California HealthCare Foundation

For the Record:
EHR Adoption in the Safety Net

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Prepared for
CALIFORNIA HEALTHCARE FOUNDATION

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Manatt Health Solutions is an interdisciplinary policy and business advisory division of Manatt, Phelps & Phillips, a law and consulting firm with offices in California, New York, and Washington, D.C. The San Diego-based **Community Clinics Health Network,** a subsidiary of the Council of Community Clinics, provides quality- and technology-related services to community clinics and health centers.

About the Foundation

The **California HealthCare Foundation** is an independent philanthropy committed to improving the way health care is delivered and financed in California. By promoting innovations in care and broader access to information, our goal is to ensure that all Californians can get the care they need, when they need it, at a price they can afford. For more information, visit www.chcf.org.

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I. Introduction

The EHR adoption rate among safety-net clinics has lagged behind that of traditional practices for some time, leaving many clinics to wonder how they can overcome the hurdles and take advantage of this technology.

Like most traditional medical practices, safety-net clinics are increasingly motivated to adopt an electronic health record (EHR) to improve the quality and efficiency of care. However, clinics that take this route typically face more hurdles than traditional practices do. They often need more product customization and specialized support because of their patient population, which requires more complex and wider-ranging services and entails more complex billing and unique reporting. In addition, given their payer mix and funding sources, safety-net clinics do not have as many opportunities as medical practices to realize EHR-related financial benefits. Consequently, the EHR adoption rate among safety-net clinics has lagged behind that of traditional practices for some time, leaving many clinics to wonder how they can overcome the hurdles and take advantage of this technology.

To get a better sense of the special EHR challenges that safety-net clinics encounter and what some have done to surmount them, Manatt Health Solutions and the Community Clinics Health Network closely examined three clinics in California. While previous reports have focused largely on identifying general barriers, this report aims to provide a more detailed account of unique as well as commonplace implementation experiences that would be instructive for other clinics.

II. Overview

EHR Lessons Learned

- Garner organizational buy-in.
- Have strong leadership and vision for technology.
- Consider technology to be a tool that can help an organization realize its vision and mission.
- Define clinical, financial, and operational requirements before making vendor/product and implementation decisions.
- Leverage clinician and technology champions.
- Engage in a comprehensive and multifaceted planning process that includes strategic, technological, business, and financial considerations.
- Practice change management techniques.
- Leverage specialized expertise in technology planning and implementation, systems management, and vendor selection and contracting.
- Plan and provide training.

Source: Falkenberg, N. *Report From the Field. Insights by Community Clinics on Information Technology Adoption.* Community Clinics Initiative: December 2004 (www.communityclinics.org/content/general/detail/708).

The report team chose three safety-net clinics for case studies: the Community Health Alliance of Pasadena, QueensCare Family Clinics in Los Angeles, and Shasta Community Health Center in Redding. It sought a representative sample of clinics whose unique insights might help others move beyond the generally accepted industry recommendations to accelerate EHR adoption, but whose experiences also would reflect considerations that all clinics should take into account if they pursue EHRs.

After members of the report team gathered preliminary information, they visited each clinic to see the EHR in action and to interview clinical, technical, and operational staff at all levels—from medical assistants to the chief executive officer—in group and individual settings. To elicit candid stories and unfiltered experiences, the interviews were relatively informal discussions. Following the site visits, the report team compiled and analyzed the interview information and contacted the clinics again to confirm it and make sure the information was complete. Clinic executives reviewed their respective case studies for accuracy. Appendix A provides more details about the methodology.

III. Background

The three case studies offer an intimate view of experiences with EHR-related issues and of emerging considerations that may be less familiar to clinics that now are considering EHRs.

Previous reports have cited general barriers to EHR adoption at community clinics and the lessons they learned (see sidebar on the previous page). Although such information provides important context, the three case studies in this report offer an intimate view of experiences with EHR-related issues and of emerging considerations that may be less familiar, but arguably more important, to clinics that now are considering EHRs.

Among the barriers are these:

- **Funding requirements.** EHRs' significant start-up and maintenance costs can deter health centers that are already grappling with funding shortages and thin operating margins;[1–4]
- **Lack of interoperability.** Sharing and exchanging data across the entire health care enterprise is critical to achieving high quality. Disparate information systems within an organization, medical practice, or clinic can be a major hurdle;[5]
- **Staff constraints.** Adopting EHRs may require that clinics hire staff with specialized training and more experience in information technology (IT) and clinical informatics, exacerbating the challenges they already face in hiring and retaining qualified staff;[6–8]
- **Customization requirements.** Few EHRs can readily meet clinics' complex billing and reporting needs. In addition, given the particular patient population they serve, clinics need EHRs that offer more clinical functions and more highly specific combinations of functions;[9,10]
- **No business case.** Even though clinics may invest significant time and resources in EHRs, the potential for them to realize a return on investment is undermined by an absence of financial incentives and the fact that direct financial benefits accrue primarily to health care payers and purchasers;[11,12]

- **Clinician resistance.** This key barrier is often a result of multiple factors, such as computer illiteracy and the amount of time it takes for clinicians to re-learn clinical skills and/or modify clinical processes;[13–16]
- **Product uncertainty.** Clinics fear they might buy a system that, in light of significant start-up costs, fails to meet their needs, quickly becomes outdated or unsupported, or whose vendor goes out of business;[17–19] and
- **Privacy and security concerns.** Compounding these concerns are legal and regulatory policies, such as the Health Insurance Portability and Accountability Act, that some providers view as unclear.[20,21]

IV. Case Studies

For CHAP, an overarching appeal of the network model was the promise of standardized implementation.

Community Health Alliance of Pasadena (CHAP),

PASADENA

CHAP is one of only two community clinics in Pasadena. Thus, it is vital to preserving and improving the health of the city's underserved and uninsured populations.

Location: Pasadena

Mission: To provide high quality, accessible, and culturally sensitive health care and related services in an environment of care and mutual respect in the greater Pasadena area.

Services: Comprehensive primary care and dental services for adults and children.

SPECIFICS

Site type:	Urban
FQHC:	Yes
Number of sites:	1
Annual patients:[1]	8,328
Annual encounters:[1]	29,796
Number of FTE providers:[2]	10.15

PAYER MIX[3,<?>]

Medi-Cal:	11.2%
Medicare:	2.7%
Capitation:	6.3%
Sliding fee/self-pay:	6.4%
Insurance:	0.3%
Uninsured:[4]	73.0%

SYSTEM/PRODUCT

PMS: Epic/OCHIN[5] **EHR:** Epic/OCHIN **Interfaced/Integrated:** Yes/Yes

PMS/EHR ADOPTION TIMELINE

PMS planning:	Early 2004
PMS/EHR selection:	Fall 2004
PMS go-live:	May 2006
EHR planning:	June 2007
EHR go-live:	November 2007

EHR implementation completed: November 2007

Productivity level[6] (duration[7]): 100% (~10 weeks)

1. Based on 2007 data from the Office of Statewide Health Planning and Development (OSHPD).
2. Based on 2007 data from OSHPD. Providers include physicians, physician assistants, registered nurses, family nurse practitioners, certified nurse practitioners, certified nurse midwives, dentists, licensed clinical social workers, other providers billable to Medi-Cal, other certified providers in the Comprehensive Perinatal Services Program.
3. Percentages calculated using revenue (vs. patient visits).
4. County indigent care.
5. Our Community Health Information Network.
6. At the time of this report.
7. Time between EHR implementation and return to the stated productivity level.

EHR Planning, System Selection, and Funding

In 2004, a unique combination of circumstances began unfolding that would ultimately set the stage for Community Health Alliance of Pasadena (CHAP) to implement an EHR three years later. At the time, Margaret Martinez, the clinic's chief executive officer, saw a growing interest in and activity around health information technology (health IT) in the safety net. She recalled, for example, that the Tides Foundation was promoting health IT and EHRs for safety-net providers, and that there was a lot of activity and discussion around what health IT could do for clinics.

As the focus on EHRs intensified inside and outside of the safety net, Martinez began envisioning how an EHR at CHAP could impact care in the clinic and in Pasadena's community of patients and health care organizations.

Meanwhile, CHAP, a federally qualified health center (FQHC), was becoming concerned about the ability of its practice management system (PMS), MedInformatix, to meet evolving billing and reporting requirements. "MedInformatix was made for private practices and the system needed to be adapted for our specific needs," Martinez explained. "I was dependent on one consultant who wasn't reliable, and I couldn't find somebody who could work with me to make the changes that we needed as a FQHC."

As Martinez considered options for replacing the clinic's increasingly problematic PMS, she saw an opportunity to seek a solution that would enable CHAP to use the system as a stepping stone to an EHR. Shortly thereafter, the media began focusing more attention on Kaiser Permanente's massive, nationwide initiative to build KP HealthConnect, an EHR it developed in partnership with Epic Systems Corporation. Given CHAP's history of working with and receiving grant funding from Kaiser, Martinez asked the health plan if CHAP could implement Kaiser's system. But Kaiser, still squarely focused on its own EHR effort, suggested that the clinic investigate other options.

Martinez and her team evaluated a limited number of other products. However, none could fully satisfy CHAP's need for a combined practice management and EHR system. At an EHR forum sponsored by the Community Clinics Initiative, CHAP was introduced to Our Community Health Information Network (OCHIN), a group of community health centers in Oregon that had formed a strategic partnership with Epic, an EHR developer. The network and Epic had agreed to work together to customize Epic's PMS suite of applications and EHR to meet the needs of federally qualified health centers for delivery of health IT services via an application service provider (ASP) model.[22] Martinez was excited about this model and began learning more about participating in a network that could provide remote access to a PMS and eventually an EHR.

Further investigation suggested that several aspects of the network ASP model would align well with CHAP's particular needs. The small clinic lacked a dedicated technology team and had limited experience using health IT. By relying on a network such as OCHIN to host and support the PMS/EHR, the clinic would not have to support the system entirely on its own. Furthermore, CHAP wanted to secure its data at an off-site storage facility to ensure safe archival and disaster recovery. A network model would almost certainly satisfy this desire because the network could back up clients' data locally in its data center or establish a back-up site elsewhere and adopt disaster recovery measures to guard against widespread data losses.

For CHAP, an overarching appeal of the network model was the promise of standardized implementation. OCHIN offered a full range of standardized tools, processes, and more, including proven workflow redesign practices, training materials and services, and change management techniques. It also knew what to expect in terms of implementation timing and impact.

Martinez ultimately decided that the network ASP model was a good fit for CHAP and pursued a relationship with OCHIN. Among the challenges she faced were obtaining support from the clinic's board of directors and raising capital to fund adoption of the EHR. Up-front costs for the PMS would be about $200,000 and those for the EHR nearly $348,000 — totals that included the cost of assistance with installation and training, and other hardware and software expenses. Although limited internal funding was available, Martinez reflected on one of her original motivations for pursuing this project: the community-wide benefits of an EHR and the potential for health data exchange in Pasadena. CHAP subsequently partnered with the Pasadena Department of Public Health to pursue a two-year grant from the federally funded Healthy Communities Access Program to pay for PMS/EHR implementation at both organizations and for some level of data exchange.

