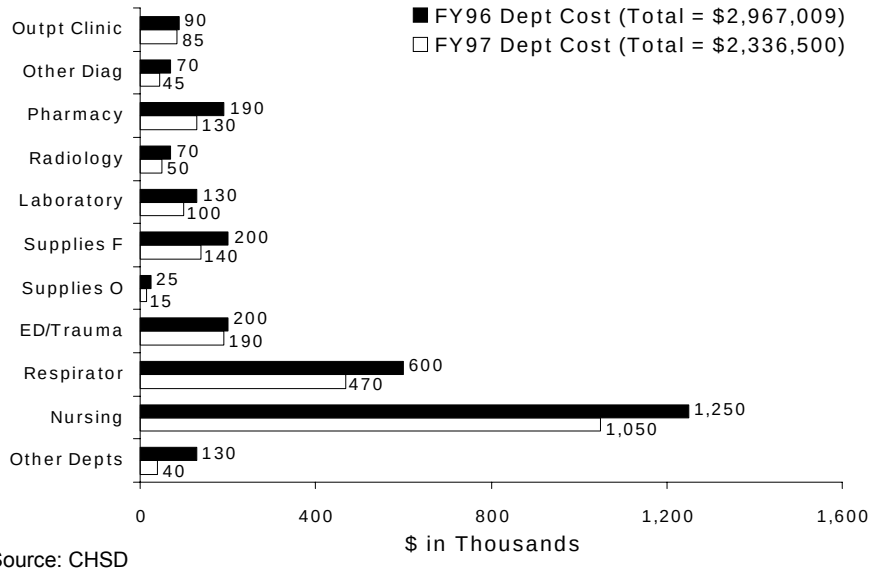
Norton elaborated on this same issue:

> When we look at cost savings, we normally look at them in two dimensions. One is reduction in length of stay; that is not necessarily an economic win for us, because for the most part savings accrue to the payer, not to Children's. The second is the reduction of resources used during the

patient's stay. So if we reduce the number of respiratory therapists per shift, or the number of unnecessary blood gases done, or we stop giving a medication that is no longer the drug of choice—those are real cost savings, whether or not length of stay goes down.

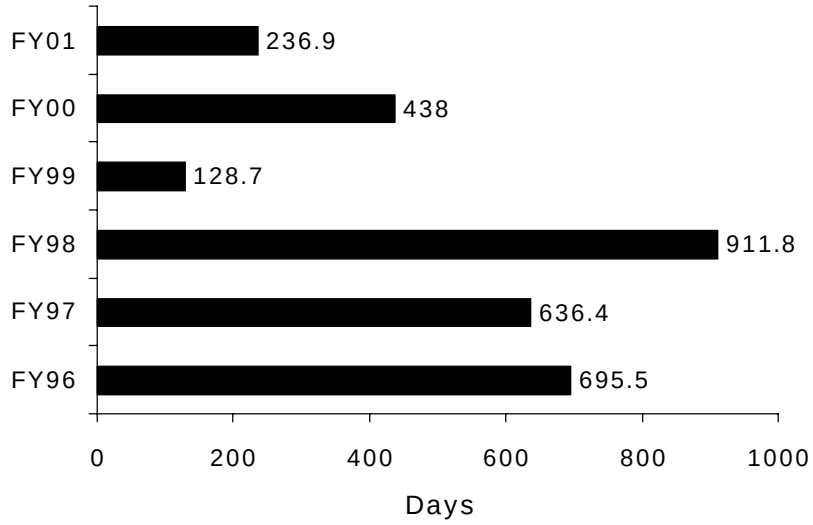
The $5.4 million in direct cost savings was derived from the more efficient and effective delivery of services through pathways. The savings were composed of many elements, including $600,000 saved by the Asthma Department between FY 1996 and FY 1997 (Exhibit 11). Surprisingly, continued improvement and cost reductions occurred year after year. "When we first started doing pathways," Richardson recalled, "we thought there would be a point of diminishing returns when we had driven out everything that we could, and improved care to the best possible level. In many, many cases we are not seeing that. Based on changes and innovations in health care, we keep finding new ways to revise the process that produce measurable improvements" (Exhibit 12). Not only did improvements continue to be made, but the older changes persisted. Studies have shown that in most organizations, only about 13 percent of major quality improvements persist after a year; at Children's, by contrast, improvements have already persisted for seven to eight years. Overall, Richardson found, the improvements endured, savings from earlier years did not return as new costs, and newer improvements continued to make the system even leaner.

Exhibit 11. Elements of $5.4 Million Cost Savings: Asthma Department FY96 & FY97



Source: CHSD

Exhibit 12. Pattern of Continuing Improvement: Decreased Number of Days Due to Pathways FY95–01



Source: CHSD

Issues in Cost Measurement. Louis Coffman, Children's new chief financial officer who came to health care from industry, found hospital accounting systems far from ideal. He explained, "We are pretty good at tracking charges, but costs are derived numbers which are usually allocated as a percent of charges. I would love to see if we can apply cost accounting to hospital settings where it is not a function of charges." Richardson, Niedzwiecki, and Billman were able to use decision-support tools, medical records, and other resources to complement the hospital's accounting system and produce precise a combination of exact numbers and pretty good numbers for their analytical purposes. As Norton noted, "Some of the costs we are measuring today are actually the true variable costs." The analysts often worked with average costs, however, while Coffman ideally want to know "the marginal contribution for each patient. You cannot make up on volume what you lose on margin." Coffman wanted to be able to make a threefold distinction among costs: (a) assignable direct costs, which are associated with a particular patient; (b) nonassignable direct costs of providing care, such as costs of nurses, which cannot be assigned to a particular patient; and (c) indirect costs, which are allocated to patients.

For the FY 2002 budget, Coffman narrowed the horizontal scope of accounts (formerly 366 cost centers) and provided much more vertical detail. "Think of a cost center as a verb. It has got to do something: it has to capture costs." Inheriting 125 days of receivables, each worth a half-million dollars, Coffman was also pushing for faster collections. He reorganized billing and collections so that each person was a specialist in a

certain area and each payer was a band in Children's receivables. "Thermometers" were put on the wall so that collectors could see how they were contributing from one month to the next in reducing the receivables in their areas.

Even if the economic impact of quality could not be assessed through true, marginal costs, Coffman believed it would be possible to use indexes to assess the dynamics of quality changes. "If you use the same method and it is consistently inaccurate, then you're measuring dynamics or changes. If we can establish something as a denominator for an index, then as long as it's reasonable and we consistently apply it, we can measure whether a change is having an effect. We might not have the right or perfect denominator, but at least we can start measuring the dynamics of improvements in quality."

