



RICHARD M. J. BOHMER

AMY C. EDMONDSON

LAURA R. FELDMAN

Intermountain Health Care

In 2002, Dr. Brent James, executive director of Intermountain Health Care's (IHC's) Institute for Health Care Delivery Research, explained to a group of clinical leaders that the more physicians and nurses complied with IHC's Clinical Integration care delivery protocols, the more patient-care quality improved, "Evidence-based, standardized care leads to better results." One nurse appeared reluctant and expressed the commonly held view that each patient was unique and could not be treated in an assembly line manner, "We're not making widgets here!" James countered, "Oh yes we are!"

Clinical Integration was IHC's approach to delivering care. It referred to both an organizational structure and a set of tools. It involved administrative and medical staff working together to implement a system of gathering, storing, and making accessible detailed medical data on each patient and then analyzing that data across all patients to create decision support tools (protocols) that helped medical providers determine the best medical interventions for each patient and also increase efficiencies. It was designed to "Make it easy to do it right." Whenever a patient exhibited defined medical symptoms, medical personnel could turn to a protocol for specific guidance on how to treat that patient.

Even though no one was required to adhere strictly to the protocols, critics called them a Taylorist¹ system that stripped away the autonomy of those who practiced the craft of medicine. James acknowledged that following the protocols increased the interdependence between the physician and the health care team, but believed that Clinical Integration was a crucial component of IHC's affordable and high quality clinical care. James reflected:

While many of the physicians directly employed by IHC have accepted Clinical Integration, the big strategic issue I face is how to bring the affiliated [non-employee] physicians on board. Some of them hate the protocols because they see them as a loss of traditional physician autonomy, prestige, power, and income. I can protect their money, but their autonomy will shift from the individual level to the professional level. To change, they have to be willing to function as part of a group.

¹ Referring to the ideas of Frederick Taylor, author of *The Principles of Scientific Management* (1911). Taylor had a profound influence on U.S. manufacturing practices, preferring discrete, highly controlled tasks to the craft-based practices that had preceded the assembly line. An analogous phrase to Taylorism in medical practice is the derogatory "cookbook medicine."

Professors Richard M. J. Bohmer and Amy C. Edmondson, and Research Associate Laura R. Feldman prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

Copyright © 2002, 2006, 2013 President and Fellows of Harvard College. To order copies or request permission to reproduce materials, call 1-800-545-7685, write Harvard Business School Publishing, Boston, MA 02163, or go to www.hbsp.harvard.edu/educators. This publication may not be digitized, photocopied, or otherwise reproduced, posted, or transmitted, without the permission of Harvard Business School.

Intermountain Health Care: Structure

IHC was created in 1975 in Utah as a secular, non-profit organization that owned a group of 15 hospitals formerly affiliated with the Church of Jesus Christ of Latter-Day Saints (LDS). In 1983, IHC entered the health insurance business: its care provider business became known as IHC Health Services while its insurance business became IHC Health Plans. By 2002, IHC Health Services was a vertically integrated health care organization that regularly earned top awards in its industry. It had 22 hospitals, 25 health centers, and over 70 outpatient clinics, counseling centers, and other offices, located across Utah and southeastern Idaho. IHC Health Plans was the largest insurer in the state.² (**Exhibit 1** describes IHC's insurance business and **Exhibit 2** provides Utah demographic data.)

Information technology

IHC was nationally recognized for its information systems, the backbone of which was the Health Evaluation through Logical Processing system (HELP) for inpatient care, and Clinical Workstation (CW) for use in outpatient clinics and physician offices.³ HELP was a clinical information system conceptualized in the 1960s as an automated diagnostic tool. Over time, the system evolved to provide clinical decision support. In the 1970s, pharmacists entered prescriptions into the system to screen for drug interactions. In the 1990s, an electronic medical record (EMR) was introduced, enabling patient monitoring, surgery scheduling, and transcription; and Antibiotic Assistant, one of several clinical-decision support modules built within HELP, could essentially "read" a patient's medical history and suggest appropriate antibiotics and dosage schedules. In 2001, IHC added Results Review, a function that gave physicians online access to appointment books, patient consult notes and charts, and laboratory results. By 2001, the EMR allowed users to perform structured queries and in three clicks of the mouse go from reviewing a patient's clinical data to the pertinent medical literature. In 2001, the system featured 18,000 workstations and 16,000 clinical users. (See **Exhibit 3** for a diagram of IHC's information system.)

Regions

IHC Health Services was organized into four regions: Urban North, Urban Central, Urban South, and Rural. Each urban region was centered around a large "collector" hospital, with a series of smaller feeder hospitals and outpatient facilities. Each urban region coordinated with geographically associated rural region facilities. Regions were led by a regional vice president, a team of medical hospital directors, and a team of medical directors representing the facility-based physician groups. Regional senior management teams included a chief medical officer, medical directors from each of the Clinical Integration Clinical Programs, and staff with financial and data management expertise.

Physician Rings

Professional staff at IHC Health Services were arranged in three rings. Ring 1 had approximately 1,200 primary care and specialist physicians – 400 of whom were salaried IHC employees (60% of the

² IHC's vision promised, "The best clinical practice delivered in a consistent and integrated way; lowest appropriate cost to the population we serve; a service experience, supported by systems and processes, that focuses on the patient and enrollee; a genuine caring and concern in our interactions with patients, enrollees, families, and one another."

³ When first introduced, hospital computing systems primarily served billing and financial functions; clinical computing systems, which manage medical data, were much less common. The HELP system at IHC was a pioneer in this field.

400 were PCPs) working in IHC's Physician Division. In 2001, the Physician Division had 1,457,000 outpatient encounters and accounted for about half of all outpatient and inpatient care delivered within IHC. The remaining 800 Ring 1 physicians were not IHC employees, but 80% of this group's patients were insured by IHC Health Plans or received care at IHC institutions. Nearly 95% of all patients (inpatient and outpatient) treated at IHC facilities were under the care of one of the 1,200 Ring 1 physicians. Ring 2 was a small group of 50–100 "splitter" physicians, who derived between 40% and 60% of their work from IHC-associated patients. Ring 3 had 1,500 physicians who were only loosely associated with IHC and only occasionally treated IHC-insured patients.

Physician groups—most often multi-specialty clinics—had formed within the Physician's Division. The two largest groups employed about 150 Physician Division physicians. There were half a dozen groups in 2002, but IHC anticipated more would form in the future.

IHC Health Services contracted out to other insurers who were too small to create their own physician network. A subset of tightly aligned, independent insurance plans, accounting for more than 500,000 additional enrollees, used IHC's facilities and physician networks almost exclusively.

Compensation

The compensation structure for employed physicians was divided into four parts: salary (30%), Fee For Service (FFS) payments (40%–50%), a performance-based bonus (10%); and profit sharing. Although specific criteria for the bonus varied from group to group (i.e., clinic to clinic), it generally reflected group-level financial performance and clinical quality indicators. The fourth component, "profit sharing" for overall organizational profitability, sometimes bumped physician salaries above 100%. The 800 affiliated physicians were paid by a discounted FFS system and did not have performance incentives. None of the 1,200 physicians worked under capitation.

Governance

In 1993, IHC invited physicians to participate more fully in the operation and governance of the organization. Half of the 28 members of the board of trustees were selected from Ring 1 physicians; the remaining seats were occupied by volunteer members of the community and IHC senior management. In addition, about 300 community members served on the boards of local facilities.

Brent James, MD, M.Stat

Brent James, a surgeon and biostatistician, was executive director of IHC's Institute for Health Care Delivery Research (the Institute) and served as IHC's vice president for Medical Research and Continuing Medical Education. James came to IHC in 1986 from the Harvard School of Public Health, where he had taught biomedical computing and biostatistics, because he believed IHC had one of the finest data systems in the country. Presented with the task of leading a clinical research program at IHC, James became intrigued by the quality of health care services.