In 2005, CHAP and the Pasadena Department of Public Health were thrilled to be awarded a grant from the program — and, a year later, were crushed to learn that the federal government had eliminated the program, which left them without the second year of grant funding necessary to complete the implementation. In reconsidering the funding approach, Martinez turned to CHAP's development director, Brian Hayes, for help. They first sought grants from private foundations to cover the remaining, and still significant, costs. This was challenging, Hayes said, because foundations want projects that will be sustainable — a difficult issue to address without a clear case for return on investment.

Even CHAP's board was skeptical. Martinez and Hayes had to educate board members, including those with experience in health care, about the value of EHRs and about strategies for raising funds. "We had to show them there wasn't going to be a [significant financial loss] with an EHR," Hayes said. "It's important to spend time with your board to help them understand the financial breakdown."

The pair's hard work and persistence paid off. They eventually won the board's support and went on to secure funding, thanks in part to the clinic's 10th anniversary gala (a major public event that community leaders and grant-makers attended) and outreach to the California Health Facilities Financing Authority, the S. Mark Taper Foundation, and the Pasadena Community Foundation. Ultimately, CHAP executives' commitment to fundraising and their willingness to make internal funds available overcame the shortfall in government aid. CHAP moved forward with plans to implement the customized OCHIN-EpicCare EHR in 2007.

Preparing for Implementation

CHAP leaders and OCHIN representatives began meeting in the spring of that year to discuss preparations and to address questions or concerns. Planning meetings took place over four months.

A critical preparatory step was to assess CHAP's workflow processes and determine what degree of redesign would be necessary to support the EHR. One notable characteristic of OCHIN's customized EHR platform and implementation approach is structured workflows in a clinic environment. All EHR vendors promote their own best practices for workflow redesign based on multiple factors, such as an EHR system's degree of flexibility and the vendor's

experience with previous implementations. The functions in OCHIN's EpicCare platform perform more effectively in settings where workflows are relatively fixed, or structured, rather than variable. For example, the use of "thin clients" (network computers that rely on servers for most information processing) in each exam room, versus roaming laptops or hand-held tablets (portable computers with touch screens), may significantly enhance a clinic's ability to optimize EpicCare. CHAP placed a higher priority on efficiency and optimal use of the EHR than on retaining its workflow processes, so it asked OCHIN for guidance on workflow redesign, given the network's product-specific knowledge and experience. CHAP would not have been able to achieve its goal of standardized workflow without OCHIN's help, according to Martinez.

Initially, Martinez worked closely with the medical director, Luis Artavia, MD. She decided to involve other clinicians and staff in the later stages of planning. Looking back, clinicians expressed frustration with this approach. At least one of them was unaware of the EHR project until the clinic notified staff of an upcoming training session. Another especially vocal clinician contemplated quitting rather than surrendering her paper charts. Overall, however, there was minimal resistance. CHAP's clinicians are relatively young compared to those at some clinics; most of them worked with an EHR or other primary clinical information system during their residencies and therefore knew how to use technology in the course of patient care.

Implementation

Technological Considerations

Because OCHIN's platform was better suited for structured workflows, CHAP chose to install thin clients in each exam room. This meant that during its PMS implementation, the clinic had to extend the computer infrastructure to prepare for the EHR. Although there is only one clinical site, outfitting all 12 exam rooms with hardware was nevertheless a time-consuming task. In addition, computers throughout the clinic—in the exam rooms, at the front desk and ancillary locations, and elsewhere—needed to be reconfigured.

CHAP had had a near seven-year relationship with its vendor, 7Layer IT Solutions, relying on the local firm for desktop and network support. During the EHR implementation, 7Layer assumed the role of in-house technology staff.

Defining Support Roles

In their complementary roles, 7Layer was responsible for providing local IT support and OCHIN was responsible for the EHR application. The network served as a resource for 7Layer in ensuring that connectivity was sufficient to enable adequate EHR performance.

In addition, OCHIN's model called for designating someone at CHAP as a "superuser"—a staff member who could be trained to provide first-line support to other users in the clinic. The superuser would answer questions and triage issues to 7Layer or OCHIN, depending on the problem. CHAP assigned a lead medical assistant to this role, a full-time job during implementation. After the new system went live, he worked about half-time as the superuser and half-time as a medical assistant.

Training

In October 2007, OCHIN staff joined the clinic staff on-site to begin training and final preparations for the early November launch. OCHIN's training approach included group and individual sessions as well as hands-on training for clinicians during patient care. After the system went live, the network also offered Web-based training modules to clinicians.

Unfortunately, few clinicians actually used the modules; later, some claimed they had not even been aware of them. Clinicians also felt that training was insufficient in some cases and possibly inappropriate in others — that group training during lunch, for example, had made attendance challenging. Absent schedule and workload adjustments, mid-day sessions seemed unrealistic, they said. Several also said that OCHIN's hands-on support during patient care was more disruptive than helpful.

"It was good to have help, but it was embarrassing," one clinician explained. "I would raise my hand and then [an OCHIN trainer] would come in and look over my shoulder, with the patient sitting right there watching."

Although some clinicians were less disparaging of this scenario, all agreed that they would have preferred more up-front training and more opportunities to practice in simulated patient care sessions.

Data Abstraction

Meanwhile, CHAP turned its attention to another challenge: populating the EHR with historical patient data. Abstraction of data from paper records began one to two weeks before the new set-up went live. OCHIN initially suggested that CHAP hire someone with clinical expertise, such as a nurse, to perform this task. But CHAP viewed abstraction as an opportunity to train clinicians. It believed that clinicians were in the best position to do this because, aside from being able to read their own writing in paper charts, they were familiar with individual patients and had preferences about which data should be readily accessible in the EHR. The clinic carved out blocks of time — two half-days per week (eight hours) — during which clinicians could review patient charts and abstract the most important data.

CHAP thought two half-days would be sufficient to abstract information about the entire patient base over several months. But it quickly became clear that this was producing suboptimal results. Many clinicians did not show up to abstract data, in part because of the significant time commitment. The whole process was very inefficient and frustrating. Consequently, clinicians modified their approach and began abstracting data during patient visits. Although this lengthened each visit, clinicians became more efficient because they abstracted data only for patients who kept their appointments. They used the abstraction carve-out time to provide care instead.

CHAP sought and received OCHIN's approval before changing the abstraction approach, as it did regarding other modifications. Neither CHAP nor OCHIN leaders were surprised by the need to adapt.

"[Many] aspects of EHR adoption, including the abstraction process, are iterative," Martinez said. "I worked closely with Dr. Artavia to make sure we knew how our clinicians felt throughout the entire process, and adjusted our approach to meet their needs. It was a trial-and-error process."

Over a two- to three-week period, CHAP compensated clinicians for their abstraction work — an additional two hours of work per day, four days per week. "Our clinicians are salaried and this was one way to show our support," Martinez explained. "I didn't want them to feel under-appreciated for climbing this mountain that would bring us to a better place." She added: "It was one way to help them feel motivated to give the system a chance."

When asked how other clinics pursuing EHRs might optimize data abstraction, one CHAP clinician suggested giving priority to the records of chronically ill patients or those with co-morbidities. If abstractions are done in blocks, this clinician said, having information about such patients readily

accessible in an EHR is of greater value than data about other patients.

Productivity

Based on previous experience, OCHIN gave CHAP a timeline and estimates for the loss and recovery of productivity (patient visits per clinician per day) during the implementation. The network told CHAP it could expect to return to pre-EHR productivity levels within eight weeks. More specifically, the estimate predicted a dip to 50 percent productivity in the first two-and-a-half weeks; recoveries to 75 percent and then 90 percent, respectively, in the subsequent two weeks; and a slow return to 100 percent by week 10. Overall, the estimate proved to be relatively accurate until CHAP reached 90 percent productivity, when a temporary reduction to 80 percent was necessary to account for the greater data abstraction demands on clinicians.

Clinicians worked through their lunch hour or stayed late to finish entering information in patient charts. Some found that certain activities now required twice as much work as before EHR implementation. For example, they still had to fax multiple paper forms to the county health department regarding referrals, so they were entering patient information twice: first into the EHR, then on paper or into an electronic file for print-out. One clinician mistakenly thought the forms would be available in the EHR and could be completed electronically. Others said that having to learn about the new workflow and EHR basics seriously impacted productivity.

Clinicians became "very frustrated," Artavia said. "There were a lot of complaints that we were moving too quickly." A clinician explained that "you have to learn a new way of doing things—how and where to sit with the patient, how to type and look at the patient. It all takes time." Productivity, she added, declined even before the new system went live, during training.

Nevertheless, clinicians generally agreed that CHAP's leaders were aware of and responsive to productivity issues. The clinic had not only adjusted productivity expectations mid-stream, but had also taken steps to offset productivity losses. For example, about a month before the EHR launch and in anticipation of the 50 percent initial drop in productivity, CHAP made sure that patients would still be able to refill their medications despite less access to providers as a result of the training sessions. Artavia and a nurse practitioner managed all refill requests during clinicians' administrative time.

CHAP returned to full productivity in February 2008. In retrospect, Martinez humbly suggested that even though the clinic was "constantly taking the pulse" of its providers, there should have been a better feedback mechanism for clinicians.

Patient Communication

CHAP shared its EHR vision with patients and the community in a number of ways. Clinicians and staff explained to patients why there were now computers in every exam room, and the clinic produced fliers and poster boards to publicly communicate its push toward an EHR to improve patient care. Patients were not left wondering why wait times in the clinic had increased. These efforts also were critical in laying a foundation for future appeals to grant-makers and community partners.

"We had to let everyone know what was happening," Martinez said. A CHAP clinician added: "Patients were frustrated at first, but then they saw the EHR during their visit and [thought] it was exciting."

Post-Implementation Experience

Quality Improvement

According to CHAP clinicians, the EHR has increased the clinic's quality of care, particularly across multiple providers. The entire organization can easily access and understand patient information, medication orders are far more efficient, and alerts and reminders help protect patients' safety. In addition, extracting data for quality improvement purposes is easier with EHRs than it had been with paper charts.

"It's worth the time you invest because of the information you get. The quality definitely goes up," one clinician said.

Clinicians also report that it is easier to engage patients in understanding how they can help co-manage their health. On electronic charts and tables, for example, patients can see their health status and where they stand relative to accepted definitions of good health.

Despite these benefits, CHAP still finds it challenging to collect, analyze, and report on certain quality metrics that, although captured in the EHR, may not be readily accessible. This may stem partly from insufficient planning during initial preparation for the EHR.

"We didn't really know how the EHR was going to fit into our quality improvement program," Martinez said. "We didn't know [enough] about what we wanted to pull from the system," which otherwise would have guided the set-up.

Another factor might also have limited CHAP's ability to analyze quality to the fullest extent. OCHIN provides more than 1,800 standardized report forms that theoretically should cover any reporting need—from financial and operational reports to clinical quality metrics. Sometimes, however, customization is necessary. Yet staff at CHAP, who at times have been overwhelmed by the sheer number of forms, lacked the knowledge and experience necessary to develop customized reports. The clinic has relied on OCHIN for this task while staff receives report customization training.

Technology Support

The division of support responsibilities between 7Layer and OCHIN is still working well. The superuser's effectiveness in providing certain types of support, on the other hand, has been problematic on occasion. Although he can help trouble-shoot basic technical problems and triage support requests, his lack of clinical knowledge has frustrated some clinicians. Based on their feedback, Martinez said that, ideally, it would have been better to assign the superuser role to a licensed vocational nurse or someone with more clinical training and patient care experience. But staffing limitations obliged CHAP to tap existing resources, she said. Noting that perfect solutions are rare, Martinez said the benefits of working with OCHIN and of the ongoing support the network model provides far outweigh this trade-off.