Payment Methodologies. With the exception of contracts for 100,000 capitated lives, Children's was reimbursed primarily on a *per diem* basis (Exhibit 12). Because ancillary services were bundled into the low day rate and these services were front-end loaded, the dramatic reductions in length of stay meant that Children's was forfeiting millions of dollars of revenue annually (Exhibit 13). Thus, the hospital and its physicians did not share in most of the savings that the quality improvement efforts had generated. The financial savings accrued overwhelmingly to the payer, with the state of California being the primary beneficiary. Children's recaptured the gains of its own quality improvement efforts only under its capitated contracts, and only if the prepaid premiums covered costs. It shared those gains with physicians by creating shared risk pools; $3 million was distributed to physicians during the past two years.

Exhibit 13. Payment Methodologies and Incentives at CHSD

Per Diem: For each patient in a bed at 12 AM, Children's received a flat sum per diem. Under this method of payment, it was irrelevant what interventions had been made, or how sick the child was; services (x-rays, pharmacy, lab costs) were bundled into the fixed payment. The only exceptions were carve-outs which had been negotiated for costly procedures (e.g., sophisticated orthopedics, trauma). Carve-outs were sometimes referred to as fee for services (FFS), but were not true FFS; the hospital received only a percentage of what it billed. Apart from carve-outs, inpatient care was reimbursed predominantly on a per diem basis. Per diem payments represented 76% of patient revenues at CHSD; Medicaid (Medi-Cal), which paid on this basis, comprised over half of CHSD revenues. California ranked 48th in Medicaid reimbursement rates, and only one California county had rates lower than San Diego county. Under California law, hospitals could not hire physicians, and physician services had to be billed separately, usually on an FFS basis.

Per diem incentivized keeping a child in hospital as long as possible and minimizing resources used and what was done for the child. Exhibit 14 is a graph in which length of stay (in days) is on the horizontal axis, and costs of care on the vertical axis. It shows that service-intensive expenses are front-end loaded, but without additional compensation for services rendered. If the patient is discharged prior to breakeven (which is reached when the area under the curve matches the area over the curve), the hospital loses money. As Paul Van Dolah described the incentive structure, "in per diem, the incentive is to keep the patient in the hospital as long as possible, past the breakeven. You also win by knocking the top off the curve which reduces the area under the curve." In other words, per diem incents stretching out expensive services.

Capitation: Children's received a fixed dollar amount per child/per month for 100,000 children insured by several HMOs, in effect becoming the insurer. Children's thereby assumed the risks that the amount it received would be enough to take care of that child throughout the year. Capitation represented about 13 % of Children's patient revenues.

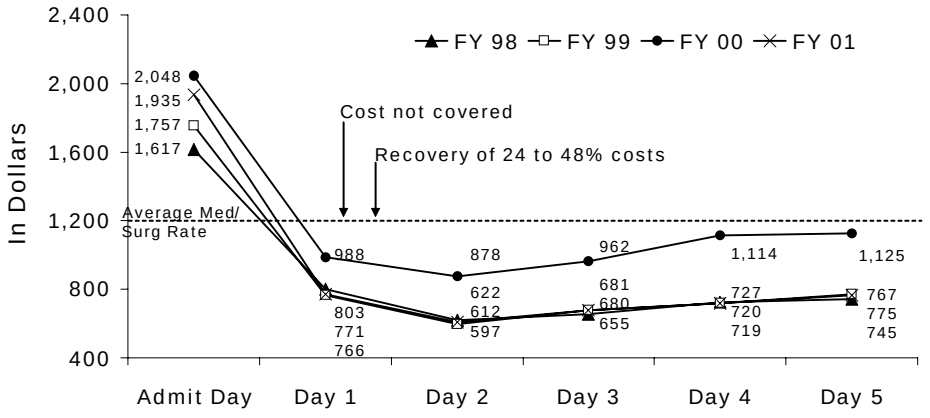
Capitation incentivized prevention and keeping children out of the hospital altogether, and put a premium on predictive and actuarial abilities. Coffman viewed success in taking responsibility for capitated lives as requiring an increased ability to manage more risk (and thereby reap greater rewards) by managing information more effectively, and developing appropriate underwriting standards. "If you just take pools of kids, you run the risk of adverse selection and all sorts of things." When successful, Children's kept the difference between what it was paid and what it had to spend on children. It split that difference with physicians with whom it had risk-sharing agreements under capitation.

"Fee for Service": Almost all of Children's outpatient services were reimbursed on a "fee for service" basis. It was not a true fee for service, as Children's was actually paid only a percentage of charges; the rule of thumb was about 65%. Discounted fee for service comprised less than 10% of CHSD revenues. Fee for service incentivized use of services.

Per Case: Children's received payment for a defined time period given a specific diagnosis or individual. Per case payment was a small percent of revenues, and usually pertained only to highly specialized services. It was seen as desirable for cases having predictable disease course.

Source: Authors' analysis.

Exhibit 14. Decreasing Length of Stay: Financial Impact Under Low Rate, Per Diem Payment Structure



Source: CHSD

The disparity between quality-generated cost reductions and payment incentives highlights a critical difference between children's hospitals and hospitals for adults. Norton focused the problem:

> When children's hospitals make improvements like reducing length of stay, they, unlike an adult hospital, don't usually get the benefits. In adult hospitals, the vast majority—60 to 80 percent depending on how much OB/GYN and early adult services they provide—of health care is addressed to seniors, and reimbursed by Medicare on a per discharge basis. If they reduce length of stay, they have a financial gain. But much of the care in children's hospitals is for chronic care, and this stresses the finances of younger families, and even if they begin with commercial insurance, they often migrate to Medicaid. So Medicaid is the primary payer and they pay on a *per diem* basis. When we make improvements in length of stay or keep them out of the hospital altogether, we get paid less. The gain goes to the payer (insurance company or the state).

Rates. Low premiums and reimbursement rates also contributed to Children's revenue problems. Medicaid payments were notoriously low in California, and San Diego County had some of the lowest rates in the state. In January 2002, Children's had been in negotiations with Medicaid for several months about an inpatient rate increase that was supposed to have gone into effect July 1, 2001. A lawsuit had been brought against the

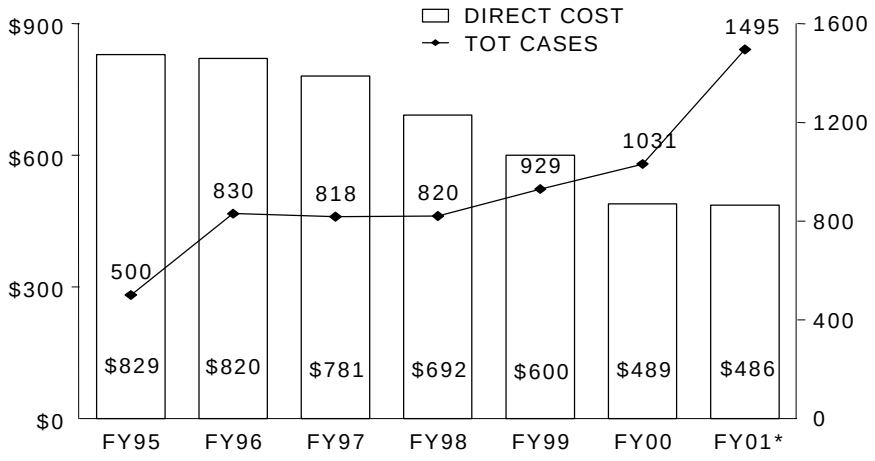
state for its failure to increase outpatient reimbursement rates for more than a decade. The lawsuit resulted in an outpatient rate increase to hospital providers of 30 percent, along with a one-time, lump-sum settlement for the failure to make increases in prior years. Nonetheless, Sadler pointed out, "There are still extraordinary gaps between costs and payment for day surgery. An eight-hour chemotherapy, which involves expensive drugs and multiple specialties, may be reimbursed as an 'outpatient visit.' Providers are not rewarded for shifting care from inpatient to outpatient settings."