The Institute—employing 15 staff, roughly one-half of whom were biostatisticians and analysts—was founded in 1990 to support James' work around organizing for clinical management. It was co-located with IHC senior administration in Salt Lake City. The Institute was a hub for internal research on the management of clinical medicine. Another arm of the Institute ran 2-, 9-, and 20-day training sessions on quality management and clinical quality improvement for physicians and health care

system administrators within IHC and from around the world. James' calendar was always booked: in addition to conducting research, honoring speaking engagements, and serving on several leading national task forces on health care quality, he facilitated all the classes offered by the Institute.

History of Clinical Care Management at IHC

IHC changed its approach to clinical-care management in 1995 when then IHC executive vice president Bill Nelson (Nelson became CEO in 1999) challenged James to fuse his "science projects" – Nelson's pet term for the proliferation of clinical and managerial quality improvement projects across IHC—into a comprehensive clinical management model. James explained, "This was a sentinel moment, when we realized that our business was clinical medicine. A big hindrance to quality improvement was you tended to get silo projects that didn't spread." Clinical process management would replace the previous piecemeal approach to improvement in health care delivery.

Early Interest in Quality Improvement

IHC had begun to tinker with the concept of clinical-care management in 1986, with a series of investigations aimed at examining variation in clinical practice. James attended a lecture by Dr. W. Edwards Deming, known as the father of TQM, who introduced a "crazy" idea: higher quality could lead to lower cost.⁴ James tested Deming's idea in pre-existing IHC clinical trials: "We just started to add cost outcomes to our traditional clinical trials and proved it true within a few months." James realized that it was due to a "godsend" that he was able to collect cost outcomes: in the early 1980s two IHC managers had decided they needed to measure the cost of clinical care. The pair built an activity-based cost accounting system and implemented it across all facilities in the IHC system. James was able to attach costs to individual clinical activities and then build a cost profile of different strategies for managing a particular clinical condition.

Senior management within IHC felt they could realize Deming's maxim by allowing their physician population to self-manage. In 1986, Dr. Steve Lewis, IHC's senior vice president for medical affairs, formed The Great Basin Physician Corporation, similar to a Preferred Provider Organization (PPO), for community physicians within IHC. According to James, the model's emphasis on self-governance and protocols for care "helped pull the physicians together, but it never really materialized. It sort of died quietly on its own."

The quality movement In 1991, IHC CEO Scott Parker sent around a memo with the subject line "Is quality improvement important for IHC?" Eighty percent of the respondents, representing IHC's top 200 managers, said "Yes." Parker asked James to conduct a special session of the IHC Facilitator Workshop Series (totaling 8 days over 4 sessions) for the top 40 managers in IHC. Parker mandated attendance and was present himself in all sessions. James presented a concept (e.g., the use of protocols to control care delivery, how service quality affected the business, and models of leadership and participation) and then opened the floor for discussion. He said to the group: "Here's a central concept. Does it apply to IHC? How would it look as it plays out within IHC? What things would we need in place?" Later, James commented, "We never reached any formal conclusions. But it's fair to say that the shared vision that we came away with from that series of meetings has informed our decision making ever since."

⁴ Deming (1900–1994) founded Total Quality Management (TQM); a widely used method of statistical process control to ensure consistency in production industries. He was credited for invigorating the Japanese economy following WWII.

The clinical counterpart to the Facilitator Workshop Series, developed in 1992, offered senior physician leadership the opportunity to learn about clinical quality improvement. Participants in the 20-day, biannual Advanced Training Program in Health Care Delivery Improvement (ATP) workshops were required to do a clinical-improvement project, such as implementation of an evidence-based best practice protocol for diabetes or reduction of wound infections in surgical cases. James explained, “ATP drew in the early adopters. Physicians and nurses would come out of the ATP as absolute quality zealots, convinced that this was something the profession needed to do.”

The project phase Enthusiasm for clinical management swelled between 1992 and 1995 and thousands of improvement projects were undertaken to reduce costs and solve facilities-management problems. In 1995, James identified 65 clinical protocols that had been developed and implemented. These produced about \$20 million in net annual savings in a clinical operating budget of about \$1.5 billion, as well as significant gains in clinical quality. (See **Exhibit 4**).

Developing the Strategic Plan – Clinical Integration

In 1993, IHC made a second attempt at developing physician self-management when it tried to establish a clinical management structure by hiring physician leaders and providing them with management tools. It spent several million dollars, but made little progress. James reflected, “We found physicians willing to manage, trained them, gave them the financial data we used for the administrative operations, and asked them to go manage physicians. But we failed because it was the wrong data. It was financial data organized for facilities management, but without the associated clinical detail.”

James felt that in order to build a successful clinical management system there had to be an overarching guidance structure. He approached Dr. David Burton, IHC’s vice president for Health Care Delivery Research, and began to form a strategic quality plan for IHC. James continued, “The key to engaging physicians in clinical management is aligning data collection to work processes. This represented a pivotal shift in mental model and in practice. Managers think in terms of cost-per-facility [e.g., an intensive care unit]. By contrast, physicians think in terms of tests and treatments required for a specific condition.” He added: “You manage what you measure . . . Doctors manage patients, not money. The data [that we provided them] didn’t have anything to do with those tasks.

Families of care The strategic plan developed by Burton and James organized IHC Health Services into four areas: clinical conditions, clinical support services, service quality (internally referred to as Patient Perceptions of Quality), and administrative support processes.

When looking at clinical conditions, Burton and James used four criteria to identify the key work processes and medical conditions for which protocols should be developed: patient volume, intensity of care (cost per day), variability, and what were termed “socially important conditions” (e.g., conditions common in ethnic minorities and women). They found that 62 of over 600 clinical work processes accounted for 93% of inpatient clinical volume and about 30 processes comprised about 85% of outpatient clinical volume. They grouped these most common Diagnosis Related Groups (DRGs) for which hospitals sought third-party payment⁵ into “families of care” and named the resulting set of clinical-process-based families “Clinical Programs.” Burton and James identified eight Clinical Programs for hospital-based procedures, then added a ninth (the Primary Care Clinical

⁵ DRGs, or Diagnosis Related Groups, were standard codes used by health care providers for billing purposes. Developed for use by Medicare in 1983, DRGs represented prospective payment based on diagnosis (regardless of resources actually utilized), assuming a given diagnosis would require a basic packet of resources, tests, and days in the hospital.

Program) to cover the 30 conditions most commonly managed in the outpatient setting. Each Clinical Program comprised a series of high-priority, tightly related clinical-care processes. For example, the nine most common clinical treatment processes performed in the Cardiovascular (CV) Clinical Program represented 18.5% of IHC's inpatient and out-patient expenditures in 1997. (See **Exhibit 5** for a list of the eight clinical programs, as well as the CV clinical processes.)

The strategic plan used a similar method to identify key work processes in the other three areas. For example, Clinical Support Services included work processes such as pharmacy operations, surgical and obstetric rooms, imaging, and nursing units. Respiratory therapy, for example, was found to have five key processes (among the more than 40 routinely performed), which accounted for more than 90% of all work performed by that group.

The strategic plan, called "Clinical Integration," was approved by the IHC board of trustees in 1996 and represented a major shift for IHC. Its aim was to establish quality (defined as process management with measured outcomes) as IHC's core business approach and to extend full management accountability to IHC's clinical functions.

The plan unfolded over the next four years. In 1997, Burton and James tested whether it was practical to build clinical-outcomes-tracking data systems. In 1998, they began to use outcomes data to hold both employed and affiliated physicians accountable for their clinical performance and to enable IHC to set and achieve clinical improvement goals. In 1999, they aligned financial incentives. To avoid passing on all the savings generated by clinical improvement to the payers, Burton and James developed strategies to retain part of those savings within IHC Health Services thereby making clinical management financially stable. Finally, in 2000, the board of trustees instructed IHC's senior management to roll Clinical Integration out across all operational functions.

Change Infrastructure

To facilitate the transition from a traditional management structure focused on managing the facilities within which clinical care took place, to one oriented around clinical quality and clinical processes, Burton and James built a clinical administrative structure to be the clinical counterpart of the administrative structure at each level in the organization.