Expanding to Improve Quality

CHAP is now focused on enhancing and expanding the use of technology for quality improvement, with its EHR as the centerpiece. Together, the clinic and OCHIN are integrating biometrics, diagnostic interfaces, and ways to improve access to specialty care, such as telemedicine for diabetic retinopathy screening. They also are implementing Dentrix, a dental EHR; leveraging i2iTracks, an automated disease registry that will be integrated with the EHR, to enhance population health management; and participating in quality improvement programs, such as the regional Building Clinic Capacity for Quality

Phase II, that help fund the necessary integration of systems and processes.

CHAP also would like to pursue data exchange with local hospitals. According to Martinez, Pasadena needs a seamless system that would enable multiple health care organizations to access patient information.

"The nuts and bolts are not really the question," she said. Rather, it is how providers use EHRs. Martinez said CHAP has a broader vision of how to properly care for its patients, and that "with an EHR, the sky's the limit."

Sustainability

To sustain the EHR financially, CHAP is looking at ways to increase operational efficiency. Ongoing costs related to the PMS and EHR average $72,000 per year, or 1.9 percent of the operating budget for 2008–09. CHAP still pays for EHR maintenance and support with operational funds and is pursuing additional grants.

Over the longer term, the clinic would like to institute pay-for-performance and receive higher reimbursement rates by capitalizing on a state scope-of-services change reflecting the EHR's impact on patient care.

QueensCare Family Clinics (QFC),

LOS ANGELES

QFC is located in a densely populated urban area with an extremely diverse patient population in terms of age, language, and health status. It is one of the largest community health centers in Los Angeles County; there are relatively few other clinics of comparable size in California.

Location: Los Angeles

Mission: To bring quality primary health care that is accessible, compassionate, comprehensive, and affordable to the low-income communities of Los Angeles County.

Services: Wide-ranging, including primary care and multiple types of specialty care.

SPECIFICS

Site type:	Urban
FQHC:	Yes
Number of sites:	7
Annual patients:[1]	33,789
Annual encounters:[1]	127,101
Number of FTE providers:[2]	32.51

PAYER MIX

Medi-Cal:	12.96%
Medicare:	2.30%
Capitation:[3]	20.42%
Sliding fee/ self-pay:	5.12%
Insurance:	0.31%
Uninsured:[4]	58.89%

SYSTEM/PRODUCT

PMS: Sage Medical Manager

EHR: Sage Intergy

Interfaced: Yes

Integrated: No

EHR ADOPTION TIMELINE

Planning: January 2006

Selection: July 2006

Go-live: April 2007

Implementation completed:[5] November 2007

Productivity level[6] **(duration**[7]**):** 97% (24 weeks)

1. Based on 2007 data from the Office of Statewide Health Planning and Development (OSHPD).
2. Based on 2007 data from OSHPD. Providers include physicians, registered nurses, family nurse practitioners, certified nurse practitioners, dentists, licensed clinical social workers, other providers billable to Medi-Cal, other certified providers in the Comprehensive Perinatal Services Program.
3. Capitated Medi-Cal/Medicare, Healthy Kids/Families, insurance.
4. Public-private partnership, state Expanded Access to Primary Care program, grants, Health Way L.A..
5. At all sites.
6. At the time of this report.
7. Time between EHR implementation and return to the stated productivity level.

EHR Planning and System Selection

In August 2006, fueled by a vision of improving quality of care through health information exchange, QueensCare Family Clinics (QFC) began planning an EHR implementation. The clinic was apprehensive about the prospect of taking on this challenging task and implementing a new PMS simultaneously. The most logical approach, QFC concluded, would be to pursue an EHR that could interface with its current PMS, Sage Software's Medical Manager. This key decision narrowed the field of potential EHR vendors.

After discussions among managers and clinicians, and demonstrations by Sage, QFC chose Intergy EHR, also a Sage product. Two important factors guided this decision: Intergy EHR could interface directly with Medical Manager and it used the MEDCIN clinical findings database from Medicomp. MEDCIN would enable the clinic to create quantified, quality-of-care monitoring reports for itself and for various collaborating organizations. In addition, the Intergy product was one of few that would enable QFC to effectively capture structured data for detailed reporting.

QFC then set out to fully understand the next steps. To make sure its expectations were grounded, it solicited input from a clinic in Michigan of similar size that had chosen to interface an Intergy EHR with Medical Manager. The Michigan clinic's candid feedback and guidance raised potential challenges for QFC related to funding, productivity, clinician resistance, and change management. QFC focused on developing a viable strategy for funding, historically a major barrier to EHR adoption at safety-net clinics.

Although making a business case for EHRs in community health centers is still challenging, QFC executives were determined to obtain funding. Terry Bonecutter, the chief executive officer, said QFC always believed that broad adoption by other health care providers would be necessary before clinics could realize a true financial return on investment in EHRs. "The ability to readily share and exchange patient information in a more timely and meaningful way is critical to seeing a return," he said.

QFC sought the support of its board and the QueensCare Foundation. Compared to most other clinics, QFC's close ties to the foundation were unusual. This relationship gave the clinic access to significant financial resources; the foundation had a history of funding QFC initiatives and operations. However, the relationship also prompted concern about the risk the foundation would bear by underwriting part of the multi-million dollar investment necessary to implement and maintain an EHR. As a federally qualified health center that had to meet requirements in Section 330 of the Public Health Service Act, the QFC board included a significant number of community representatives who were likely to benefit directly, as patients, from an EHR. The QueensCare Foundation board, in contrast, consisted largely of experienced business professionals who were charged with making prudent investment and disbursement decisions. The inevitable drop in productivity and revenue losses as a result of EHR adoption were less acceptable to them, at least initially, according to a QFC executive.

By emphasizing the value of improved patient care and the clinic's commitment to return to pre-EHR productivity levels eventually, QFC succeeded in persuading the QueensCare Foundation to fund a substantial portion of the up-front costs. External grants and clinic reserves made up the balance of start-up funding. Ultimately, QFC spent nearly $3 million on the project. About half of the total was for "hard costs," such as hardware and software, and about half for "soft costs," including training, temporary staff, and consultants, said Lee Huey, the chief financial officer. Bonecutter said EHR

adoption would not have been possible without the foundation's support and commitment.

Preparing for Implementation

In January 2007, QFC began preparing for EHR implementation. Preparation included sizing up tasks that would require substantial project management, such as documenting and redesigning workflows. Bonecutter saw a need for external help.

"We are very lean at the management level," he explained. "The people on our steering committee were wearing two hats and didn't have the time to really focus on this effort. I could see that people were stressed."

Expectations about the time and focus necessary to manage the project effectively, and a lack of internal experience with EHR adoption, were the main factors that motivated Bonecutter to seek a consultant. QFC hired Grace Consulting, a health care-oriented group that would manage implementation activities and, when necessary, guide executives through the process. "They kept us on our toes and made us accountable," a staff member said.

Grace analyzed workflows at all seven clinic sites to help QFC understand and prepare for the impact of automating current or redesigned processes. In effect, Grace freed executives to concentrate on leading the organization through EHR adoption rather than trying to manage every little detail.

As the moment of broader organizational impact drew closer, the executive management team realized it needed to communicate the EHR implementation plan to everyone else at QFC. Its strong commitment to success and its belief in the value of an EHR helped the team frame a communication approach. The message to staff characterized EHR adoption as an opportunity for the clinic to become a more innovative and cutting-edge operation, and emphasized that technology can improve patient care and increase efficiency.

The response from clinicians and staff was mixed. Most expressed a willingness to learn a new way to work with patients, but some became quite anxious, primarily about computer literacy and the EHR's complexity.

"I'm one of the older clinicians and I don't know a lot about computers. I was scared—very scared," a provider recalled, adding that he thought he might have to look for work elsewhere. Another clinician said his fear arose from a general dislike of technology: "When I first heard about it, I said, 'I wish I wasn't in the 21st century.'"

Grace managed some communications with clinicians and staff. Huey, the chief financial officer, said they probably were more open to suggestions or critiques from a third party than from management.

Although the communication approach helped QFC garner buy-in from most clinicians, some felt that management should have highlighted the adoption challenges as well as the benefits. One clinician, when asked if QFC could have been done anything differently to alleviate clinicians' concerns, said: "I think having a more realistic understanding of what the process was going to be like would have been helpful. I don't think it would have scared us or made us more concerned." A manager suggested that a greater emphasis on the adoption rationale—the "why"—might have generated broader organizational support early on.

Despite lingering discontent among some clinicians and staff about the degree of pre-implementation disclosure, the executive team clearly made an effort to plan and provide support well beyond its verbal assurances. Along with Grace, the clinic hired two additional IT support staff, set up a help line that staff could call if they had EHR-related questions, and planned to station superusers

at each clinic site. The IT department, at the urging of management, offered classes during lunch and in the late afternoon to help clinicians improve their computer skills and learn the basics, such as working with email and navigating within a Windows environment. QFC also harnessed the enthusiasm of Guillermo Diaz, MD, the assistant chief medical officer. He became the project's clinician champion, a cheerleader who infused the effort with energy and provided support to clinicians and staff. The EHR implementation prompted only one clinician to leave.

Implementation Approach and Experience

Technological Considerations

One of the first key technological decisions was whether QFC should rely on wired, thin-client desktops or wireless tablets/laptops. Battery life, upgrade and maintenance costs, and potential theft were among the considerations. In the end, flexibility for clinicians who moved frequently between rooms and, in some cases, between sites was the primary driver of QFC's choice of tablets. They would enable clinicians to continue using "their" desktop computers—and thereby retain a sense of ownership, which seemed important to some who were more apprehensive—and to roam. Tablets would also enable clinicians to work outside the office to abstract data, close charts, or perform other tasks.

However, the tablets proved challenging for some clinicians, who ultimately returned to using their desktops and modified their workflows accordingly.

"I started with a tablet, but the screen size and text were too small, and they strained my eyes," one of these clinicians explained. "I was very new to computers and it was easier for me to learn on a desktop."

The physical burden of carrying around tablets was also a problem for several clinicians. QFC eventually purchased rolling carts to serve as mobile work stations for the tablets.

Another important decision was how to phase in the EHR, given that there are seven clinical locations. When the new system went live in April 2007, QFC chose to roll it out one site at a time, beginning with the site closest to the corporate offices. The short distance enabled the IT staff to respond quickly to issues. The order of subsequent roll-outs was based on clinics' encounter volume, from smallest to largest. The phased approach enabled QFC to leverage its previous experience along the way and continually refine implementation, ensuring that the largest site would benefit from tried-and-true practices.

Scanning and Abstraction

In converting to electronic records, clinics can scan paper records, manually abstract data from those records, or do both. QFC handled archiving and abstraction by combining long-term scanning of patient records with abstraction at the point of care. It started scanning before the EHR implementation as a way to transition to a digital archive. The clinic initially hired four individuals to help scan records. Breaking down the information in paper files and reassembling it in digital form took the most time, so this was the major effort before roll-out, Huey said.

However, the scanning workload increased significantly as the go-live date drew closer. QFC would have to either push for more time using existing staff or enlarge the scanning team. After careful consideration, the executive team concluded that the burden was too great for existing staff, and six additional part-time contractors were hired.