An extended price war among commercial insurers had depressed premiums and rates for years. Eventually, as Van Dolah recounted, the insurers could no longer sustain their position.

> In the last 18 months, the insurance companies have said, "We cannot stay alive if we keep on pricing our product this way." So, around the country and in California especially, we have seen 20 to 25 percent and even 30 percent rate increases by insurance companies to employer groups. The struggle that providers have had is to get some portion of that to flow through to improved reimbursement rates. Because we have been successful with that, our FY 2002 business plan calls for an increase of almost $40 million in revenue. Two variables inform that number: an increase in volume (which has been skyrocketing for us, and represents the largest portion of the increase in revenues) and an increase in rates.

Pricing. Children's had not been able to charge more for higher-quality service but, if it could beat the street price or get very close, better quality could win the day, as exemplified by its experience with tonsillectomies. With tonsillectomies priced at $800, Children's was losing business to free-standing surgery centers that charged $550 for the procedure, even though Children's made the case that it had pediatric surgeons, pediatric anesthiologists, and pediatric nurses. Through an improvement led by ear, nose, and throat surgeons, Children's reduced its costs even below those of surgery centers, and matched their price. Not only did its tonsillectomy business rebound, but it captured a great deal of new business (Exhibit 15). As Kurtin summarized, "We became perceived as the high-value provider, and that moved business to us."

Exhibit 15. Price x Volume of Business: Tonsillectomies



Source: CHSD

Macroscopic Level: Capacity, Share, Contracts, and Relationships

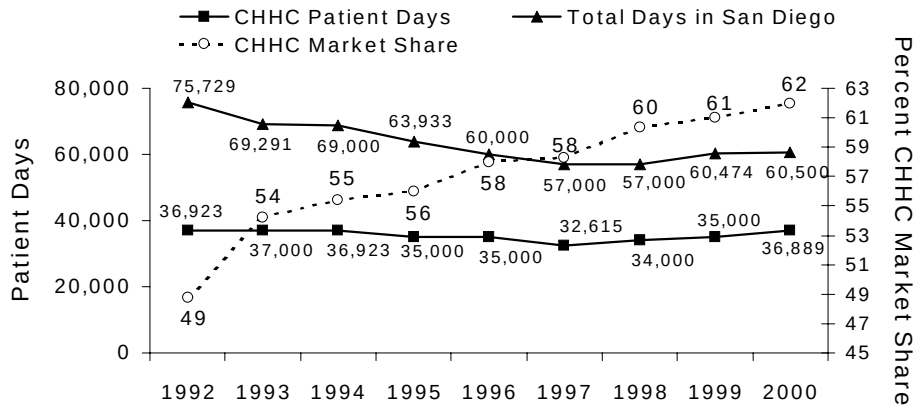
Despite the fact that 85 percent of Children's payers did not reward its quality improvement and innovation successes in a direct, immediate way, Children's leaders identified several ways in which the quality engine had turned the Children's train around and set it on a new track. Quality improvement efforts greatly increased the hospital's organizational capacity and market share, altered its dialogue and relationships with brokers and payers, and changed its relationships with physicians and other service providers. An evolving dialogue with brokers and payers fostered new business and some innovative contracts, and may lead to for larger breakthroughs in the future.

Organizational Capacity and Market Share. Kurtin asked, "How many bed days have we saved so they didn't have to put up a new building two years ago? What is the business case for this extra capacity that we have brought to the system? We weren't forced to make those investments because we kept kids well and out of the hospital, or cut their length of stay." Niedzwiecki elaborated the same theme, "We are seeing unprecedented levels of business, but we didn't have to build a new wing yet. One way of quantifying that success is that we have increased our market share without a big capital outlay since 1993."

One measure of market share (inpatient days for children 0–14) increased from 49 percent to 62 percent in the past nine years (Exhibit 16). This growth entailed an enormous increase in the amount and quality of care that Children's provided, the number

of patients it serviced, the number of surgeries it performed, the number of prescriptions it filled—all without adding beds or other physical capacity and in the context of a rapidly expanding, ethnically diverse population. The hospital's Emergency Department, built to serve 25,000 children in 1984, actually served 55,000 in 2000, while surgeries increased 25 percent between 1996 and 2000. An increasing percentage of patient days were at acuity levels 3 and 4, and Children's now treated most of the county's severely ill children.

Exhibit 16. Share of Market
San Diego County Patient Days (0–14)



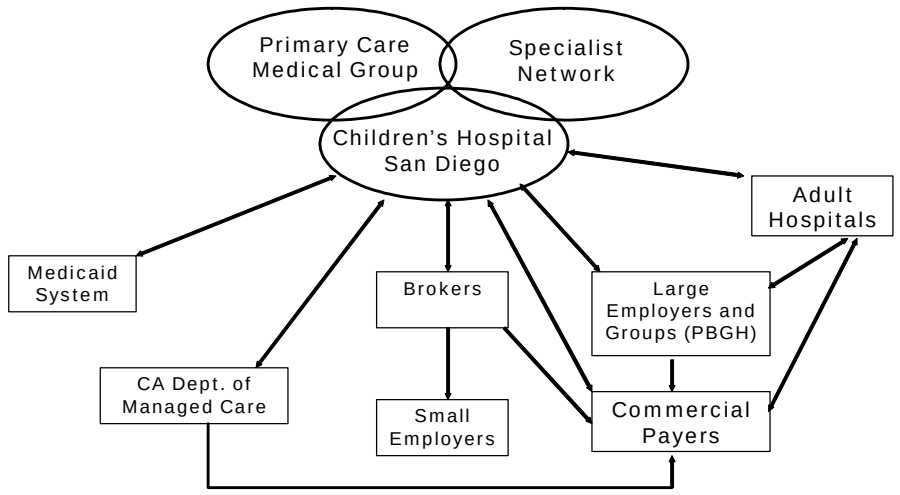
Source: CHSD

Dialogues and Relationships. Children's began informally sharing outcomes and quality data with the insurance broker community in 1996–97. This network played an influential role in the San Diego community, where most employers are small and rely upon brokers to identify the insurance products they offer to employees. It was therefore incumbent upon Children's to convince brokers that one measure of a quality health plan was that it include Children's. By the late 1990s, brokers were so impressed by Children's outcome data that they decided to form a brokers' advisory council so that, as Sadler put it, "they could help us make our case to employers."