Clinical-Care Management

Guidance Councils In 1998, IHC began creating Guidance Councils for its Clinical Programs to coordinate program goals, management strategies, and data collection across an integrated system. The Guidance Councils were built around physician/nurse leadership dyads based in IHC's three urban regions. In each region, a Clinical Program physician leader was selected from practicing physicians. IHC bought one-quarter of their time for Clinical Program leadership activities, and provided additional training in quality management, leadership, and financial skills. A full-time nurse manager dealt with routine administrative matters and linked to clinical staff. The dyads had two major responsibilities: meeting with clinical-care delivery groups and meeting with line administrative management structures. Monthly Guidance Council meetings always included a report on current level of performance, progress towards meeting clinical goals, and the identification of barriers towards realizing the goals. (For more details on program governance see **Exhibit 6**.)

Development Teams Within each of the Guidance Councils were one or more permanent Development Teams.⁶ Development teams created protocols, sent them to front lines for implementation, data collection, and review, and updated them as new information became available. (See **Exhibit 7** shows one such protocol.)

Each Development Team comprised a physician leader, nurse, physician team members drawn from front-line care deliverers who would actually implement any protocols the team developed, and a “core work group” of three or four expert physicians dedicated to following research around that specific key clinical process. IHC reimbursed all Development Team members for time spent working on the team. (Many members were affiliated physicians.) IHC also supplied staff support for the development teams to: (1) help design outcomes tracking systems (with assistance from the Institute’s statisticians, as well as representatives from IHC’s Electronic Data Warehouse group), using a set of formal design tools; (2) generate educational materials for professionals and for patients; (3) design and implement electronic medical record and clinical decision support systems; and (4) plan and support operational implementation at the front line.

Specialist physicians serving on core work groups had salaried time to fill three specific roles: (1) provide expertise to develop the initial evidence-based best practice protocol; (2) keep the protocol current over time by applying new findings from the medical literature, from similar physician groups in other institutions, and by closely tracking and leading discussions based on IHC’s internal outcome and protocol variation data; (3) train front-line physicians on “state of the art care” for their particular protocols; and (4) operate a specialty clinic for patients who could not be well-managed within the primary care setting.

Similar to the work performed by the Development Teams, processes occurring within the clinical support services (laboratories, etc.) were also analyzed, standardized, and specified.

Protocol development James identified three sources of ideas for developing and updating protocols: the medical literature, variance in outcomes data, and “spontaneous neat ideas.” In the first situation, for example, the Development Team for cardiovascular care searched the medical literature and guidelines published by professional societies and found that IHC’s rates of appropriate use of discharge medications for cardiovascular disease were better than the national average, but still well below theoretic perfect performance of 100%. In response, the CV team created a check sheet with indications and contraindications for patient discharge medications that led to significant improvement. (See **Exhibit 8** for improvement rates.)

In the second situation, Development Teams would look for statistically significant patterns of variance in process and outcome for opportunities to improve the protocols. For example, an IHC physician recognized that different physicians chose one of two antibiotics to treat Community Acquired Pneumonia (CAP). The team conducted a literature review and found the two drugs worked equally well. Dissatisfied with the medical literature, the team launched a randomized controlled trial and found improved outcomes were associated with one of the drugs. It then rewrote the protocol to make that drug the default antibiotics for treating CAP.

Finally, as James explained, “Sometimes people just come up with a neat idea.” James cited Dr. Alan Morris as an example: “Morris has all sorts of hunches that he tests. His ICU is a little learning lab. At one point he had three trials running, all using a standard protocol as a control.”

⁶ For example, the Primary Care Clinical Program had 10 Development Teams including Diabetes, Adult Asthma, Pediatric Asthma, and Congestive Heart Failure and Ischemic Heart Disease (both also part of the Cardiovascular Clinical Program).

To assess the effectiveness of protocols and other clinical management strategies, James and his colleagues developed an outcomes tracking system. Starting with key clinical processes, they iteratively refined them to identify the most pertinent measures. They took care to develop a set of balanced measures, including medical outcomes, patient perceptions, service quality, and cost. (See **Exhibit 9** for an example of outcomes tracking for CAP.) The first two Guidance Councils, created on a pilot basis, allowed James and Burton to test the Guidance Council structure for organizing families of care, developing flow charts, setting annual clinical goals (each focused on one aspect of care), and gathering data on current practice while simultaneously working to standardize and improve it.

Integrated Management Structure

Having built a new clinical management structure parallel to the existing administrative structure, James planned to merge the two over time. His strategy was to encourage interdependence so the groups would realize “they have to be joined at the hip.” Both branches of the parallel structure reviewed clinical goals and assessed outcome data according to their level of focus (i.e., individual physician, physician group, or region; **Exhibit 10** provides more detail). James continued, “We give the two structures tight links and shared goals and then let them collapse together, into a single structure. We hope that over time they will experience and see the redundancy and ask themselves, “Why are we holding two meetings?” and merge of their own accord.”

IHC’s integrated management structure was cemented in 1998 when the format of the annual board-level goals was revised to include two or three goals per clinical program. (**Exhibit 11** lists goals for the CV program.) James stated that one-third of board meeting time was devoted to clinical outcomes, which was far above the norm; the remaining two-thirds were focused on service quality performance and a traditional financial performance review.

Finally, IHC changed its withhold-incentive-pay system for senior managers to reflect the new priorities. The board established a median salary for each senior manager. Twenty-five percent of the median salary was withheld, but could be won back by meeting goals. Prior to Nelson becoming CEO, nearly all goals were financial, but he changed the withhold so that one-third was based on medical-outcome goals, one-third on service outcomes, and one-third on cost outcomes. In James’ words, this had “a positive effect on getting the administrators to look at the clinical side of things.”

Clinical Care Management: Operations

Most health care delivery systems ran two parallel, redundant, data systems. Physicians and nurses maintained a medical record, while administrators tracked financial measures for billing and facility management. The financial information was captured, in large part, from the clinical process. Data were moved from clinical activities to financial operations through, (1), chart abstraction,⁷ and (2) by recording all billable clinical services (e.g., a dose of a drug or use of a procedure room). James noted that such redundancy was wasteful. At one point, IHC estimated that as much as 15% of its single largest business expense, salary for operational staff, was devoted to entering data into the billing/financial tracking system.

⁷ Chart abstraction in most hospitals was notoriously inaccurate and a source of fraud and abuse in health care payment. The average hospital took more than three months to prepare a final bill, with every bill seeing a large number of corrections after the fact. One study estimated that over 50% of all final hospital bills contained at least one significant error.

The Patient Care Management System (PCMS)

In 1997, Burton and James conceived PCMS when they asked themselves if it would be possible to organize nursing services by task and then structure an electronic clinical data collection system accordingly. James explained, “It’s an old idea that has worked well in industry. It’s a new thing for health care but it’s not new to Alcoa Aluminum.” Part of the impetus for the PCMS was to reduce redundant data collection. Once nursing services were defined by type of task they could create one data system for clinical charting that would automatically generate billing data. The PCMS would also embed clinical protocols in a clinical workstation (a computer).

Burton and James’ team identified four subcategories of nursing tasks: assessment, intervention, monitoring, and patient comfort and education. These categories were derived from a hierarchy of clinical reasoning that began with a functional problem list (making a diagnosis) to a goal list (how should the problem be controlled), and finally, a task list (actions to achieve the goal).

For example, a patient with a heart attack would be entered into the computer system with left ventricular myocardial infarction (the functional problem). A window with a series of sub-problems would appear on the screen. Some of the sub-problems, such as decreased coronary blood flow, were automatically generated, while others could be checked off by the physician. Identification of the functional problem and sub-problems would trigger a list of goals, including pain management and restoring blood flow. Each goal was directly linked to a series of orders or tasks to be performed by physicians and nursing staff. The PCMS incorporated decision support into the order set so that the system could automatically calculate, for example, morphine dosing for pain control.