Scanning personnel worked as a unit to maximize efficiency. Huey said they arranged the process like

an assembly line: three workers to break down paper files, four to scan, two to reassemble the information in digital form, and one to supervise. Later, each of the clinic sites got a permanent scanner. Paper records were to be retained for two years after scanning.

This scanning arrangement had some pitfalls. Initially, the scanning unit organized documents into few and loosely defined categories within the EHR, making search and retrieval difficult for clinicians who had not scanned the documents themselves. Over time, QFC designed a more appropriate process, but the initial approach was very frustrating for clinicians and front-office staff.

After scanning, certain data still had to be abstracted for the EHR. QFC enlisted clinicians for this purpose. They abstracted data from charts—from paper charts if they had not been scanned yet—during patient visits, which enabled them to determine which data were most essential and current. Although combining abstraction with patient care caused some loss in clinician productivity, it proved to be a good solution.

Training

In coordination with Grace, QFC provided on-site training to groups and individuals. Some providers found that training during lunch time and in the afternoon was problematic, given their regular clinic schedules. One clinician later said it would have been better to clear providers' schedules months in advance so they could attend.

The training content for groups was general to accommodate clinicians' different skill levels. This strategy ensured comprehension, but it was frustrating for clinicians who would have preferred a "right size" approach. Some providers were already very proficient, while others did not even know how to use a mouse, said Leland Chew, the director of information systems. Grace and QFC support staff later provided more personalized training. A combination of group learning and individual support was critical to achieving a common level of comfort with the EHR.

"Active learning was key," a clinician said. "Sometimes you forget what you learn in the classroom, and it was very helpful to have someone there on the site to answer questions. The on-site support was always accessible and timely."

A survey one year after implementation revealed that 24 percent of clinicians felt "very proficient" using the EHR, 33 percent felt "proficient," 38 percent were "comfortable" with it, and 5 percent were "not comfortable."

Productivity

Taking into account the generally accepted loss of productivity during—and oftentimes long after—EHR implementation, and the eventual return to productivity, QFC set certain goals. It measures productivity based on the number of reportable patient visits per month as defined by the Health Resources and Services Administration's Uniform Data System. One goal was to regain pre-EHR productivity within two years, Bonecutter said. QFC balanced productivity expectations for clinicians with the new EHR demands on them by initially requiring that they work on a low ratio of electronic charts to paper charts. Expectations were very low at the outset—one electronic chart per day for a week. The ratio then increased incrementally as clinicians became more comfortable with the EHR.

At first, the new system was configured to capture nearly every aspect of a patient visit by means of structured data elements. Templates and mouse clicks requiring minimal entry of free text guided the entire process. However, as EHR use increased, the executive team noticed that the click-heavy approach appeared to have a greater negative impact

on productivity than anticipated. "It was taking too long to click everything," Diaz said. So QFC decided to limit structured data collection to four categories: diagnoses, procedures, labs, and prescriptions. Clinicians could enter all other data as free text, thus streamlining the visit and improving productivity.

"There is an emotional tie to paper," explained Allen Rothfeld, MD, the chief medical officer. "There is something about paper that gives providers a [deep sense of] attachment. Then, little by little, they are willing to let go."

Clearly, letting go of free-text entry altogether was overwhelming at first. But by making a mid-stream adjustment, QFC successfully found a way to make the record "say" what was necessary and still meet the business objectives for productivity. It planned to shift other data from free-text entry to structured data collection incrementally over time, enabling clinicians to sustain productivity despite the greater number of mouse clicks.

Although some clinicians still struggle with productivity, most have been able to keep pace with QFC's expectations. Among the factors that contributed to productivity loss were a lack of computer literacy, the need for initial and refresher training, and the longer time it took to document patient visits. Clinicians and managers agreed that productivity is to some extent a function of a clinician's particular style. Therefore, QFC must now figure out how best to support each individual provider in achieving the organization's objectives, which makes it difficult to achieve targeted results within a specified timeframe.

Post-Implementation Experience

Quality Improvement

QFC completed the implementation at all sites in November 2007. Although it is still too early to quantify the EHR's impact on health outcomes, clinicians have noticed other immediate benefits. They say it is easier to engage patients in care—with a graph showing trends in their health, for example—and that the delivery of patient education has improved. Both clinicians and executives cite efficiency improvements in ordering medications, analyzing the patient population, and other processes. For the first time, said Rothfeld, the clinic can see how many patients have a body mass index greater than 28 and analyze weight changes, something he never dreamed was possible before the EHR. In addition, QFC can compare clinic sites and, if one is performing better than another, try to determine why. It can also develop internal best practices across the organization.

QFC says that compared to the old paper-based system, the EHR makes it easier to analyze some clinical measures, such as the mean HbA1C (a type of hemoglobin that reflects blood glucose level) in the clinic's entire patient population and the percentage of patients with an HbA1C of less than 7 percent. QFC can also analyze operational measures, such as the percentage of patient visits completed using the EHR. The clinic is slowly phasing out its Patient Electronic Care System registry as structured EHR data become an integrated, centralized source of patient information.

Rothfeld noted that the EHR has enabled better quality assurance monitoring because it simplifies the chart review process and reduces the burden on clinical leaders of assessing clinician performance. Reporting is more legible, comprehensive, and detailed than it was in the past.

However, the continued collection of both free text and structured data has presented challenges. It makes the EHR easier for clinicians to use and has contributed to a recovery of productivity, but it also inhibits full achievement of QFC's quality

improvement goals, which will require more efficient data extraction and analysis.

Unanticipated Technical Challenges

Meanwhile, the clinic is encountering unanticipated technical challenges stemming from its use of an interfaced rather than integrated PMS/EHR. Quality-focused analysis, such as that regarding management of chronically ill patients, requires data from both components. Diaz said QFC needs an integrated PMS to manage this population. For example, if the clinic wants to find out when diabetic patients last visited for a foot exam, it cannot access the necessary information through the EHR database.

Another significant challenge is dealing with disparate information systems. QFC uses a unidirectional lab interface that feeds results back to the EHR, but orders still must be placed through the lab vendor's Web client. Consequently, matching customer data with billing is problematic. Sometimes entire orders disappear.

Clinician and Staff Experiences

Since the EHR went live, clinicians and staff have noticed changes in daily interactions with patients. "We don't give patients enough eye contact when we are pressed for time—we are busy typing and documenting," one clinician reported. The new system also has impacted clinician-staff interactions. Clinicians can now see how front-office staff schedule patients and "push back," a medical assistant said.

Clinicians are pleased to have greater control over their schedules, which gives them more say about which patients they will see and how many. The results of an internal survey suggest that clinicians generally have a positive view of the EHR. When asked if they wanted to revert to a paper system, 86 percent said no. More than 75 percent indicated they were satisfied that electronic charting had "improved the quality of care with some problems" or very satisfied that it had "improved my quality of care."

One clinician said: "I wouldn't go back to paper charting because all the [patient] information is right here and easily accessible." In other words, there was no need to hunt for charts or missing documents. On the other hand, front-office staff initially had difficulty explaining to clinicians that double or triple booking of appointments was necessary to maintain productivity.

Productivity and Quality Improvement

Now, about one year after the final roll-out, QFC hopes to focus on improving productivity and bolstering quality improvement. Despite the initial drop in productivity, the clinic has nearly returned to pre-implementation levels—about 97 percent, according to Bonecutter. Rothfeld and many clinicians doubt that QFC can reach 100 percent again, but there are clear efforts to provide support and motivation to maximize productivity. QFC is also planning to migrate to Sage's integrated Intergy PMS/EHR and to increase data exchange with other organizations. Bonecutter believes that more substantial exchange is necessary to improve quality.

Sustainability

QFC hopes that the EHR's ability to more accurately and efficiently capture the services delivered during patient visits, along with quality-based financial incentives from payers and grant-makers, will boost revenues. For now, the clinic is using funds from its operating budget to pay for maintenance and support. Huey estimates that annual hardware and software expenses will rise to as much as $500,000 in 2009, representing a 2.28 percent increase in the annual budget, but will decrease significantly after the transition to the integrated Intergy system.

Shasta Community Health Center,

REDDING

Shasta is one of California's earliest EHR adopters. It has become known for its consistent engagement and leadership in new and exciting quality improvement efforts, such as the region's e-prescribing pilot program.

Location: Redding

Mission: To provide comprehensive, high quality, efficient, and effective health care services, delivered in a holistic, caring, and compassionate way as part of an interdependent health system, to the residents of Shasta County.

Services: A range of preventive, acute, and chronic care.

SPECIFICS

Site type:	Urban
FQHC:	Yes
Number of sites:	5
Annual patients:[1]	28,379
Annual encounters:[1]	109,456
Number of FTE providers:[2]	35.55

PAYER MIX

Medi-Cal:[3]	55.40%
Medicare:	15.90%
Sliding fee:	14.40%
Other public:[4]	5.58%
Insurance:[5]	2.90%
Insurance:	5.91%

SYSTEM/PRODUCT

PMS/EHR: NextGen **Interfaced/ Integrated:** Yes/Yes

PMS/EHR ADOPTION TIMELINE

PMS/EHR Planning:	2003
PMS selection:	July 2003
PMS go-live:	January 2004
EHR go-live:	April 2007
Implementation completed:[6]	September 2007
Productivity level[7] **(duration**[8]**):**	85% (~40 weeks)

1. Based on 2007 Uniform Data Set (UDS) (Bureau of Primary Health Care in the Health Resources and Services Administration).
2. Based on 2007 UDS report. Providers include physicians, physician assistants, registered nurses, family nurse practitioners, certified nurse practitioners, certified nurse midwives, dentists, licensed clinical social workers, other providers billable to Medi-Cal, other certified providers in the Comprehensive Perinatal Services Program.
3. Includes the state Child Health and Disability Prevention program.
4. Includes County Medical Services Program.
5. Includes the state Healthy Families program.
6. At all sites.
7. At the time of this report.
8. Time between EHR implementation and return to the stated productivity level.

EHR Planning and System Selection

In 2003, as it became increasingly frustrated with the cost and inefficiency of paper-based processes, Shasta Community Health Center in Redding began pursing an integrated PMS/EHR. Chief Executive Officer Dean Germano had become interested in EHRs years earlier, but failed implementations elsewhere made him hesitant. But increasing dissatisfaction with Shasta's PMS and the mounting cost of managing paper records prompted him to consider transitioning to an electronic, integrated environment. At one point, there were as many as 27 employees in the medical records department, yet clinicians still could not get what they needed, Germano recalled. He knew that the clinic had to implement an EHR.

Shasta set its sights on selecting an integrated PMS/EHR platform (interfaces at that time were much less refined). It assembled a team of clinical, technical, and operational stakeholders from throughout the organization to choose a system. Germano said he kept his involvement to a minimum to ensure that clinicians would participate and decide what would work best for them.

After the clinic evaluated various products, it selected NextGen's integrated PMS/EHR, based largely on the platform's flexible design and on assurances that the platform would enable Shasta to meet the diverse needs of its varied and complex clinical service departments. The clinic moved forward with implementing the NextGen PMS and began planning for the EHR addition.

Historically, Shasta had successfully raised funds for capital improvements and innovative projects, so Germano initially expected that the clinic would be equally adept at raising capital to pay for EHR start-up costs. However, obtaining a large block grant probably would have required that it partner with

other clinics, an option Germano was not interested in pursuing.