Brokers often told hospital executives that they dissuaded employers from choosing provider groups or HMOs that did not use Children's as its predominant provider of pediatric services. Sometimes those shifts entailed moving business away from Kaiser. Kurtin noted, "Kaiser is the only system in town that is closed and doesn't use Children's Hospital routinely."

Such presentations and informal dialogues were now shifting to another level, becoming more targeted and more highly organized. The overall objectives were to develop a community of partners and to create innovative payment methodologies and contracts through which Children's (and its provider partners) could reap some of the benefits of its quality-based savings. Target groups had been stratified: payers, health plan medical directors, physician groups, and adult system strategic partners. A series of meetings was being planned to not only share outcomes data, but also give these audiences a broader sense of what Children's was doing, where it was headed, how it was reducing errors and harm, what it believed was important, and to ask decision-makers what was important to them (Exhibit 17).

Exhibit 17
CHSD Organization and Stakeholders



Source: Authors' analysis.

Changing Payer Relationships and Contracts. Norton and her staff demonstrated potential savings to payers as a starting point for the development and piloting of new gain-sharing models. A child with severe asthma, for example, might cost a health plan $60,000 to $100,000 a year. If, instead, the payer agreed to share the savings generated by an asthma management program with Children's and its physicians, there could be a potential win-win situation for everyone. Blue Cross of California had confirmed an interest in such models, and Pacific Care had just appointed three people to work with Children's on models of payment to support two pilots (for asthma and medication safety in hematology/oncology).

Norton believed that the dialogues with payers might soon break open for another reason as well. Numerous health plans had received poor scores from the California Department of Managed Care in chronic disease management, improving quality, and reducing harm. The public nature of such report cards had made these plans much more attentive to Children's suggestions that they become its partner in managing their kids, and that they engage in a serious dialogue about changing the methodologies of payment and incentives. "The dialogue that was very hard to have four years ago is starting to happen," Norton reported.

Sadler described the role of outcomes data in getting direct contracts using capitation. "Before 1999, payers were saying, 'We are not going to contract with you directly, that would be a carve-out, and our contracts have to be cradle to grave. Go talk to adult medical groups, we are going to contract with them, and they will give you a subcontract.' We could not get in the door. In that year, by showing the pathway data and consistently demonstrating quality and satisfaction, we convinced eight commercial HMOs to give us direct contracts for 35,000 capitated lives for kids only. People had said, 'the market will never do that.'"

In addition, some payers had agreed to pay for both home visit and outpatient support for asthmatic patients. They had been persuaded by outcomes data showing, for example, that emergency room visits dropped 50 percent for the "frequent flyer" children in the disease management program for asthmatics. Niedzwiecki exclaimed, "Outcomes have given us the ability to go to market and make successful arguments in the face of one of the most difficult health care, financial markets in the country." Nonetheless, getting home coverage was still the exception rather than the rule.

Outcomes data also enabled Children's to take more risk in the form of seeking a greater number of capitated lives. Coffman elaborated, "If we assume more of that risk, and it takes us only two days to get an asthma kid in and out, and for everybody else it's four, that difference falls through to our bottom line. Therefore, outcomes data have enabled us to take more risk in the form of a greater number of capitated lives, which theoretically can produce bottom line results."

Some skeptics in the health care community have questioned whether physicians who share in risk-pool savings under capitation might be motivated to keep patients out of the hospital. Van Dolah believed, to the contrary, that capitation added an incentive for clinicians to ask deeper questions, and that the criteria for pool distributions were mutable.

> Nothing in the old model provokes a physician to ask what caused that person to be in the hospital. In a capitated environment, the provider asks, "Why is that child in the hospital to begin with?" Now providers are motivated to ask that question. What results is an alignment that says: *Do the right thing*.

Changing Provider Relationships. Many adult systems and medical groups in San Diego County who had had their own pediatric programs were turning them over to Children's. Increasingly, Children's was becoming the pediatric interlink of choice for most of the adult systems in the area. Norton ascribed this shift to "the work we have been doing in outcomes, customer service, attitude, openness, and responsiveness." These providers had, she believed, figured out that they could not afford to provide pediatric service, nor could they do it as comprehensively as a program devoted solely to pediatrics. She described a similar pattern emerging among medical groups.

> I can't think of a medical group in San Diego other than Kaiser-Permanente that has not made the choice, if not to turn over all their kids to Children's, at least to have Children's as their primary service provider for specialized children's health care. That was not true five years ago; probably 40 percent of medical groups did not use children's as their primary choice. In the last three months, we have even had three medical groups who used to be very staunch family practice provider groups, very independent, turn to us and say, 'We think our children ought to be with Children's—in the Children's system and not enrollees of our medical group.'

In short, Children's leadership believed absolutely that pathways and quality innovations had moved significant business to Children's, transformed its relationships with brokers, employers, and providers, and put it on the cusp of effecting larger breakthroughs with payers.

Computerized Physician Order Entry Business Case

At roughly $100,000, the costs of the CPOE module itself was a minor part of the total Information Management portion of the CPOE budget (Exhibit 18). Led by Rich Richards on the CPOE core team, and working with Nursing, Pharmacy, and other units, Information Management would have to integrate the new software module into Children's existing infrastructure. The core team would also lead the training and implementation process. Linda Macomber, RN, the other Information Management

member of the CPOE team, had a great deal of experience in setting up training for nurses and rolling out care documentation for them.

Exhibit 18. Computerized Physician Order Entry Budget (IT Portion)

Software modules	$105,000
Hardware	
Inpatient	$114,000
Outpatient	$158,200
Personnel (FTEs)	
Implementation Build (6 months)	$307,000
IT support (3 FTEs)	
Pharmacy, Nursing, Ancillary (2.35 FTEs)	
Development, Training, Support (ongoing)	$248,750
IT support (2.5 FTEs)	
Pharmacy, Nursing, Ancillary (2 FTEs)	
Other ongoing Costs	
Software	$15,750
Total, Year 1	$948,700
Start-Up IT Costs	$684,200
On-Going IT Costs	$264,500

Source: CHSD

Based on the costs that had been attributed to medication errors by various researchers, the Information Management portion of the project could potentially pay for itself in 16 months. One study estimated that medication errors cost $2,500 to $3,500 per bed/per year; in a 220-bed hospital such as Children's, that could add up to three-quarters of a million dollars. Another study, which surveyed literature on adverse drug events, suggested that $3,000 to $4,500 in additional costs could be expected for every medication error that caused harm. Another large teaching hospital spent $5 million dealing with adverse drug events in a recent year.