In 2001, IHC partnered with the Mayo Clinic and Stanford to develop the protocols (goal and task lists) and with IDX Systems Corporation to develop the software platform. IHC planned to go live with a paper-based pilot on two floors of LDS Hospital and at two other IHC sites in April of 2003.

Clinical Information Systems

James believed that IHC could “make it easy to do it right” by embedding protocols in the PCMS and making them the default option for care. After the pilots, the next step was to automate patient medical records and make them dynamic electronic documents that could interact with the PCMS. To achieve this level of standardization, James turned to IHC’s IT system and the EMR.

The Electronic Medical Record Two ideas governed James’ strategy to encourage physician usage of the EMR: (1) every stage paid for itself, and (2) it had to fit into the flow of practice. James explained, “The rule is you can’t destroy clinical productivity.” A major strength of the EMR was that usage was largely intuitive and each step in the adoption process prepared the user for the next. (See **Exhibit 12.**) James elaborated, “When one of our physicians began using the EMR for clinical charting we didn’t have to even tell him about the order function. He found it on his own and within a week he had gone from electronic charting to online medication orders. The EMR doesn’t require that you rethink the structure of the medical record – it’s enough to ask you to move from paper to computer.” In addition to encouraging PCMS compliance, the EMR had several features for specialists that supported the decision-making associated with routine care—for example, the Antibiotic Assistant and automated ventilator settings.

Antibiotic Assistant One of IHC’s more popular decision support tools was the Antibiotic Assistant. Given a list of possible sources of infection, Antibiotic Assistant applied a protocol to perform a customized assessment of a patient, producing (1) a list of “most likely” infections, and (2)

a list of the most appropriate antibiotic to treat them, including such factors as allergies, drug-drug interactions, dosing, and current antibiotic sensitivities in the hospital population.

Ventilator settings A second function of the EMR advised respiratory therapists about optimal ventilator settings for each patient. Additionally, it standardized the procedures for taking patients off the ventilator: for example, one rule stipulated that a patient should be taken off in the morning so that they could be off the ventilator when more physicians were in-house.

Encouraging Physician Buy-in

Two features attracted physicians to the EMR: increased productivity and protocol override.

Increased productivity Use of the automated Diabetes Work Sheet increased the typical outpatient bill from \$35 to \$75 by helping physicians more fully document, and bill for, the services they were performing. Use of the work sheets also boosted a patient's abilities to self-manage and reduce complications. Additionally, entering data into the system during a patient visit meant that fewer resources were spent on transcription. Note-taking was facilitated by the default options on each screen which represented the most common care strategy.

Override capability James' vision for the PCMS hinged on the idea that one "designed for the common and managed the uncommon cases individually."⁸ He clarified, "No protocol fits *every* patient, and no protocol perfectly fits *any* patient." All physicians were granted override capability; if they chose not to follow the orders automatically generated for a particular patient, they were prompted to type their reason into the system. IHC designed this function not to track physician "disobedience" but to learn from exceptions. There were two options for not following the protocol: the protocol was wrong and it should be modified; or it was correct but the patient had complications so the protocol was not applicable. To James, the latter situation was "random noise."

Realizing the Benefits of Clinical Management

By the mid-1990s, IHC clinical-improvement projects routinely showed cost savings, but operating income was not improving as expected. James resolved this puzzle when he examined the results of the protocol for CAP. Using the protocol, fewer patients needed to be hospitalized, those that were hospitalized had shorter lengths of stay, and the average cost per patient decreased. During his examination, James, for the first time, looked at reimbursement rates. He found that while the protocol reduced costs by \$1.2 million, it also reduced reimbursements by \$1.7 million. James presented this finding—outstanding clinical outcomes and distressing financial news—to IHC's top 25 managers. He remembered:

I showed them how the protocol worked, the clinical improvements that resulted, the cost data and, finally, the reimbursement data. Then I apologized. It turned out that none of the savings came back to us. Bill Nelson, our CEO, publicly chastised me for apologizing. He said, "You will not apologize for better patient outcomes." He was sending a message to his team. Bill said, "I expect clinical management like that to be done. It's our job as administration to figure out how to balance the finances."

⁸ Institute of Medicine, *Crossing the Quality Chasm* (National Academy Press, 2001) p. 128.

After considering several options, IHC developed a strategy by which the clinical management system could harvest savings back from payers and boost revenues. Under the strategy, piloted in 1999 by Burton and Sidney Paulson, IHC's Health Plans CEO, if a given clinical program demonstrated improvements in care, then IHC Health Services (the care delivery organization), IHC Health Plans (the payer), and the physicians in the clinical program shared in any risks or benefits. Risks and benefit included changes in revenues, profit margins, or physician incomes. James liked this approach because, "all of the key players have a stake in the improvement game."⁹

The physician population, however, was wary of the proposal: while IHC originally proposed that the physicians, as a group, accept 20% of the risk, the physicians ultimately accepted a smaller upside benefit to avoid any direct downside risk. IHC Health Services and IHC Health Plans then split the downside risk evenly. James estimated that within the pilot, the annual payout per physician was about \$3,000. James anticipated expansion of risk sharing to other physicians as IHC implemented its outcomes tracking system. In 2002, IHC began "marketing" Clinical Integration and its shared-benefit cost models to its larger insurance partners.

The Long-term Plan

Reflecting on the Clinical Integration meeting and the nurse's alarm about standardizing care, James realized that he had been hosting an internal debate on this topic for years. Would physicians adopt best practices on their own, or must best practice be paired with measurement and accountability systems? In addition to thinking about incentives, about what constituted "best practice," and about how to develop systems that would simultaneously increase the quality of care and decrease cost, James listed progress on the implementation of the clinical care management system. In mid-2002, five of the Clinical Programs (CV, Neuromusculoskeletal, Women & Newborn, Oncology, and Primary Care) were in use; the remaining four would be up by 2007. Four of 500 conditions (acute myocardial infarction, bronchitis, CAP, and total hip replacement) in the PCMS were running, albeit on paper. The IT department hoped to have 35 conditions charted by the end of 2002 and 75 by the end of 2003, at which point the PCMS would go live.

James realized that it would take at least ten years to fully consolidate the clinical management structure and get all components of Clinical Integration running; however, equally important was how long it would take to get IHC's physicians to subscribe to the concept. He commented:

Deming once said, "If you want to convert the culture of an organization, and that organization contains n people you first need to convert the square root of n ." Well, he should have added, "You specifically need the early adopters." It's not just *any* square root of n . I've got about 1,200 core physicians, so the square root is somewhere between 30 and 40. There was a palpable change in the medical staff when we crossed that number. It wasn't just Brent James, partially tainted by being over in the administration offices, saying that physicians as a profession needed to do this. It was a long list of respected physicians who could say, "Guys, I've done this in my practice and it really makes sense. It's better care for our patients, a better lifestyle for me, and more productive."

⁹ The shared benefit approach routed distribution of the savings through the insurance arm of the organization—IHC Health Plans—so that the final approach could meet federal fraud and abuse standards.

Exhibit 1 Intermountain Health Care: Insurance

IHC entered the insurer market in 1983 at the behest of Dr. David Burton who anticipated that insurance companies would play an increasingly important role in healthcare.

IHC Health Plans In 2001, IHC offered five traditional HMO health plans which offered a range of benefits and price points. Three of the plans were POS (Point of Service) options: IHC Med, Select Med, and IHC Care. IHC Med was the most economical and enrollees could select from a panel of 600 primary care physicians (PCPs) and specialists while Select Med and IHC Care enrollees paid higher prices and had access to 1,500 and 2,600 PCPs and specialists respectively. Health Choice was a non-panel option that allowed enrollees to receive care outside the panel at a lower level of coverage. IHC Access was for Medicaid enrollees. IHC Health Plans boasted a longer tenure per enrollee (5–6 years average) compared to a national average (1–2 years).