"Most grant opportunities were for collaborations at the time," he recalled. "We wanted to focus our energy on our own effort because we knew how difficult this was going to be just with my own organization, let alone having partners." He turned instead to the clinic's board of directors, hoping to finance the EHR primarily with capital reserves.

Germano and his executive management team developed a three-year budget that included the anticipated cost of hardware and licensing, and ongoing expenses such as maintenance and support. Sherry Caldwell, the chief financial officer, also factored in estimates for soft costs—for example, training and changes in processes such as transcription. Shasta expected licensing and support to cost more than $350,000 up-front, and ongoing maintenance and support about $60,000 annually. The clinic would also have to spend $200,000 on server upgrades and $300,000 on laptops, monitors, Ergotron arms (affixed to computers on exam room walls, enabling movement), and cables. Ultimately, consulting services and external training expertise cost $97,000 and $60,000, respectively.

To make their case to the board, Germano and Caldwell tried to estimate the return on investment. But the board thought their estimate was neither comprehensive nor convincing. Caldwell said that many things, such as job satisfaction and patient safety, were impossible to quantify. Board members were concerned about the lack of a clear business case and the significant initial investment.

"The board was hesitant—it's a hard pill to swallow," Germano said.

The board came to accept a different EHR value proposition that Germano presented: improvement in the quality of care and internal processes, and greater information exchange, such as ordering and receiving lab results electronically. In the end, it approved his proposal. Reserves and a few small grants would cover start-up costs.

Preparing for Implementation

An important decision Shasta faced as it prepared for implementation was whether it should invest time and resources in formally assessing workflow. Beth Greenwood, the quality improvement director, was adamant about the importance of redesigning workflows before implementation. The clinic chose instead to rely on the flexibility of the NextGen platform to adapt to current workflows.

"We talked about the pitfalls of not [assessing workflows], but we were focused on so many other things," Greenwood recalled. In retrospect, the entire executive team agreed that this was a serious misstep.

The team focused intently on other important preparations, such as garnering clinician buy-in and communicating with staff about the EHR adoption effort. From the very beginning, staff communication was considered an integral part of planning and implementation. Shasta established an EHR committee and began holding monthly meetings, which soon became weekly. Committee members included clinicians, some of whom served as project champions, and other stakeholders from throughout the organization.

"Getting buy-in was critical," Germano said. Providers were told that the project would be done their way. He and other executive team members believed that organizational culture, rather than management fiat, would be the primary driver of buy-in.

"I think you can take a top-down approach if that is your culture, but you will probably lose people on a project like this," Germano said. Yet, when asked if this approach would be effective at clinics generally,

he conceded that relinquishing too much control can be problematic, adding, "It needs to be a balance."

Clinicians' reactions to the EHR venture ranged from genuine excitement to blatant resistance.

"Initially, I was really against it," one of them said, noting that productivity issues apart from an EHR were challenging enough. "But now I'm one of the biggest supporters." Clinicians also expressed concern about computer literacy, EHR complexity, and having to change how they practiced.

Germano said some of the older providers were the clinic's most productive and cared for the most complex patients; an EHR might make their job even more difficult. Others, such as medical records staff, were concerned about job security. They did not fully understand how their jobs would change and become more interesting as well as challenging.

Implementation Approach and Experience

Technological Considerations

The decision to deploy desktop computers, tablets, or a combination was a crucial one. In determining which approach would be best, Shasta considered several factors, including ease of use and mobility for clinicians, and ease of maintenance and support for IT staff. Desktops and tablets had distinct features and benefits—and presented distinct challenges. For example, desktop computers would likely be easier for clinicians to use, given their familiarity and comfort with them, but the equipment was immobile. Tablets, on the other hand, were highly mobile, but they depended on battery power, were easy to steal, and raised ergonomic issues. Shasta decided to deploy desktops in all locations except the mobile clinical unit. Some computer-savvy clinicians received tablets and used both types of computers.

"We wanted to give people tools [they were] comfortable with," Germano said. "Our nurses were not comfortable with tablets, so we stuck with the basics."

Shasta also had to decide whether to roll out the EHR simultaneously at all five sites or in phases. If it chose the latter approach, the order of roll-out would be important because the initial positive or negative impact could affect productivity and staff perceptions at the other sites. Would it be better to begin at a satellite location for the sake of simplicity, or at the main site to ensure that the most comprehensive view of clinic activities was captured up-front? The debate ended when Shasta chose to use its mobile unit, a van, for pilot testing. The unit was a relatively simple and controlled environment in which basic technical and operational issues could be resolved.

The EHR would be an ideal tool for the van, which served the homeless, because it did not have access to patient charts. Shasta subsequently rolled out the new system at its main site, first to departments whose clinicians were the most enthusiastic and seemingly committed to success. In retrospect, Germano said this approach had a "major drawback": Not rolling out the EHR to the most complex site first meant the clinic could not fully gauge its impact.

At the outset of implementation, a broader goal was to ensure that the EHR could connect with other information systems to retrieve important data, such as lab results. Shasta had two major lab partners, which made this challenging and complex. Nevertheless, managers viewed a functional lab interface as critical; without it, the project could not move forward.

Training

The selection of NextGen, touted as a highly flexible development platform, affected Shasta's training approach. There was not a standard training curriculum for all clinicians; rather, the IT staff

customized training based on the specific functions and templates a department expected to use. In most cases, clinicians received individual training according to their department affiliation and, in some cases, according to personal preferences if templates were customized for their particular needs.

This approach worked well early on, but it fostered a high degree of variation in terms of clinicians' knowledge, their ability to provide peer-to-peer support, and dependence on IT staff. Shasta had to modify and add templates frequently throughout the adoption process to satisfy evolving requirements as the new system was rolled out to departments, and each addition risked frustrating clinicians and staff who were already using the EHR.

"Training was hard because we were constantly changing and adding templates," one clinician said. "Providers would learn one thing and then we would have to modify it or learn something else."

Non-clinical staff received training primarily in group sessions at Shasta's training lab. After basic training, they had access to superuser support and a dedicated phone number they could call to ask for help. New clinicians and staff received training on their first day of work. Later, Shasta paired new arrivals with a veteran user to accelerate the learning curve.

Clinic leaders recognized that computer literacy and general comfort with technology varied widely. To address this, they offered basic computer training to anyone who felt a need to improve their skills. The clinic ensured an appropriate degree of training standardization by contracting with a trainer from nearby Shasta College.

To increase comfort with technology in general, Germano and his executive team implemented a stepping stone approach. They invested in and promoted other technologies, such as personal digital assistants (PDAs) and digital transcription software, before the EHR went live. The hope was that PDAs would help clinicians become comfortable checking formularies and checking for potentially harmful drug interactions or drug allergies, and that the transcription software would ease the migration of some data into the EHR. Although this approach seemed logical, clinicians did not use the tools to their fullest extent, and some found them to be more distractive than helpful. They were "one more thing on the learning path," a clinician said.

Despite Shasta's supportive efforts, executives realized that certain individuals simply would not survive the transition to an EHR. Robin Glasco, the chief operating officer, cited high turnover among licensed vocational nurses. She said some of them could not navigate between EHR screens even with help from trainers and had neither the necessary computer skills nor the drive to improve such skills.

To prevent similar problems in the future, Shasta has revised its minimum qualifications for potential new hires and how it evaluates them. Registered nurses and licensed vocational nurses must be able to type at least 35 words per minute or, at a minimum, demonstrate a desire to learn computer skills and improve them.

A Flexible Platform

The NextGen platform and the lack of a formal workflow assessment required immediate development of customized templates that would mirror the clinic's work processes. Shasta had intentionally selected a flexible platform, but the need to customize templates proved to be a greater burden than it expected. It had hoped that the templates would be more "turnkey," Germano said. On the other hand, improving productivity without modifying the templates to accommodate workflow did not seem possible. German described this situation as "kind of a Catch 22."

The number of templates that Shasta customized and implemented has yielded benefits and also created hurdles. For example, some variables not entirely within the clinic's control, such as NextGen updates, continually raise concern about the stability of the highly customized environment. The vendor "always says it will be fine, but you really have no idea until you try it," one clinician said. Shasta now spends considerable time testing changes in the EHR to mitigate the risk of problems they might cause. It realized that other difficulties may have resulted from insufficient testing early on.

Looking back, Germano said one of the pitfalls of flexibility is the temptation to do too much. The clinic wanted to capture all data.

"It was naïve," he said. "For other clinics considering how to deal with customization, I would suggest selecting a limited set of markers to capture."

During initial implementation, the clinical informatics manager "just couldn't handle it" and decided to leave, according to a member of the executive team. Germano was tempted to seek immediate support from an outside consultant, but he felt strongly that the organization should build internal capacity, given the project's complexity. Shasta was fortunate to stumble upon an incredible resource: Charles Kitzman, a friend of Germano's wife, who had a background in computer science and education.

"Charles was literally packed and leaving for Seattle the next day, but I looked at his background and thought he might be a good fit," Germano said. "So I immediately called him to try and convince him to stay and work for us."

Kitzman accepted the offer. As the new director of clinical informatics, he immersed himself in the implementation. Although Shasta briefly enlisted an EHR consulting firm with significant NextGen experience to help with and support template development and to manage a technical hotline, Kitzman soon grew into his new role and quickly became the clinic's "EHR guru." However, his central role also put Shasta at risk: If he failed, the consequences might be far-reaching. Kitzman contended that because other IT staff are deeply involved in supporting all aspects of the ever-evolving EHR, the clinic is not in danger. Nevertheless, Shasta is reducing its dependence on Kitzman by getting him additional support, which will provide a cushion if something goes wrong.

Productivity

When it was preparing for implementation, Shasta expected a 50 percent decline in productivity (the number of patient visits per hour) and hoped to steadily regain and even surpass the previous level. However, as the implementation got under way, the executive team realized, based on feedback from clinicians, that expectations needed adjustment. For example, the clinic underestimated the potential increases in efficiency as a result of ordering medications and sending and receiving lab orders electronically. It also overestimated the return to productivity by not recognizing the impact of training, data abstraction, and documentation of patient interactions at the point of care, which placed greater demands on clinicians.

One clinician said that finding necessary information in scanned documents took more time and that seeing patients with complex, co-morbid conditions amplified the challenge of using a new system. In addition, clinicians spent more time learning how to perform new tasks, such as coding all diagnoses, during and after patient visits. Accurate coding was necessary to track and measure quality, said Patricia Sand, a co-chief medical officer and head of quality assurance.

The idea behind having clinicians abstract patient data from paper charts containing their hand-written notes was to let them decide which data were most important. This would also preclude legibility problems. But abstraction at the point of care and during administrative time proved to be too time-consuming for clinicians, which impaired productivity. So Shasta experimented with an alternative approach: It enlisted medical assistants to abstract some preliminary data before patient visits. Although their help gave clinicians a head start on abstraction during visits, the data were often inadequate due to the assistants' lack of clinical knowledge.

Shasta modified its approach yet again. This time, it asked nurses to perform the preliminary abstractions, leveraging their clinical expertise. And quality improvement staff reviewed these data before the patient's clinician saw them, which also ensured a high-quality transfer of information from paper to electronic records.

Germano said he would recommend the latter strategy to other clinics. But he cautioned them not to underestimate the overall time it takes to abstract and re-enter data.

For clinics, "it's a challenge trying to input information when you have the pressure to pay bills," he said. A complicating factor, he added, is the health condition of Shasta's patients, many of whom have chronic diseases and are very sick. Most of the information in their complex medical histories must be transferred into the EHR.