Many of the costs associated with medication errors were not highly visible, and had ripple effects throughout the system. One recent effort to categorize the cost of errors grouped them into three categories (legal, marketing, and operational), and subdivided each category by direct, indirect, and long-term costs (Exhibit 19). Billman believed that

the biggest share of costs were the hidden operational costs of the paper-based infrastructure, an issue that would have to be addressed by a number of electronic initiatives in addition to CPOE, most notably, by electronic medical records.

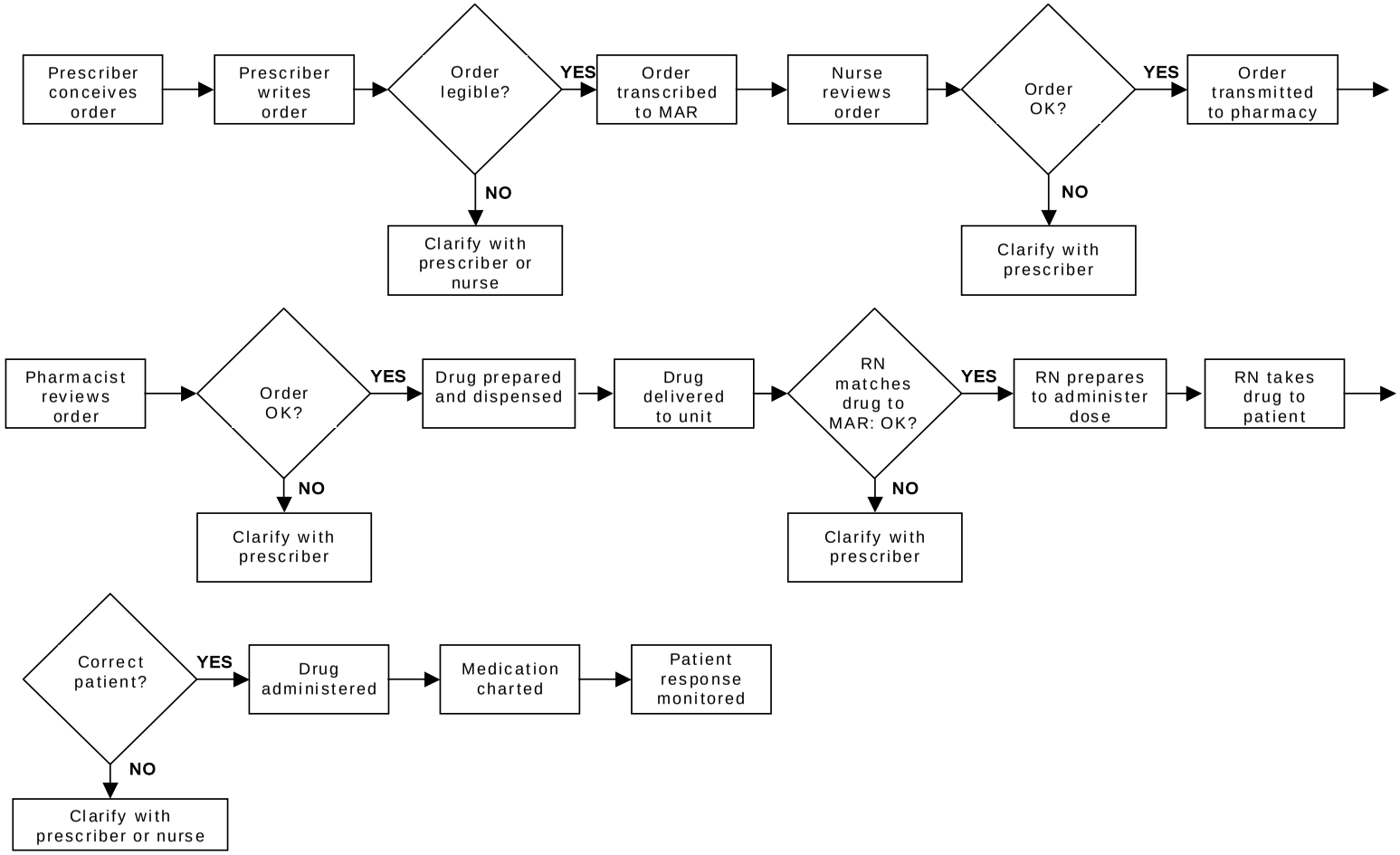
Exhibit 19. Categorizing Costs of Preventable Medical Errors: Two Cases

Category	Subcategory	Case 1	Case 2
Legal	Direct costs	Legal fees	Legal fees
		Award cost	Settlement costs
			Risk management time
	Indirect costs	Personnel for case defense	Reallocation of staff time in response to lawsuit
	Long-run costs	Increased sinking fund reqs	Higher malpractice premiums
Marketing	Direct costs	Market research	Advertising
		Containment efforts	New initiatives designed to promote quality
	Indirect costs	Adverse publicity	Adverse publicity
		Investment in new technology	Loss of referrals
	Long-run costs	Decreased staff morale	Loss of staff (& their patients)
		Diversion of resources to marketing effort	Loss of market share
Operations	Direct costs	Accreditation & reporting	Risk management time
		Provide time away from care	New processes of care
			Reallocation of staff time
	Indirect costs	Increased employee turnover	Decreased staff morale
		Decreased staff morale	Poor interdepartmental relationships
		New technology	
	Long-run costs	Change in availability of funds	Increased use of lab and radiology services

Source: William Weeks, Julia Waldron, Tina Foster, Peter Mills, Erik Stalhandske, "The Organizational Costs of Preventable Medical Errors," *Journal of Quality Improvement*, October 2001.

Handwritten orders were a major source of errors. Relatively few of such errors made it all the way through the hospital system to the patient. (Exhibit 20 diagrams a generic medication system, showing the myriad possibilities for error and potential changes to improve the safety of the system.) Independent of the costs associated with harm and errors, the paper ordering system had an entire infrastructure of costs and inefficiencies associated with it.

Exhibit 20. Generic Medication System



Leape LL, Kabcenell A, Berwick DM, Roessner J, *Breakthrough Series Guide: Reducing Adverse Drug Events*. Boston, MA: Institute for Healthcare Improvement; 1998.

Costs of Harm and Savings from Avoided Harm. At Kurtin's behest, Billman began looking into the costs associated with harm in the late fall of 2001, and thus begin the process of estimating the savings that could be expected from the CPOE system. Focusing on harm rather than on errors had advantages: actual events could be analyzed, and there was no doubt that such events were significant. Billman's approach approximated Coffman's ideal for cost-tracking, because he was working prospectively rather than retrospectively, tracking actual costs of specific events as they happened.