Competition IHC Health Plans was the largest insurer in Utah. In 2001 it covered 460,000 individuals and had a 40% market share. Its leading competitors, Blue Cross Blue Shield, Altius, and United HealthCare covered 425,000, 180,000, and 150,000 enrollees respectively. A second tier of six competitors covered between 45,000 and 85,000 each while many smaller insurers each had less than 20,000 enrollees.

Pricing of the insurance product Consistent with its non-profit status, IHC Health Plans maintained break-even prices against which other insurers, many of which were for-profit organizations, could compete and IHC was willing to accept a loss in the short-term in order to be a permanent player in the Utah insurer market. As a consequence, IHC Health Plans forced its competitors' prices down. IHC Health Plans aimed to encourage competition based on quality, not cost, in order to create a positive pressure to raise the standard of health care.

Source: Casewriter.

Exhibit 2 Utah Demographics in 2000

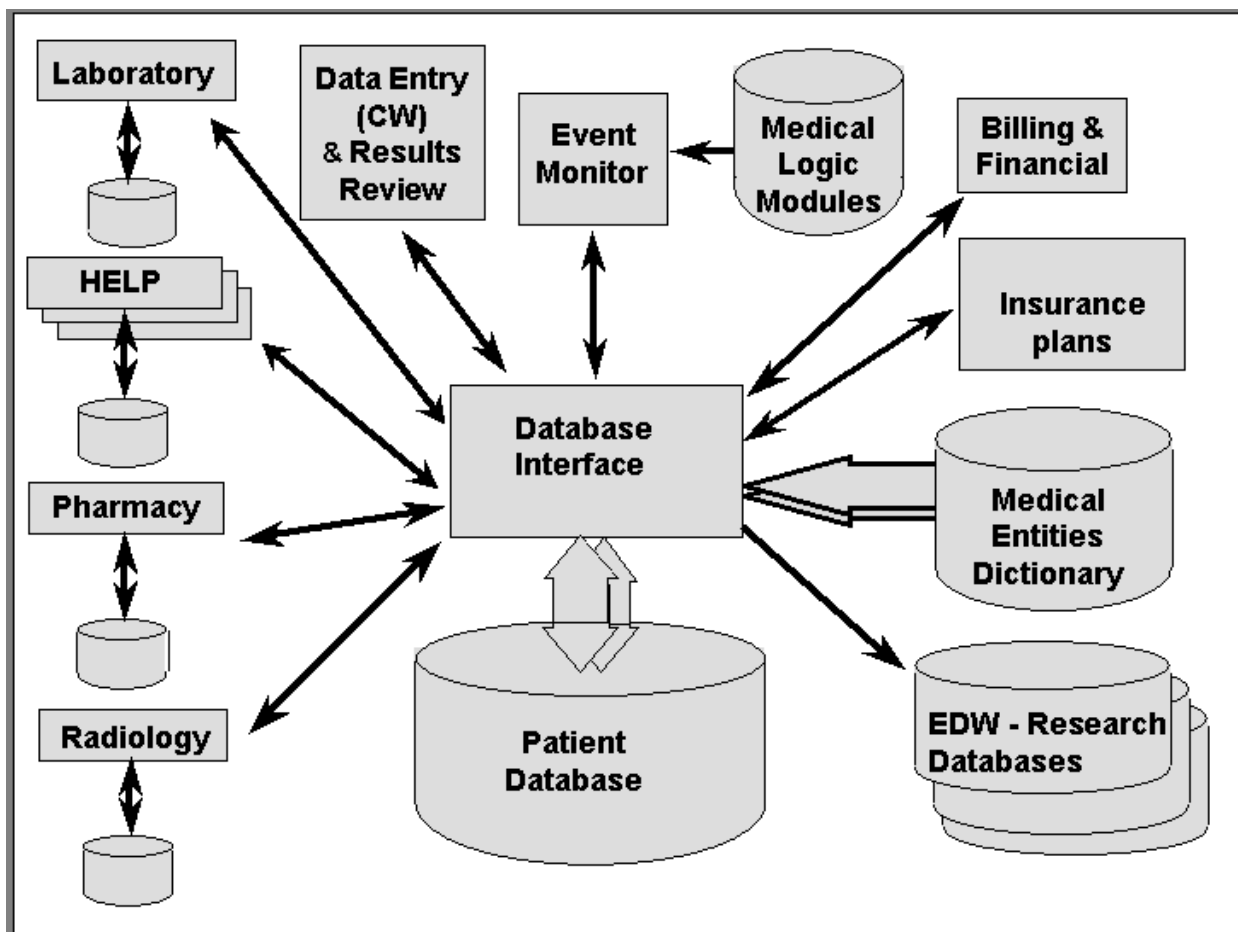
	Utah	United States
Population, 2001 estimate	2,269,789	284,796,887
Population, percent change, April 1, 2000-July 1, 2001	1.6%	1.2%
Population, percent change, 1990 to 2000	29.6%	13.1%
Persons under 5 years old	9.4%	6.8%
Persons under 18 years old	32.2%	25.7%
Persons 65 years old and over	8.5%	12.4%
White persons ^a	89.2%	75.1%
Black or African American persons ^a	0.8%	12.3%
American Indian and Alaska Native persons ^a	1.3%	0.9%
Asian persons ^a	1.7%	3.6%
Native Hawaiian and Other Pacific Islander ^a	0.7%	0.1%
Persons reporting some other race ^a	4.2%	5.5%
Persons reporting two or more races	2.1%	2.4%
Persons of Hispanic or Latino origin ^b	9.0%	12.5%
White persons, not of Hispanic/Latino origin	85.3%	69.1%
Female persons	49.9%	50.9%
High school graduates and higher, persons 25 years and over	87.7%	80.4%
Bachelor's degrees and higher, persons 25 years and over	26.1%	24.4%
Housing units	768,594	115,904,641
Homeownership rate	71.5%	66.2%
Households	701,281	105,480,101
Persons per household	3.13	2.59
Households with persons under 18	45.8%	36.0%
Median household money income, 1997 model-based estimate	\$38,884	\$37,005
Persons below poverty, 1997 model-based estimate	10.0%	13.3%
Children below poverty, 1997 model-based estimate	12.5%	19.9%
Employment Status		
Population 16 years and over	1,600,279	217,168,077
In labor force	69.0%	63.9%
Employed civilian labor force	65.3%	59.7%
Unemployed civilian labor force	5.0%	5.8%
Not in labor force	31.0%	36.1%

Sources: U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments, available at <http://quickfacts.census.gov/qfd/states/49000.html>, accessed July 30, 2002; U.S. Census Bureau, Census 2000 Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53, available at http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_SF3_U_DP3_geo_id=01000US.html, accessed September 25, 2002.

^a Includes persons reporting only one race.

^b Hispanics may be of any race, so also are included in applicable race categories.

Exhibit 3 IHC's Clinical Information System



Note: Cylinders represent databases.

All inpatient and outpatient clinical information resided together in the IHC Clinical Data Repository (CDR, or "lifetime patient record"). The CDR included a series of key sub-functions essential to the operation of an EMR, such as an electronic master patient index, and a database of shared field definitions. These data interacted with medical knowledge—compiled from the medical literature, physician consensus, and best practice guidelines and protocols—to provide real-time clinical decision support in applications such as the Antibiotic Assistant. An electronic data warehouse (EDW) pulled together all clinical data, as well as financial transaction data, insurance claims data, patient outcomes data, and all other information used across the entire enterprise, into condition-specific data marts. The data marts, in turn, generated clinical and administrative management information to drive management within the IHC system. In effect, the CDR was the core information resource for the whole system, and HELP, Clinical Workstation (CW), and Results Review were tools used to view and update that shared resource.

Source: Intermountain Health Care.