Financial Incentives

With growing pressure on clinicians to regain productivity and deal with the evolving customized templates, Shasta designed a financial incentive program to reward clinicians for becoming adept at using the EHR. As a first step, it offered a bonus of $1,000 to those who relinquished their digital recorder, a symbolic reflection of their commitment to leaving the old transcription approach behind. Then it added financial incentives for "EHR mastery," with the goal of motivating clinicians to gain command of the new system as quickly as possible. The incentives were based on proficiency during the first year of the transition rather than on productivity, a measure that would have been frustrating for clinicians, according to Germano. The rewards ranged from $2,000 to $4,000 each, while the proficiency rewards for most staff were around $400 each.

"We knew we were going to take it on the nose with productivity, so gaining proficiency with the EHR was our number one goal for the year," Germano said. Other clinics, he added, should be aware that the first year of implementation "is a very difficult one for most organizations"; they may need to "think out of the box a little" in terms of incentives. In the second year, Shasta will tie financial incentives not only to productivity, but also to several other indicators, such as use of e-prescribing.

Post-Implementation Experience

Immediate Pains of Lower Productivity

Glasco, the chief operating officer, said that when the implementation began, Shasta had to stop seeing new patients and focus instead on meeting the demands of current patients, given clinicians' reduced availability. It did not want to turn away new patients. But for awhile, standard procedure among staff was to ask prospective patients if they were seeing another provider and, if they were, to suggest they take advantage of the access.

Shasta did not accept new patients outside of the urgent care department for about six months. Glasco, Sand, and Ann Murphy, MD, a co-chief medical

officer, instituted a system for current patients whereby registered nurses triaged those with the most pressing needs to providers for timely care.

Shasta is still working to boost productivity, which, as of July 2008, had reached about 85 percent of pre-implementation levels and was continuing to climb modestly.

Quality Improvement

In addition, Shasta is increasing its focus on improving the quality of care — specifically, gaining immediate access to patient information and accumulating and reporting data — as Germano, Sand, and Murphy had envisioned when the clinic embarked on the EHR project. However, this objective, like most aspects of the implementation, has posed challenges.

"We have yet to see the full benefits we were looking for in terms of quality, but we're getting there," Sand said.

Among other things, Shasta can now provide better continuity of care across multiple clinical sites and departments, and between fixed locations and the mobile unit. Clinicians in the Healthcare for the Homeless van have access to patient records in the field. In addition, "this is the first time we have been able to get a true picture of our entire diabetic population and the average HbA1c," said Greenwood, the quality improvement director. "As we are able to develop and refine these reporting tools to provide good feedback to the clinicians, I do expect to see clinical quality improvements." Clinicians noted that they can engage their patients more easily with visual representations of health indicators and by simply having patient information available for discussion or reference during visits.

Yet obstacles remain. One hurdle from the outset has been errors stemming from the interface with Quest labs. Another is the difficulty clinicians still have when they retrieve information from scanned documents, which impedes their desire to deliver high-quality and efficient care. The "biggest disappointment" with the EHR, one clinician said, is that providers cannot always access patient histories and notes, even though this should be easy.

Clinician and Patient Perspectives

Shasta surveyed clinicians and patients at different points during implementation, which helped managers monitor the EHR's impact. As Table 1 illustrates, clinician sentiment improved significantly between April 2007, when Shasta was in the middle of training and preparations to go live, and December 2007.

Table 1. How Shasta Clinicians Rated the EHR

In April and December 2007, Shasta asked clinicians to rate their level of agreement with the notion that implementing an EHR:

"…is going to make me more efficient."

"…will provide higher quality care than I had thought before."

"…is going to be easier than I thought."

	APRIL	DECEMBER
Strongly agree	18%	36%
Agree	26%	28%
Somewhat agree	21%	11%
Somewhat disagree	15%	8%
Disagree	14%	11%
Strongly disagree	5%	6%

Most patients accepted and were with impressed with the EHR capabilities, such as sending prescriptions to the pharmacy. According to Germano, their feedback in a December 2007 survey was mostly positive, particularly regarding the Health Outreach for People Everywhere program that uses wireless technology so clinicians in the van have access to patient information. Among patients' comments were "it helps, and makes things faster"

and "it's an awesome invention!" However, some expressed frustration with the change in interactions with clinicians.

"Some patients felt that we were more interested in the computer than hearing about their problem," Sand said. "It's difficult to see patients [while using] computers and still feel that you're doing a good job."

Consequently, Shasta gave its clinicians scripts that helped them explain to patients why they were using a computer in the exam room. The clinic also educated patients about the EHR and set appropriate expectations for them about its capabilities.

Quality Improvement and Sustainability

Shasta is now optimizing use of the EHR for quality improvement. "We want to prove what we do makes a difference—that we can achieve better outcomes, reduce ER visits, and avoid unnecessary hospitalizations," Germano said. The clinic is moving clinical tracking processes for managing activities, such as cervical screening, mammography, and specialty referrals, into the EHR. It also plans to implement a dental EHR product like Dentrix or QSI and pursue data exchange opportunities with local hospitals and area specialists.

"This is the hardest thing I've ever done. But we never threw in the towel and we knew that the technology would help us do our job more effectively," Germano said. "It is certainly a marathon, not a sprint."

Shasta will continue tapping its operational budget to pay for ongoing costs, which are closer to 3 percent than the original 2 percent estimate, according to Caldwell, the chief financial officer. The clinic hopes that quality-based reimbursement will eventually generate revenue, although it does not expect such revenues in the immediate future.

It also hopes to offset costs over time through higher reimbursement rates, having successfully persuaded the state that EHR adoption constitutes a change in the clinic's scope of services. Shasta is the first clinic in California to pursue this kind of EHR-related change. The process was challenging for the state Department of Health Care Services, according to Germano, because rules governing the definition of EHR-related costs leave much room for interpretation, and the state did not precisely define "implementation" and other related specifics.

Approval of the scope-of-service change "was a positive and critically important step in the right direction and a step that is being watched by clinics throughout the United States," Germano said.

V. Analysis

The experiences of CHAP, QFC, and Shasta provide a wealth of information and insights for other clinics.

The experiences of CHAP, QFC, and Shasta provide a wealth of information and insights for other clinics. All three cases support the notion that executive commitment and other widely accepted factors are critical to the success of EHR adoption. A comparative analysis also reveals common decision points, solutions, and themes at these clinics that will help others better understand the associated issues.

Product Selection: The PMS Criterion

The three clinics in this report preferred a PMS/EHR solution. Is the PMS a key criterion in EHR selection, and if so, should it be integrated or interfaced with the EHR?

QFC chose the interface route, largely because it did not want to subject the organization to a wholesale PMS change while adding an EHR. One driver was the fact that QFC's PMS vendor offered an EHR. CHAP and Shasta, on the other hand, pursued an integrated solution because they needed a new PMS system as soon as possible and wanted an integrated platform in the future.

Although QFC chose an interfaced solution, all three clinics agreed that an integrated PMS/EHR platform is optimal. Indeed, vendors are moving in this direction. But choosing an EHR vendor based mostly on this characteristic is a very narrow approach. It runs somewhat counter to recommendations in recent years that have stressed the importance of an in-depth selection process based on a thorough assessment of, and input from, the entire organization.

The case studies identified certain limitations of interfaced PMS/EHR products. Because an interface cannot connect all data elements, pieces linking the PMS and EHR often are missing. Demographic data in the PMS are replicated in the EHR, but duplication and corrupted data can create problems in the electronic record. There are reporting limitations, as well, particularly if the interface allows data to flow only in one direction—from the PMS to the EHR. Finally, billing is less seamless in an interfaced system than in an integrated one. For example, ensuring that clinical diagnoses and procedures are correctly captured and billed in the PMS can be problematic.

The CHAP, QFC, and Shasta experiences raise important questions:

- Aside from the integrate-or-interface issue, is the PMS/EHR relationship the most important factor in successfully choosing a vendor?
- Do the potentially higher hard and soft costs associated with implementing a new PMS and integrating it with an EHR outweigh the challenges that insufficient data integration and managing the combined systems may pose?
- Given that selection processes and product choices vary widely, what are the critical underlying factors? The particular processes and choices at CHAP, QFC, and Shasta obviously paid off, but are there key factors that warrant consideration in all cases?

Network Model: Benefits and Trade-Offs

CHAP is the only clinic in this report that selected a network-model EHR. Its motivation to adopt a specific product partly drove the choice, but, as it had in the past, CHAP also wanted to outsource IT services and leverage OCHIN's standardized approach.

That said, other clinics must evaluate network offerings and, based on their own needs, determine if the model would be a good fit. Even if it is, choosing the most appropriate network can be equally important. Although networks may understand clinics' needs better than vendors do, their ability to customize a standardized approach varies.

Another important consideration is the financial implications of working with a network. Networks typically offer economies of scale by leveraging their technical infrastructure and functional expertise across multiple organizations. Yet they are unlikely to attain the level of economy that primary vendors can achieve, given vendors' large customer base. Therefore, one of the most valuable attributes of networks is the targeted services they can offer to clinics, thanks to a deep understanding of clinics' needs.

Financing and Sustainability

All three clinics obtained grant funding from external sources. In each case, the fund-raising approach depended heavily on the clinic's relationship with potential funders and the other resources available to it. Arguably, QFC and Shasta are unique. Most clinics do not have special access to a foundation, as QFC did, nor adequate reserves to self-fund an EHR, as Shasta did. Perhaps the most relevant financing model for other clinics was the one at CHAP, which secured funding partly by conveying its community-wide vision of EHR value and partly by establishing community partnerships.

One noteworthy finding: The chronology of implementations in this report, from oldest to most recent (Shasta, QFC, and then CHAP), appears to be correlated with the amount of external funding the clinics obtained. The more recent the implementation, the greater the funding. Clearly, multiple factors had an effect on how much external funding each clinic pursued. But the progressively larger amounts may reflect an increasing awareness of the value of EHRs for quality improvement. In addition, the growing number of EHR successes may make funding a more realistic possibility now for other clinics.

CHAP, QFC, and Shasta expect to pay for ongoing expenses out of operations, although their strategies for offsetting or justifying the additional costs vary. QFC is focused on the promise of quality-based reimbursement in the future. CHAP and Shasta, in contrast, hope to leverage the potential value of a scope-of-service change if, under regulations governing federally qualified

health centers, they can justify EHR adoption as a "triggering event" leading to a higher reimbursement rate.[23]

Although the case studies in this report do not suggest that any single fund-raising strategy is a panacea, clinics might consider CHAP's approach — namely, conveying a community-wide vision of EHR value and building community partnerships. In instances where the financial benefits of adoption might accrue to certain stakeholders in the community, such as providers of emergency or specialty care, clinics may be able to garner financial assistance or in-kind support in recognition of the potential broader impact of their EHR.

EHRs' momentum and California's evolving scope-of-service policies will probably lead to limited cost recovery and financial incentives for clinics. However, incentives will not likely translate into a true financial return on investment in the near term. Clinics should instead view such incentives as a way to get closer to the break-even point for costs associated with sustaining an EHR, which in turn would reduce the amount of grants or operating funds necessary for this purpose.

Productivity Losses

These three clinics illustrate that variations in individual clinicians' productivity before EHR adoption, as well as data abstraction and scanning during implementation, need to be taken into account. Clinics must also be prepared to adjust expectations or approaches mid-stream to mitigate loss of productivity or if clinician morale suffers.