Some of the costs Billman tracked were the additional resources required to make a child well, such as hospital days, nursing care, additional medication doses (as well as medications needed to counteract the problem), equipment use, laboratory costs, litigation costs (with or without a settlement), remediation costs (e.g., training video and training costs/time), the time of the Quality Management investigator, and the time of the multidisciplinary medical staff review.

Interventions to prevent potential harm also carried a price tag that could be greatly reduced through CPOE. For example, the Pharmacy intervention program captured data on how long it took a pharmacist to rectify a problem; when multiplied by a pharmacist's wages, the cost of the intervention could be determined. If the CPOE did in fact eliminate the need for most of those interventions, those costs could be avoided and pharmacist's time would be freed up. This in turn would increase capacity—a major accomplishment considering it is difficult to get pharmacists to work in San Diego.

Infrastructure Costs. In theory, the costs associated with paper orders could be analyzed, and savings from CPOE could be projected. There could be potential savings in terms of reduced nursing time spent on paperwork, a critical issue since Children's has had difficulty hiring permanent nurses. There have been enormous costs associated with moving medical records around, a situation that is being addressed by the hospital's ongoing conversion to electronic records. Billman drew the picture, "For us to have—100 percent of the time—physician orders that are complete, legible, and signed, there are cost savings: we don't have to track the physician down, pull the record, and make sure the two meet."

Other Bankable Cost Savings. Bankable cost savings might also accrue from other CPOE benefits. For example, the decision-making support of the CPOE system might offer more effective choices of medications and thus entail lower costs. If, for example, a patient had a urinary tract infection and the lab revealed the presence of E coli, the choice of antibiotic could be guided by the resistance pattern of the bacteria rather than a physician's ability to remember all the possible treatments. Billman noted, "We need a

antibiotic that will cure the infection; we don't need to use the most advanced and expensive weapon in our arsenal when a peashooter would be just as effective." With 4,000 drugs in Children's formulary, some of which provide equivalent results but at different costs, the physician would have the option of choosing the lower-cost solution.

CONCLUSIONS

The project of which this case study is one part was intended to explore the business case for quality in health care settings. Quality pays off in industry, but does it also pay off in health care? If not, what are the systemic barriers? How do innovative health care systems manage the contradictions?

CPOE

Because CPOE is still in the planning stages at Children's Hospital of San Diego, it is too soon to draw conclusions about the business case for this quality improvement. However, Children's approach is likely to produce a CPOE system that is widely used and achieves its intentions of dramatically reducing medication errors, avoiding the costs of harm and intervention time/costs, and, in conjunction with other electronic initiatives, eliminating many inefficiencies of the paper system. How so?

CPOE at Children's is not the technology program-of-the-month, but an integral extension of its systematic work on outcomes and safety—work that has seeped into the bones of the operating processes through which Children's delivers care and, to a considerable extent, transformed its culture (Exhibit 21). CPOE requirements are being systematically developed through Children's analytical approach to errors and harm, and Children's has taken an early adopter stance to ensure those requirements are met by the vendor's product.

Although we do not have much data, CPOE lends itself to something that approximates a traditional business case analysis *because its calculus is purely internal:* the costs of doing harm versus the costs of investing in CPOE and changing to a computerized system.

Pathways. When, however, we look at the larger picture—what happens financially when Children's reduces the variance in cost and quality through clinical pathways—we see an altogether different story *because the outcome benefits are disconnected from rates and payment methods*. Given 76 percent per diem payers at low rates, the net financial results of pathways is for Children's to lose millions of dollars yearly in revenues. Under the current payment and rate structure, a conventional business case cannot be made.

For pathways to be economically viable, its benefits must be reflected in reimbursement. This means changing payment methods, creating new models, increasing rates, and broadening the scope of coverage for prevention and aftercare (e.g., home care, patient and family education, and medication coordination).

Lens for Assessment. Is a traditional, micro-level, mechanistic economic analysis an appropriate or adequate lens through which to assess the economic impact of pathways and outcomes? Absolutely not. The real outcomes story is playing out at a much larger scale and needs to be viewed through a holistic lens:

- Reduced length of stay enhances organizational capacity, which generates new business and marketing opportunities.

- Children's is changing/creating dialogues with brokers, employers, and payers in which:

  - brokers influence small employer decision-making towards Children's;
  - brokers and large employers may lean on payers to split gains (so that providers benefit financially from gains they produce when insurers increase rates to employers); and
  - new models and types of contracts may be co-created with payers and employers.

- Children's work in outcomes is creating the basis of partnering relationships with adult providers.

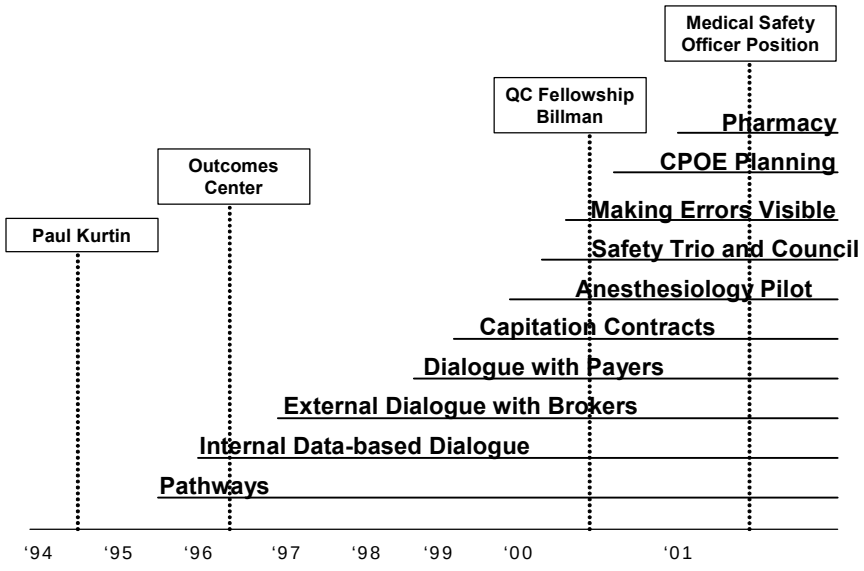
The dialogue Children's is orchestrating and the new relationships it is forging are the fabric from which a new kind of business model can arise. This fabric has been woven both by the internal transformation of Children's and how it delivers care—a transformation whose engine is the clinical pathways.

But, in order for Children's quality improvements to be rewarded rather than penalized, sustained for the long term rather than crushed by survival needs, and in order for this new business model to become a reality, payers must not only come to the table, but also sit on the same side of the table. Payers need to come ready for dialogue rather than confrontation, and be ready to explore innovative models in which providers share in the gains that they generate, payers invest in the research and development of new

business and education models, and coverage extends beyond the hospital location and beyond procedures to parent education and medication coordination.

Children's is unusual in its proactive orchestration of a network of players. It has done a remarkable job of opening the doors to a new paradigm. But the enormity of the paradigm shift that needs to take place must be driven from the top as well as from the side, at the Medicare and Medicaid policy and practice level. Otherwise, places like Children's will remain the exception rather than the rule, and innovations and quality improvement will not become standard.