Exhibit 4 Performance Improvement Outcome Data

Savings from Clinical Projects, 1995

Clinical Project	Cost Structure Improvements (\$ millions)
Fast-track extubation in TICU	\$5.5
Long-term ventilator management	4.7
HFOV (RDS in premature newborns)	3.7
Shock Trauma Respiratory ICU (12 protocols)	2.5
Antibiotic Assistant	1.2
Pediatric ICU (8+ protocols)	0.7
Infection prophylaxis in surgery	0.6
Adverse drug event prevention	0.5
Community-acquired pneumonia	0.5
Ventilator support for hypoxemia	0.5
Group B strep sepsis of newborn	0.3
Subtotal	\$20.7
+ 30 additional successful clinical projects without cost savings analysis	?

Source: Intermountain Health Care

Exhibit 5 Referral Care Clinical Programs**IHC Referral Care Clinical Programs as percent of hospital cost**

Clinical Program ^a	Hospital inpatient and outpatient cost (\$ millions)	% of Total Cost	Cumulative %
Cardiovascular	\$129.4	18.5%	18.5%
Neuromusculoskeletal	128.7	18.4	36.9
Surgical Specialties	116.6	16.7	53.6
Women and Newborn	115.0	16.4	70.0
Medical Specialties	94.8	13.5	83.5
Pediatric Specialties	44.6	6.4	89.9
Behavioral Health	17.2	2.5	92.3
ICU + Trauma	31.1	4.4	96.7
Unassigned	<u>22.8</u>	<u>3.3</u>	<u>100.0</u>
Total	\$700.1	100.0%	100.0%

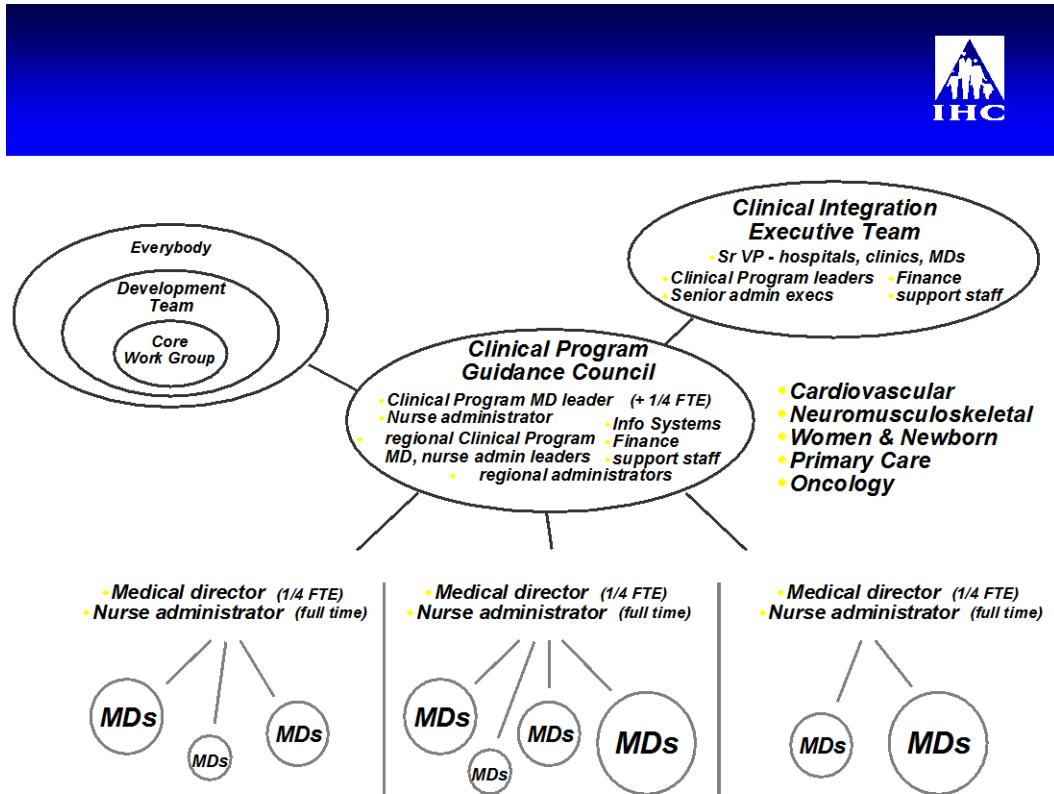
^a The 9th clinical program was for Primary Care medicine. Based on 1997 Case Mix Database; cost data organized by APR-DRG.

Cardiovascular Clinical Program Family of Processes

Process	DRGs	Hospital inpatient and outpatient costs (\$ millions)	% of Total Costs	Cumulative %
<i>Ischemic heart disease</i>				
CABG <i>et al.</i>	106-108, 110-111	\$34.2	28.9%	28.9%
Dx cath, PTCA, stents, etc.	112, 124-125	24.2	20.5	49.4
Acute chest pain	121-123, 132-133, 140, 143	9.3	7.9	57.2
<i>Congestive heart failure</i>				
Valves	104-105	13.4	11.3	68.5
CHF	87, 127	5.3	4.5	73.1
Transplant	103	4.2	3.6	76.7
Arrhythmias/ pacemakers	116-118, 129, 138-139, 141-142	9.0	7.6	84.3
Peripheral vascular surg	5, 130-131, 478-479	8.4	7.1	91.4
Resp Ca/ pulmonary surg	75-77, 82-84, 94-95	7.3	6.2	97.6
Other Cardiovascular	120, 126, 135-136, 144-145	<u>2.9</u>	<u>2.4</u>	<u>100.0</u>
Total		\$118.9	100.0%	100.0%

Source: Intermountain Health Care

Exhibit 6 Guidance Council Structure



Source: Intermountain Health Care.