Clinician Variation and Data Abstraction

Reasons for variation in productivity among clinicians include differences in motivation, the quality of documentation, personal style, and patients' severity of illness. EHRs can standardize certain aspects of data capture — for example, by using a common terminology or code set and requiring consistent data entry methods. But clinics must understand that EHRs alone will not eliminate productivity variations. The technology may improve, impair, or maintain the productivity of individual clinicians.

Scanning and data abstraction contributed to a loss of productivity at CHAP, QFC, and Shasta. Even though data abstraction appeared to have a greater negative impact on clinician productivity, two of the three clinics preferred it. Non-clinical staff could scan documents, but data abstraction enabled clinicians to review, select, and enter the appropriate medical information. Other clinics should keep in mind that while abstraction by clinicians produces higher-quality and more readily accessible information in the EHR, the trade-off is lower clinician productivity, at least in the short term.

Managing Expectations, Mitigating Losses

Clinics must establish and, if necessary, modify expectations for productivity loss and recovery as they work with their clinicians, board of directors, and others. QFC, which ultimately returned to 97 percent productivity, gave the QueensCare Foundation continuous updates on the implementation and reinforced the notion that quality of care, not productivity alone, is also a measure of EHR value.

Modifying productivity expectations mid-stream can be just as critical as setting realistic expectations at the outset. Even though CHAP returned to 90 percent productivity more quickly than anticipated, it temporarily lowered the target to 80 percent when clinicians expressed frustration with the higher data entry demands. QFC also encountered clinician frustration. But it adapted by adjusting its mix of structured and free-text data collection, and requiring

less clinician abstraction. Shasta may have endured the most painful loss of productivity, which, at the time of this report, was hovering at around 85 percent of pre-EHR levels. The challenges it faces in regaining productivity likely stem from insufficient workflow redesign and possibly its tendency to accommodate clinician preferences through a high degree of EHR customization.

None of the three clinics could articulate an ironclad approach to mitigating the risk of excessive or drawn-out productivity losses. Martinez, CHAP's chief executive officer, suggested in retrospect that, before implementation, she would develop a strategy for increasing productivity to offset anticipated losses. But it seems unlikely that many clinics could do this, as most of them operate at or only slightly below capacity. For most clinics, space would probably be the limiting factor; it could prevent them from contracting with an adequate number of additional care providers. Nonetheless, increasing productivity before EHR adoption to mitigate the risk of lost revenue is an interesting option clinics might consider.

Implementation Support

Important considerations regarding external support include determining if such support is necessary, when to leverage it, and using it in the most effective way. A clinic focused on building internal capacity should be cautious about avoiding outside support; doing so could be disadvantageous.

Pure necessity or organizational culture often drives the outsourcing decision. Many clinics do not have adequate internal resources to undertake a large project like EHR adoption, so they turn to value-added resellers, consultants, or consortia for help. In such cases, clinics must decide when to enlist support, as this has financial and other implications. QFC realized early on that it needed external support. Its executives strongly believed—and are still convinced—that outside help was necessary for success, despite the significant cost.

Outsourced Relationships

Many clinics, including CHAP, routinely leverage external resources, such as IT services, regardless of whether or not they have implemented an EHR. For them, determining how to leverage existing relationships effectively in concert with an EHR vendor or network is an important consideration.

CHAP relied on OCHIN to provide implementation, training, and support services, and to host the EHR. However, throughout the process, the clinic continued to rely on its existing relationship with 7Layer for local IT support and infrastructure services. This fostered consistency when local hardware issues arose. In addition, 7Layer was a knowledgeable local partner with which OCHIN staff could interact. The arrangement may also have alleviated any risk of "turf wars" during the implementation.

Although CHAP's experience is insufficient to conclude that outsourcing IT support is unequivocally better than building an internal staff, it suggests that clinics that take this approach are likely candidates for working with networks and may benefit from a combination of internal and external support.

Avoiding External Support

Unlike CHAP and QFC, Shasta focused almost exclusively on building internal capacity. The resulting challenges have been significant: the higher cost of an IT staff, concerns about a single point of failure (the director of clinical informatics), and constantly managing the expectations of clinicians as they become increasingly accustomed to template customizations and personalized support. This is

worth noting because, even though Shasta's desire to build internal capacity and avoid reliance on external support is impressive, doing so requires a long-term conceptual and financial commitment.

Workflow Redesign

CHAP and QFC made substantial efforts to assess, and in some cases redesign, workflows to account for anticipated changes following EHR adoption. And both of them leveraged external resources — OCHIN and a vendor-agnostic consultancy, respectively. Shasta, on the other hand, relied on product flexibility to adapt to and support workflows as they evolved during implementation.

All three clinics recognized, perhaps at different implementation stages, the importance of assessing and potentially redesigning workflows, and approached redesign differently. Shasta apparently experienced the most significant challenges because its redesign took place late in the process. However, timing was not the only factor that influenced the workflow redesign method and effectiveness. The nature of EpicCare and its legacy before customization and implementation by OCHIN partly drove CHAP's workflow redesign, while QFC's redesign was driven primarily by an external consultant who assessed the organization and recommended changes.

Both CHAP and QFC planned and executed workflow redesign toward the beginning of implementation, and the role of an external "force" appears to have contributed to their success. Perhaps most interestingly, the level of productivity the three clinics were able to regain appears to be correlated to the level of flexibility in their workflow redesign. Sustained productivity loss has remained the greatest at Shasta, where there was no formal redesign. Of the three clinics, CHAP adapted its workflows to vendor/product specifications the most, and regained the highest level of productivity.

These cases clearly support the industry consensus that workflow redesign is critical to successful EHR adoption. The clinics' experiences also suggest that engaging an external party to lead the redesign may improve its effectiveness. In addition, clinics may regain more productivity if they conform to a vendor's or product's constraints or best practices rather than try to mold products around existing processes that might not function well in a new EHR environment.

Clinician Engagement

EHR Planning and Decision-Making

For CHAP and QFC, clinician engagement was more of a tactical consideration than a philosophy. Shasta took a different approach: It engaged clinicians earlier in the process and in a more influential role. In all three cases, the level and timing of clinician involvement in decision-making appears to have been at least partly a function of organizational culture. At Shasta, culture drove significant clinician engagement at many levels throughout EHR planning and implementation.

Interestingly, the importance and effectiveness of such engagement is not simply a matter of whether a clinic achieves clinician buy-in. These cases suggest wide variation in strategies and the extent to which greater and/or earlier efforts to involve clinicians in decision-making ensures success or hampers progress.

At two of the three clinics, another important engagement-related factor was incentives. Not surprisingly, clinicians liked them. However, the clinics' incentives seemed to have had more symbolic value than motivational value in terms of changing behavior. Other clinics need to be mindful of such limitations.

Those reflecting on how and when to engage clinicians in EHR adoption should consider the way other decisions are made regarding clinical operations. The case studies in this report suggest that clinics must be cautious about overturning their historically successful approaches to decision-making, even if these approaches do not align with common notions about what is necessary for EHR buy-in. Providing financial incentives that amount to more than strong symbolism will likely be difficult to fund. Therefore, clinics should think about non-monetary incentives that clinicians and the organization agree will improve broader outcomes, such as productivity and quality of care.

Clinician Champions

Each of the three clinics communicated with staff and patients about the EHR in its own way, and relied on clinician champions to varying degrees. Because CHAP is significantly smaller than QFC and Shasta, there was less need for structured, formal communication within the organization. Furthermore, CHAP employs fewer clinicians, and interaction between them and the medical director is greater, so having a clinician champion other than the medical director may have been less important than it would be at other larger clinics.

CHAP's success does not necessarily rule out the need for a champion. CHAP and QFC relied on third parties to deliver and take responsibility for certain types of communication, which, aside from champions, may have played a critical role. Shasta acknowledges that its communication process was cumbersome at times, but this may have had more to do with its organizational culture.

Implementation Approaches

Phased Roll-Out

Clinics must decide whether or not they should roll out their EHR in phases at multiple sites. Multi-site phase-in was not an issue for CHAP because of its single location. QFC and Shasta rolled out the new system one location at a time, leveraging their experience in each case to improve subsequent roll-outs. Phasing at Shasta was even more detailed due to the complexity of, and variation among, its clinical service departments.

Another option is to roll out specific EHR functions or modules in steps rather than all at once. For example, a clinic might start with results reporting or e-prescribing. Or it might activate only basic functions and leave the more complex ones, such as secure messaging, until later. Although none of the three clinics in this report did modular-level phase-in, QFC and Shasta implemented lab interfaces soon after basic functions went live at their clinical sites. Both recommend implementing lab interfaces as soon as possible.

A related issue is whether to implement the new PMS and EHR simultaneously or separately. CHAP and Shasta chose to implement the PMS component of their integrated systems first and the EHR later. QFC kept its existing PMS and interfaced it with the EHR.

Data Pre-loading and Abstraction

QFC and Shasta decided to scan paper documents first in transitioning to electronic records, and they abstracted data in different ways. CHAP, in contrast, relied exclusively on clinicians for abstraction.

The clinics' experiences suggest that scanning can be a valuable strategy for pre-loading patient information, as it achieves digital archiving without imposing much of a burden on clinicians.

But scanning does have drawbacks. It can create ongoing data-retrieval inefficiencies because data within documents are not indexed. In addition, an effective taxonomy must be designed and maintained to facilitate storage and retrieval of scanned information. On the other hand, while abstraction captures discrete and subsequently searchable data, it requires greater reliance on clinicians to ensure that appropriate information is accurately abstracted. Analysis suggests that abstraction may be better than scanning in the long run to improve quality and increase efficiency by using an EHR.

Structured Data and Free Text Requirements

QFC and Shasta had to balance the collection of structured data with the practical advantages of—and, in some cases, clinicians' preference for—free-text data entry into EHR templates. Had QFC not achieved this balancing act, it might never have nearly returned to the pre-implementation level of productivity. At Shasta, it is unclear to what extent the structured data/free-text issue contributed to the difficulty in regaining productivity.

What is clear is that the long-term value of structured data collection (quality improvement, in QFC's and Shasta's view) versus the short-term benefits of free-text data entry (speed and flexibility, in the view of some clinicians) may have important implications. Regaining productivity as soon as possible is essential for clinics that must stabilize their revenue stream, but without structured data on patients and populations, clinics will almost certainly be less able to realize measurable quality improvements and reap the rewards of quality-based financial incentives.

Technological Considerations

Wired Versus Wireless

CHAP deployed wired network computers in every exam room, QFC deployed wireless tablets, and Shasta deployed both. As they considered their options, each took into account the clinic's special characteristics—including the size and number of sites, and clinician preferences—as well as product-specific benefits.

Although the best approach will vary depending on the clinic, important general considerations include these:

- Wireless environments, while convenient, may raise security concerns even if they are carefully configured. They also pose a higher risk of equipment theft, given the portability of laptops and tablets, and typically incite more fear among clinicians who are less computer literate;
- Wired environments usually require that computers and the necessary cables be installed in all exam rooms, which must be large enough to accommodate the equipment as well as workflow. Cable installation costs can be significant in older buildings. In addition, computer tampering in exam rooms, especially in pediatric settings, may be problematic;
- Combining wired and wireless might seem like a good compromise. However, the benefit may not outweigh the higher cost. Clinics should closely examine the benefits and costs of individual components in a mixed environment; they may discover that choosing one or the other type of equipment satisfies their major needs and is less expensive.