Exhibit 21. Context Viability of CPOE at Children's



Source: Authors' analysis.

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#620 *Smallpox Vaccinations: The Risks and the Benefits* (April 2003, Web publication). Rena Conti. Prepared for the 2003 Commonwealth Fund/John F. Kennedy School of Government Bipartisan Congressional Health Policy Conference, this issue brief argues that offering voluntary smallpox vaccinations to the public presents benefits that must be weighed against associated medical, logistic, and economic risks. Policymakers must navigate complex tensions between scientific and political uncertainty, and between the government's role in protecting its citizenry while guaranteeing individuals' rights to self-determination.

#619 *The Nursing Workforce Shortage: Causes, Consequences, Proposed Solutions* (April 2003, Web publication). Patricia Keenan. Prepared for the 2003 Commonwealth Fund/John F. Kennedy School of Government Bipartisan Congressional Health Policy Conference, this issue brief argues that projected long-term nursing shortages will create still greater cost and quality challenges, and that without increased payments from public or private purchasers, health care institutions will most likely have to make tradeoffs between investing in staffing and pursuing other quality-improvement efforts.

#615 *Balancing Safety, Effectiveness, and Public Desire: The FDA and Cancer* (April 2003, Web publication). Rena Conti. Prepared for the 2003 Commonwealth Fund/John F. Kennedy School of Government Bipartisan Congressional Health Policy Conference, this issue brief discusses the challenges the FDA faces in balancing the need to ensure that cancer drugs are safe and effective against pressure to make therapies available quickly.

#614 *The Business Case for Tobacco Cessation Programs: A Case Study* (April 2003, Web publication). Artemis March, The Quantum Lens. This case study looks at the business case for a smoking cessation program that was implemented through the Group Health Cooperative (GHC), a health system and health plan based in Seattle.

#613 *The Business Case for Pharmaceutical Management: A Case Study* (April 2003, Web publication). Helen Smits, Barbara Zarowitz, Vinod K. Sahney, and Lucy Savitz. This case study explores the business case for two innovations in pharmacy management at the Henry Ford Health System, based in Detroit, Michigan. In an attempt to shorten hospitalization for deep vein thrombosis, Henry Ford experimented with the use of an expensive new drug, low molecular weight heparin. The study also examines a lipid clinic that was created at Henry Ford to maximize the benefit of powerful new cholesterol-lowering drugs.

#612 *The Business Case for a Corporate Wellness Program: A Case Study* (April 2003, Web publication). Elizabeth A. McGlynn, Timothy McDonald, Laura Champagne, Bruce Bradley, and Wesley Walker. In 1996, General Motors and the United Auto Workers Union launched a comprehensive preventive health program for employees, LifeSteps, which involves education, health appraisals, counseling, and other interventions. This case study looks at the business case for this type of corporate wellness program.

#611 *The Business Case for Drop-In Group Medical Appointments: A Case Study* (April 2003, Web publication). Jon B. Christianson and Louise H. Warrick, Institute for Healthcare Improvement. Drop-In Group Medical Appointments (DIGMAs) are visits with a physician that take place in a supportive group setting, and that can increase access to physicians, improve patient satisfaction, and increase physician productivity. This case study examines the business case for DIGMAs as they were implemented in the Luther Midelfort Mayo System, based in Eau Claire, Wisconsin.

#610 *The Business Case for Diabetes Disease Management at Two Managed Care Organizations: A Case Study* (April 2003, Web publication). Nancy Dean Beaulieu, David M. Cutler, Katherine E. Ho, Dennis Horrigan, and George Isham. This case study looks at the business case for a diabetes disease management program at HealthPartners, an HMO in Minneapolis, Minnesota, and Independent Health Association, an HMO in Buffalo, New York. Both disease management programs emphasize patient and physician education, adherence to clinical guidelines, and nurse case management.

Hospital Disclosure Practices: Results of a National Survey (March/April 2003). Rae M. Lamb, David M. Studdert, Richard M. J. Bohmer, Donald M. Berwick, and Troyen A. Brennan. *Health Affairs,* vol. 22, no. 2. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845, www.healthaffairs.org.

The Business Case for Quality: Case Studies and An Analysis (March/April 2003). Sheila Leatherman, Donald Berwick, Debra Iles, Lawrence S. Lewin, Frank Davidoff, Thomas Nolan, and Maureen Bisognano. *Health Affairs,* vol. 22, no. 2. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845, www.healthaffairs.org.

#606 *Health Plan Quality Data: The Importance of Public Reporting* (January 2003). Joseph W. Thompson, Sathiska D. Pinidiya, Kevin W. Ryan, Elizabeth D. McKinley, Shannon Alston, James E. Bost, Jessica Briefer French, and Pippa Simpson. *American Journal of Preventive Medicine,* vol. 24, no. 1 (*In the Literature* summary). The authors present evidence that health plan performance is highly associated with whether a plan publicly releases its performance information. The finding makes a compelling argument for the support of policies that mandate reporting of quality-of-care measures.

#578 *Exploring Consumer Perspectives on Good Physician Care: A Summary of Focus Group Results* (January 2003, Web publication). Donna Pillittere, Mary Beth Bigley, Judith Hibbard, and Greg Pawlson. Part of a multifaceted Commonwealth Fund-supported study, "Developing Patient-Centered Measures of Physician Quality," the authors report that consumers can understand and will value information about effectiveness and patient safety (as well as patient-centeredness) if they are presented with information in a consumer-friendly framework.

#563 *Escape Fire: Lessons for the Future of Health Care* (November 2002). Donald M. Berwick. In this monograph, Dr. Berwick outlines the problems with the health care system—medical errors, confusing and inconsistent information, and a lack of personal attention and continuity in care—and then sketches an ambitious program for reform.

Achieving and Sustaining Improved Quality: Lessons from New York State and Cardiac Surgery (July/August 2002). Mark R. Chassin. *Health Affairs,* vol. 21, no. 4. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845. Available online at http://www.healthaffairs.org/readeragent.php?ID=/usr/local/apache/sites/healthaffairs.org/htdocs/Library/v21n4/s8.pdf.

Improving Quality Through Public Disclosure of Performance Information (July/August 2002). David Lansky. *Health Affairs,* vol. 21, no. 4. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845. Available online at http://www.healthaffairs.org/readeragent.php?ID=/usr/local/apache/sites/healthaffairs.org/htdocs/Library/v21n4/s9.pdf.

Factors Affecting Response Rates to the Consumer Assessment of Health Plans Study Survey (June 2002). Alan M. Zaslavsky, Lawrence B. Zaborski, and Paul D. Cleary. *Medical Care,* vol. 40, no. 6. Copies are available from Paul D. Cleary, Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, Massachusetts 02115, E-mail: cleary@hcp.med.harvard.edu.