Exhibit 7 Clinical Protocol for Cardiovascular Care

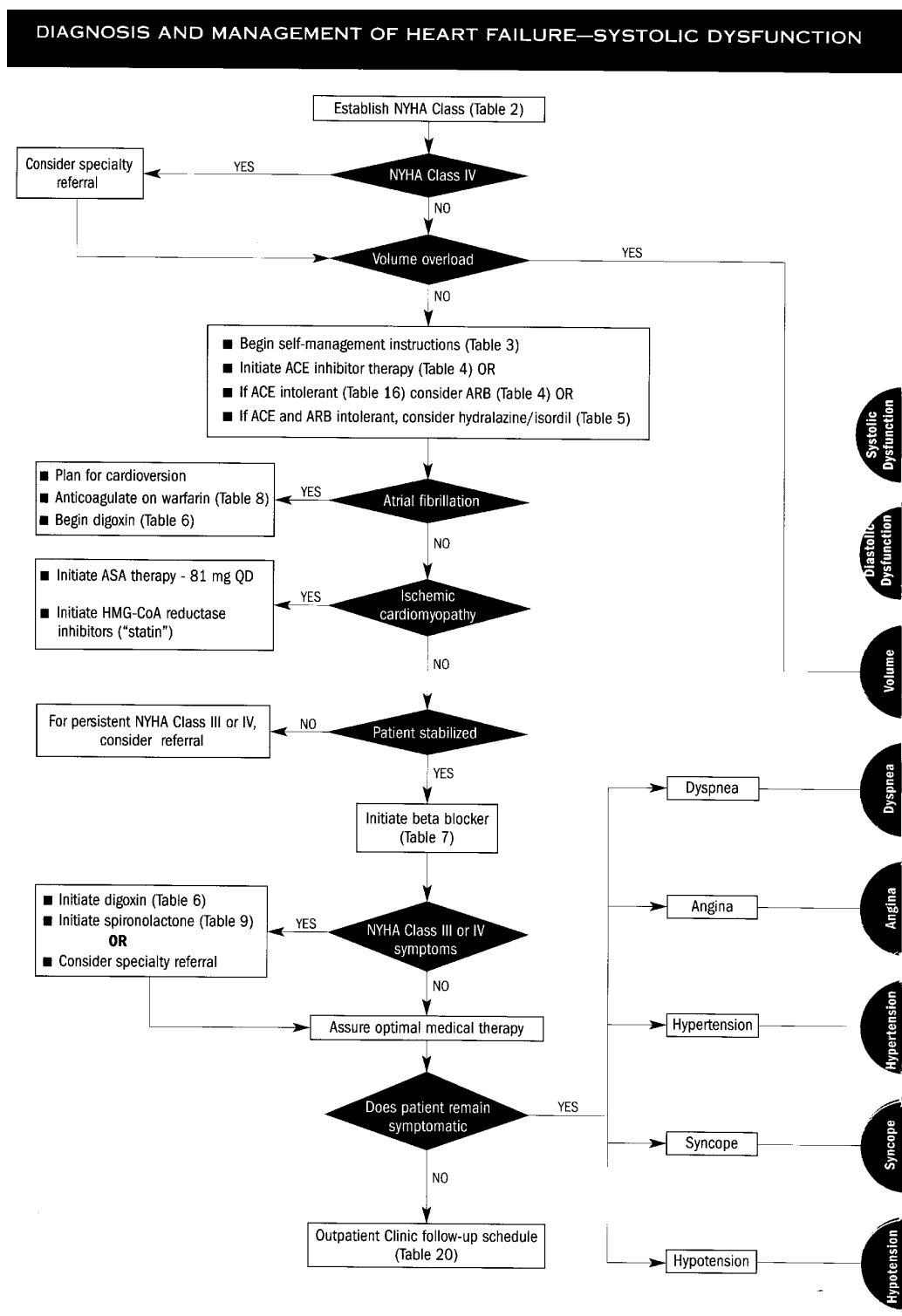


Exhibit 7 (continued)

Table 4: GUIDELINES FOR ACE INHIBITOR THERAPY

1. **ANGIOTENSIN CONVERTING ENZYME INHIBITORS (ACEI):** Proven to improve symptoms, decrease hospitalizations, and decrease mortality in patients with heart failure. May be safely initiated even with systolic blood pressure as low as 90 mmHg. Risk of hypotension increased with hypovolemia; consider decreasing diuretic dose prior to ACE inhibitor initiation or titration.
2. **MEDICATIONS:** (Lisinopril is preferred in stable patients given its daily dosing schedule)
 - a. ***Lisinopril (Prinivil®, Zestril®):** Target 20mg daily, start at 2.5mg daily, increase by 5mg every week until target dose reached.
Max dose: 40mg daily.
 - b. ***Enalapril (Vasotec®):** Target 10mg twice a day, start at 2.5mg twice a day, increase by 2.5mg per dose every week until target dose reached.
Max dose: 40mg daily.
 - c. ***Captopril (Capoten®):** Target 50mg three times a day, start at 6.25mg three times a day, increase by 6.25 to 12.5mg per dose every 2 weeks until target reached.
Max dose: 300mg daily.
 - d. ***Quinapril (Accupril®):** Target 20mg twice a day, start at 5mg daily, increase by 5mg per dose every week until target dose reached (divided doses when daily dose >10mg).
Max dose: 40mg daily.
 - e. **Ramipril (Altace®):** Target 5mg twice a day, start at 1.25-2.5mg daily, increase by 2.5mg every week until target dose reached (divided doses when daily dose >10mg).
Max dose: 20mg daily.
3. **LABS:** Basic Metabolic Panel weekly until target dose achieved. Monitor for elevations in potassium (>5.0) and decrease potassium supplementation (if applicable) or modify target dose of ACE inhibitor.
4. **CONTRAINDICATIONS:** Shock, angioneurotic edema, or significant hyperkalemia >5.5 mm/L.
5. **PRECAUTIONS:** Renal impairment (creatinine >3.0), mild hyperkalemia >5.0 mm/L, dialysis, hypovolemia (consider decreasing diuretic dose if applicable), cerebrovascular disease, renal artery stenosis, hypotension (systolic BP <90mmHg).
6. **ADVERSE REACTIONS:** Dizziness, headache, fatigue, diarrhea, upper respiratory symptoms, cough, nausea, hyperkalemia, orthostatic hypotension, renal impairment, angioneurotic edema.
7. Therapy should continue for life.

* IHC Formulary

Source: Intermountain Health Care.

Exhibit 8 New Protocol for Discharge Medication

2000 Hospital Discharge Medicine Goals: Patients discharged from the cardiovascular unit achieve at least 90% compliance with appropriate discharge medications:

1. Ischemic Heart disease (aspirin, HMG agent; beta blocker post-Myocardial Infarction (MI))
2. Heart failure due to Left Ventricular dysfunction (ACE inhibitor)
3. Atrial fibrillation (Coumadin)

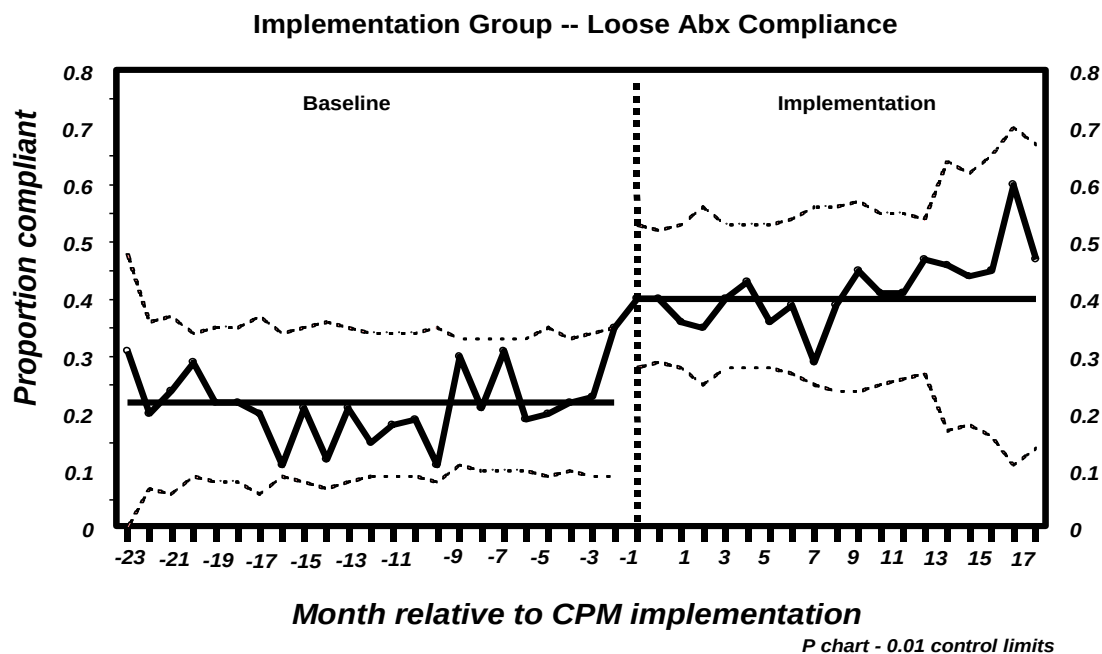
Percent eligible patients treated at discharge with appropriate medications, 2000

	Before protocol	After protocol	National rate
Beta blockers	57%	91%	41%
ACE/ ARB inhibitors	63	94	62
Statins	75	95	37
Antiplatelet	42	99	70
Warfarin	10	90	<10