#539 *Improving Health Care Quality: Can Federal Efforts Lead the Way?* (April 2002). Juliette Cubanski and Janet Kline. This issue brief, prepared for the 2002 Commonwealth Fund/Harvard University Bipartisan Congressional Health Policy Conference, discusses the ways in which various federal agencies can work to improve health care quality for all Americans. Available online only at www.cmwf.org.

#535 *Assessing the Threat of Bioterrorism: Are We Ready?* (April 2002). Patricia Seliger Keenan and Janet Kline. This issue brief, prepared for the 2002 Commonwealth Fund/Harvard University Bipartisan Congressional Health Policy Conference, examines federal preparedness, state and local infrastructure, congressional actions to improve preparedness, and regulatory and legal policies regarding the threat of bioterrorism in the United States. Available online only at www.cmwf.org.

#534 *Room for Improvement: Patients Report on the Quality of Their Health Care* (April 2002). Karen Davis, Stephen C. Schoenbaum, Karen Scott Collins, Katie Tenney, Dora L. Hughes, and Anne-Marie J. Audet. Based on the Commonwealth Fund 2001 Health Care Quality Survey, this report finds that many Americans fail to get preventive health services at recommended intervals or receive substandard care for chronic conditions, which can translate into needless suffering, reduced quality of life, and higher long-term health care costs.

#520 *Quality of Health Care in the United States: A Chartbook* (April 2002). Sheila Leatherman and Douglas McCarthy. This first-of-its-kind portrait of the state of health care quality in the United States documents serious gaps in quality on many crucial dimensions of care: lack of preventive care, medical mistakes, substandard care for chronic conditions, and health care disparities. The chartbook is based on more than 150 published studies and reports about quality of care.

A 58-Year-Old Woman Dissatisfied with Her Care, Two Years Later (March 27, 2002). Anne-Marie Audet and Erin Hartman. *Journal of the American Medical Association,* vol. 287, no. 12. Copies are available from Anne-Marie Audet, M.D., The Commonwealth Fund, 1 East 75th Street, New York, NY 10021-2692, E-mail: ama@cmwf.org.

Delivering Quality Care: Adolescents' Discussion of Health Risks with Their Providers (March 2002). Jonathan D. Klein and Karen M. Wilson. *Journal of Adolescent Health,* vol. 30, no. 3. Copies are available from Jonathan D. Klein, Strong Children's Research Center, Division of Adolescent Medicine, Department of Pediatrics, University of Rochester School of Medicine and Dentistry, 601 Elmwood Avenue, RM 4-6234, Rochester, NY, Tel: 585-275-7660, E-mail: jonathan_klein@urmc.rochester.edu.

#503 *Accessing Physician Information on the Internet* (January 2002). Elliot M. Stone, Jerilyn W. Heinold, Lydia M. Ewing, and Stephen C. Schoenbaum. In this field report, the authors analyzed 40 websites that offer information about physicians. Finding many instances where websites had incomplete, missing, and possibly inaccurate or outdated data, the authors conclude that health care accrediting organizations, health plans, hospitals, and local and national industry organizations and

associations should make efforts to improve the information on the Internet, saying that it is a potential valuable tool for consumers.

#528 *The APHSA Medicaid HEDIS Database Project* (December 2001). Lee Partridge, American Public Human Services Association. This study (available on the Fund's website only) assesses how well managed care plans serve Medicaid beneficiaries, and finds that while these plans often provide good care to young children, their quality scores on most other measures lag behind plans serving the commercially insured.

For-Profit and Not-for-Profit Health Plans Participating in Medicaid (May/June 2001). Bruce E. Landon and Arnold M. Epstein. *Health Affairs,* vol. 20, no. 3. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845, www.healthaffairs.org.

Improving Quality, Minimizing Error: Making It Happen (May/June 2001). Elise C. Becher and Mark R. Chassin. *Health Affairs,* vol. 20, no 3. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845, www.healthaffairs.org.

#456 *A Statistical Analysis of the Impact of Nonprofit Hospital Conversions on Hospitals and Communities, 1985–1996* (May 2001). Jack Hadley, Bradford H. Gray, and Sara R. Collins. In this study, the authors analyze the effects of private, nonprofit hospital conversions that occurred between 1985 and 1993 by comparing converting hospitals to a control group of statistically similar private nonprofit hospitals that were estimated to have a high probability of conversion, but did not convert over the observation period. The report is available online only at www.cmwf.org.

#455 *The For-Profit Conversion of Nonprofit Hospitals in the U.S. Health Care System: Eight Case Studies* (May 2001). Sara R. Collins, Bradford H. Gray, and Jack Hadley. This report examines the 87 for-profit conversions of nonprofit hospitals in the years 1985–1994, more than one-third of which took place in three states, and nearly half of which were in the Southeast. The report is available online only at www.cmwf.org.

Measuring Patients' Expectations and Requests (May 1, 2001). Richard L. Kravitz. *Annals of Internal Medicine,* vol. 134, no. 9, part 2. Copies are available from Richard L. Kravitz, Center for Health Services Research in Primary Care, University of California, Davis, 4150 V Street, PSSB Suite 2500, Sacramento, CA 95817, E-mail: rlkravitz@ucdavis.edu.

Current Issues in Mental Health Policy (Spring 2001). Colleen Barry. *Harvard Health Policy Review,* vol. 2, no. 1. Adapted from an issue brief prepared for the John F. Kennedy School of Government/Commonwealth Fund Bipartisan Congressional Health Policy Conference in January 2001. Available online at http://hcs.harvard.edu/~epihc/currentissue/spring2001/barry.html.

Health Plan Characteristics and Consumers' Assessments of Quality (March/April 2001). Bruce E. Landon et al. *Health Affairs,* vol. 20, no. 2. Copies are available from *Health Affairs,* 7500 Old Georgetown Road, Suite 600, Bethesda, MD 20814-6133, Tel: 301-656-7401 ext. 200, Fax: 301-654-2845, www.healthaffairs.org.

Patient Safety and Medical Errors: A Road Map for State Action (March 2001). Jill Rosenthal and Trish Riley. Copies are available from the National Academy for State Health Policy, 50 Monument Square, Suite 502, Portland, ME 04101, Tel: 207-874-6524, Fax: 207-874-6527. Available online at www.nashp.org/GNL37.pdf.

#446 *The Quality of American Health Care: Can We Do Better?* (January 2001). Karen Davis. In this essay—a reprint of the president's message from the Fund's *2000 Annual Report*—the author looks at health care quality: how to define it, how to measure it, and how to improve it.

Envisioning the National Health Care Quality Report (2001). Committee on the National Quality Report on Health Care Delivery, Institute of Medicine. Copies are available from the National Academy Press, 2101 Constitution Avenue, NW, Box 285, Washington, DC 20055, Tel: 800-624-6242, E-mail: www.nap.edu.