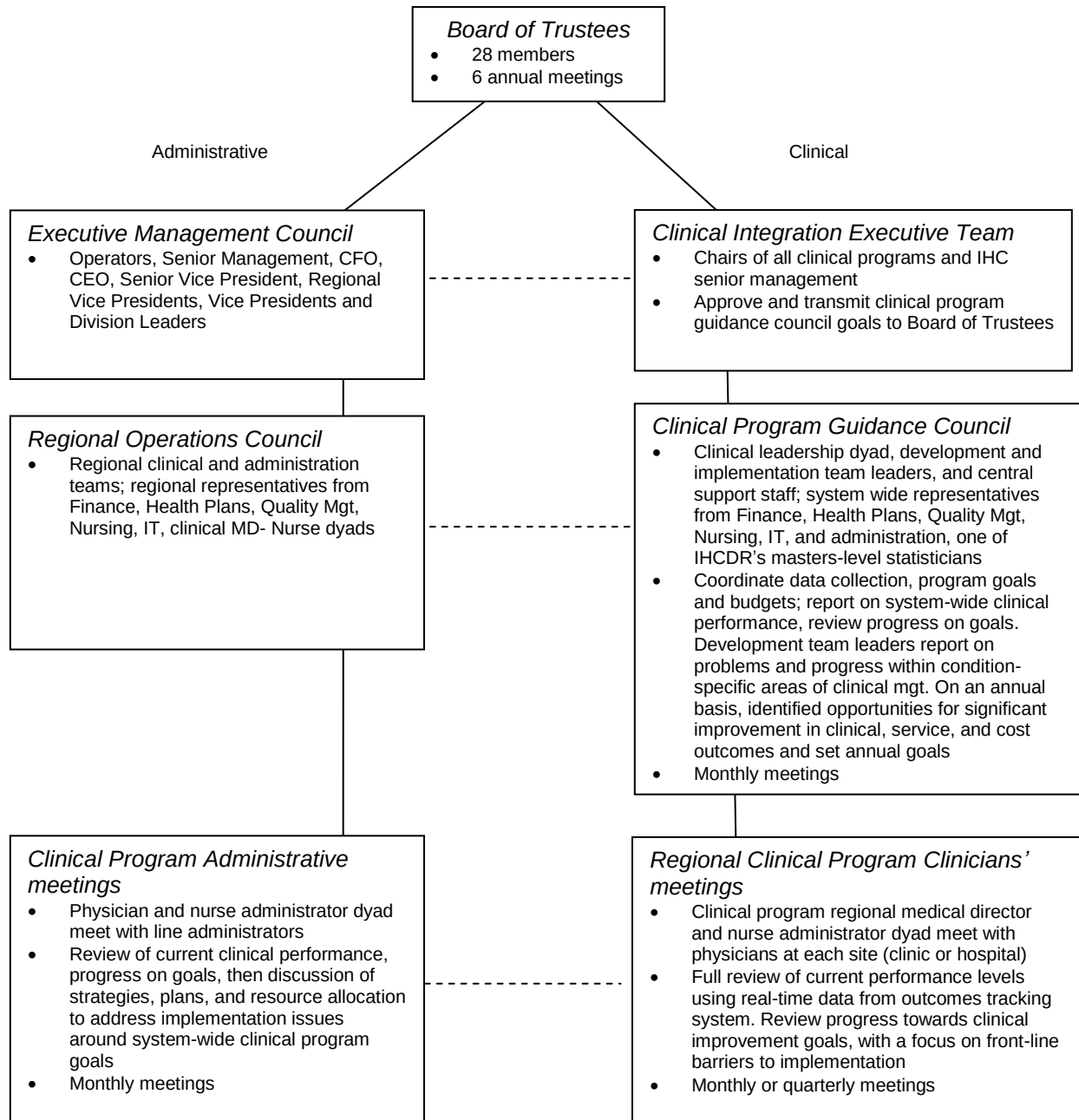
Mortality and Readmissions within one year of discharge

	Mortality		Readmissions	
	Before protocol	After protocol	Before protocol	After protocol
Chronic Heart Failure (n=19,083)	22.7%	17.8%	46.5%	38.5%
Ischemic Heart Disease (n=43,841)	4.5	3.5	20.4	17.7

Source: Intermountain Health Care.

Exhibit 9 CAP Outcomes Tracking

Source: Intermountain Health Care.

Exhibit 10 Parallel Administrative Structure

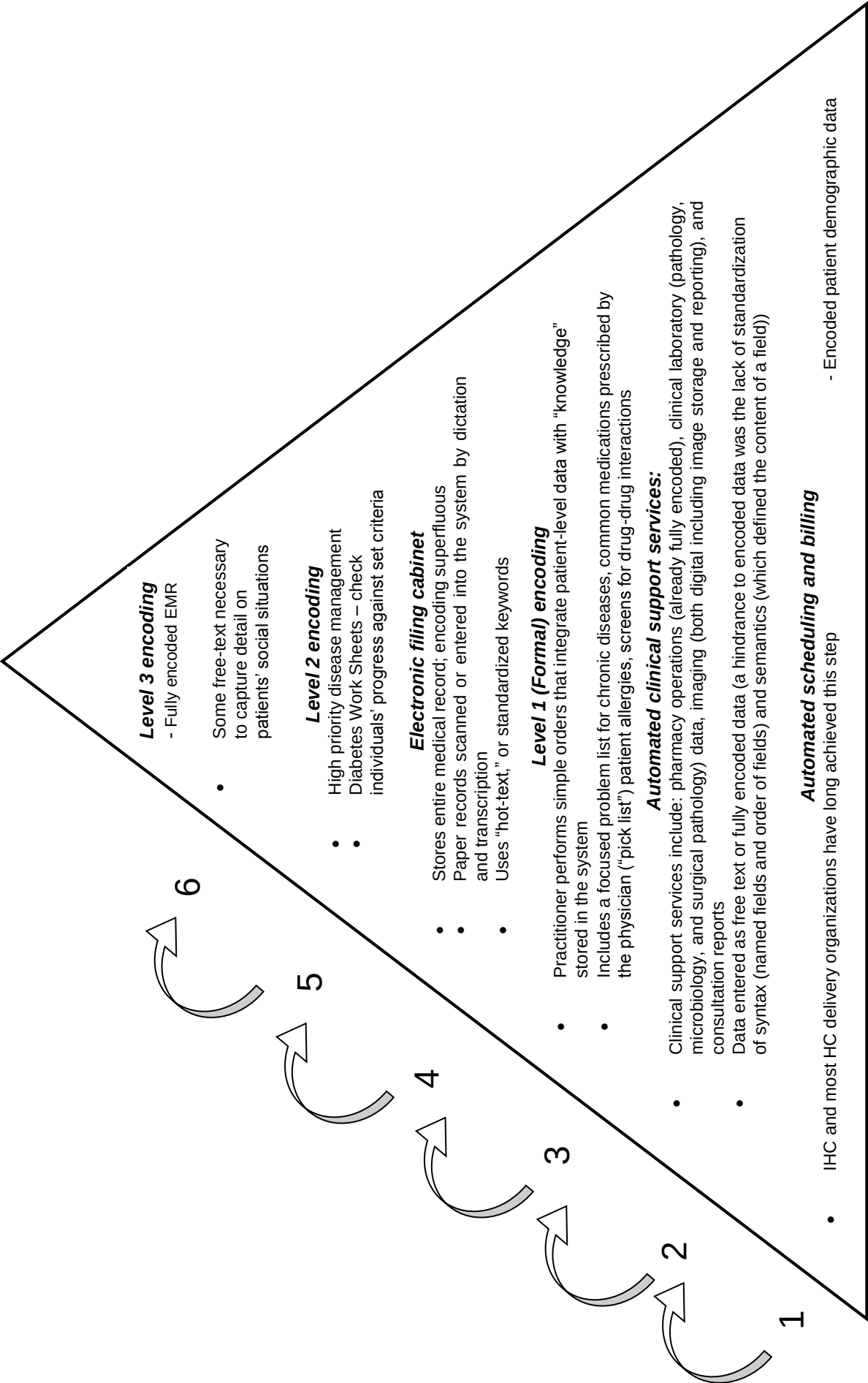
Source: Casewriter.

Exhibit 11 2001 System Goals for Cardiovascular Clinical Program

- Exceed national standards for timeliness of reperfusion for ST-Elevation MI's
- Prescribe appropriate hospital discharge medicines for CAD, heart failure, atrial fibrillation
- Stabilize readmission rate after hospitalization for ischemic syndromes
- Achieve CV surgical mortality rate lower than national standards
- Achieve average extubation time after CV surgery of 7.5 hours or lower
- Improve CV surgical costs
- Implement evidence-based indications/ guidelines for 13 CV procedures
- Inpatients with heart failure document LV ejection fraction and provide diet, smoking cessation, weight, and medication management instructions

Source: Intermountain Health Care.

Exhibit 12 EMR Roll-out



Source: Casewriter.