Developing and Managing Interfaces

With data exchange a common motivation for EHR adoption, an important issue for these three clinics was implementing and managing interfaces. In their view, lab interfaces were the most crucial ones to have in place before EHR use began. Leaders at Shasta underscored this point: They said the clinic should not have gone live without a functional lab interface, and suggested that other clinics take this approach. However, QFC's experience with inconsistent and unreliable lab data illustrates the challenges that clinics may encounter even when an interface is functional early on.

In contrast to QFC's and Shasta's lab interface experiences, CHAP's was far less eventful, suggesting that networks can help address this challenge. Networks such as OCHIN offer a degree of standardization that individual clinics cannot achieve. When a new interface is necessary, a network can leverage its previous experience to limit the risk of unexpected problems and also minimize the cost.

Staffing Considerations

Vendors claim that EHRs may enable providers to reduce staff, thus increasing the potential for achieving a return on investment. At CHAP, QFC, and Shasta, however, this possibility is unlikely to generate significant financial savings in the foreseeable future. In fact, two of the three clinics added staff for IT and operational support, and trained some staff to fill other roles.

Before EHR implementation, none of the clinics forecasted a financial return on investment, let alone a financial return that would be attributable in part to staff reductions. Their experiences suggest that clinics may commonly underestimate the need for IT and operations support during and after implementation. This is not surprising, given that EHR return-on-investment calculations are generally based on operations at larger health care providers, which have more access to IT support. The case studies in this report suggest that clinics hosting their own EHR will probably have to add IT and operations support staff, while those in an EHR network may have less need to do so or might even be able to reduce staff.

EHR adoption altered the skill requirements for new hires. At Shasta, for example, prospective staff now must have typing and basic computer skills. CHAP and QFC have not formally modified their requirements, but they are more selective in hiring and they offer basic computer training to new and existing staff. Raising the bar for new hires and existing staff can attract talented people who want to be in a cutting-edge clinic environment, and can foster cultivation of employee talent. On the other hand, it might also shrink the pool of qualified applicants, cause more turnover, and fuel a demand for higher salaries.

Quality Improvement

CHAP, QFC, and Shasta cited quality improvement as a primary goal of EHR adoption. During implementation, they all became aware of the potential for better care coordination and higher satisfaction among clinicians, staff, and patients. Although such awareness was inconsistent among clinicians and staff, EHRs apparently sparked curiosity and discussion about quality of care, including the metrics for assessing it.

However, planning and executing systematic approaches to quality improvement remain a challenge. The issue regarding structured data collection versus free-text data entry illustrates this challenge. In addition, problems associated with the PMS/EHR interface has made it difficult for QFC to fully leverage the data in both systems. At CHAP, staff was initially unable to customize some reports

and overwhelmed by the number of standardized report forms from OCHIN.

CHAP, QFC, and Shasta are now in a better position to establish a quality-of-care baseline and begin tracking data, but their ability to accurately measure the data they collect is less than ideal. Clinics might consider placing a higher priority on meeting broader, quality-focused reporting requirements and population-based quality goals than on satisfying clinician preferences for free-text data entry.

Clinics need to be aware that neither EHR technology nor any specific product is a substitute for a clear vision of how they want to use an EHR and an understanding of what they must do to realize that vision. The availability of digital data is a significant step toward better patient care, but data alone are not enough.

VI. Conclusions

Barriers that traditionally have prevented EHR adoption at clinics are not insurmountable.

The EHR success stories at Community Health Alliance of Pasadena, QueensCare Family Clinics, and Shasta Community Health Center provide a unique view not only of widely recognized EHR barriers, but also of some of the special challenges clinics encounter when they plan, fund, and implement this promising technology. Their experiences are especially insightful given that few safety-net clinics in the United States, much less California, have implemented EHRs.

The three case studies yielded two key conclusions:

- Barriers that traditionally have prevented EHR adoption at clinics are not insurmountable. First, board members at all three clinics, who were initially skeptical of EHRs and knew little about them, came to understand that electronic records would enable better decisions about how to improve patient care. Second, all three clinics found different ways to pay for start-up costs and are working to reduce the impact that ongoing expenses have on their operating budgets. Third, they all achieved clinician and staff buy-in in a manner consistent with their organizational culture, which has important productivity implications. As of summer 2008, two of the three clinics had fully or nearly regained their pre-implementation productivity. Both of these clinics made workflow redesign a priority at the outset of implementation;
- The three clinics have had difficulty fully realizing their vision of leveraging the EHR for quality improvement, a primary goal. While several clinicians thought that the quality of care had improved as a result of EHRs, data-driven improvement has been difficult due to a lack of data standardization, possibly unrealistic short-term goals, and other factors. A key lesson is that clinics must plan how they will leverage an EHR—particularly to improve quality, which requires iterative learning—and determine what additional personnel and processes may be necessary.

Appendix A: Methodology

For case studies, the authors sought a representative sample from among the few safety-net clinics in California that have adopted EHRs. They wanted clinics whose experiences would provide unique insights on this subject and also illustrate common challenges and experiences.

The selection was based on a wide range of information, including clinic demographics (encounter volume, number of sites, rural/urban location), vendor/product characteristics, and overall implementation approach. In addition, the authors sought clinics whose insights might help others move beyond the generally accepted EHR recommendations from industry and academia. One notion, for example, is that quality-based financial incentives funded by payers or grants will help speed adoption. Yet none of the three clinics in this report waited for such incentives before they adopted EHRs.

The report team compiled a standard, comprehensive set of questions about EHR adoption that it shared with each clinic before a site visit. The questions were only a general discussion guide for interviews with executives, managers, clinicians, and staff, and did not limit any additional information or insights that interviewees might provide. Question categories included goals, adoption (planning, product selection, implementation processes, optimization), obstacles, outcomes, sustainability, future development, and lessons learned.

Appendix B: Barriers to EHR Adoption

Lack of Available Funding

Research suggests that EHR implementations can cost as much as $54,000 to $64,000 per user, with ongoing annual expenses of up to $21,000 per user. Without a clear financial return on investment, community health centers that already face funding shortages and slim operating margins are easily deterred by EHRs' significant start-up and maintenance costs. Because grants and Medicaid reimbursements account for nearly 70 percent of all operating revenues at clinics, small clinics—unlike their private sector counterparts—cannot shift adoption costs to private payers and may have greater difficulty obtaining loans.[24–27]

Interoperability and Data Exchange

Sharing and exchanging data across a health care enterprise is critical to achieving high-quality health care. However, the lack of interoperability—even among disparate information systems within an organization—can be a major barrier to EHR adoption. One significant hurdle is an inability to integrate an EHR with a billing/claims submission system. Accessing critical information, such as laboratory and radiology results, and avoiding the need to shuttle medication lists between different applications also are challenges. Even an integrated PMS/EHR that works as it should does not guarantee that comprehensive care will be delivered. Clinics that care for often-transient patient populations must rely on diverse stakeholders—county health systems, hospitals, and other clinics—for specific types of care. This accentuates the need for more effective exchange of patient information and highlights the limitations of individual EHR systems.[28]

Human Resource Challenges

Clinics often have difficulty hiring and retaining qualified staff. This is especially true in rural areas, where the applicant pool is smaller. Implementing an EHR can exacerbate the problem because the clinic needs new staff who have more specialized training and experience, particularly in IT and clinical informatics. Many EHR adopters also must train existing staff to improve computer literacy or other skills.[29–31]

Customization Requirements

Originally, most EHRs were designed for in-patient settings and medium to large physician practices. Tailoring EHRs to small physician and specialty practices is a more recent development. But few products are available that can readily meet clinics' complex billing and reporting needs. In addition, clinics are unique in that they require more and sometimes highly specific combinations of clinical EHR functions to serve their particular patient population. The health status of patients who receive care at community health centers is typically complex. Many of these patients have multiple chronic conditions and require psychological care, and some present other challenges, such as the need for language translation.[32,33]

Lack of a Business Case

EHR implementation usually causes productivity and revenues to fall, at least temporarily, which puts more strain on clinics that are already financially fragile. In addition, there are few financial incentives to adopt EHRs. Even if clinics invest considerable time and resources in a system that promises quality improvements at some future point, the more immediate pay-off—fewer hospitalizations and treatments, and lower drug costs, for example—accrues primarily to payers and purchasers.[34,35]

Clinician Resistance

Clinician resistance often stems from multiple factors, such as lack of computer literacy and the time investment necessary for clinicians to re-learn clinical skills and/or modify the way they provide care. Resistance is more likely among older clinicians who are used to paper charts, as they tend to be content with the existing workflow.[36–39]

Vendor Uncertainty

Clinics may not feel confident about selecting a vendor from the many that now offer EHR products. After investing significant funds to pay for start-up, what if a product fails to meet their needs or quickly becomes outdated? Clinics considering an EHR that would be hosted by another party may also worry that the host will go out of business, leaving them without access to their data.[40–42]

Privacy and Security

EHR adopters rank privacy and security as chief concerns. In a survey of members, the Medical Informatics Association found that about half of physicians cited privacy and security as a major barrier to EHR adoption. Related legal and regulatory policies, such as the Health Insurance Portability and Accountability Act, which some health care providers consider to be unclear, compound these concerns.[43,44]

Endnotes

1. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.
2. Moiduddin, A., Gaylin, D.S. *Health Information Technology Adoption Among Health Centers: A Digital Divide in the Making?* National Health Policy Forum: July 2005.
3. Shields, A.E., Shin, P., Leu, M.G., and others. "Adoption of health information technology in community health centers: Results of a national survey." *Health Affairs* 2007;26(5): 1373–1383.
4. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.
5. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.
6. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.
7. Moiduddin, A., Gaylin, D.S. *Health Information Technology Adoption Among Health Centers: A Digital Divide in the Making?* National Health Policy Forum: July 2005.
8. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.
9. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.
10. Moiduddin, A., Gaylin, D.S. *Health Information Technology Adoption Among Health Centers: A Digital Divide in the Making?* National Health Policy Forum: July 2005.
11. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.
12. Congressional Budget Office. *Evidence on the Costs and Benefits of Health Information Technology.* May 2008.
13. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.
14. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.
15. Congressional Budget Office. *Evidence on the Costs and Benefits of Health Information Technology.* May 2008.
16. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.
17. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.
18. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.
19. Congressional Budget Office. *Evidence on the Costs and Benefits of Health Information Technology.* May 2008.
20. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.
21. Ackerman, K. "EHR adoption efforts should focus on small practices." iHealthBeat: January 8, 2007 (www.ihealthbeat.org/Features/2007/EHR-Adoption-Efforts-Should-Focus-on-Small-Practices.aspx).
22. In the ASP model, another organization houses and maintains the software and related hardware. Users pay a monthly subscription fee to access the system remotely via a network connection. OCHIN would become the ASP for CHAP.

23. For more information on EHR implementation as a "triggering event," see Dall, A. *Implementation of Electronic Health Record as a Triggering Event for Increased Reimbursement of Federally Qualified Health Centers.* California Primary Care Association: February 2008 (www.cpca.org/resources/research/documents/EHRasTriggeringEvent2008-02-04FINAL.pdf).

24. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.

25. Moiduddin, A., Gaylin, D.S. *Health Information Technology Adoption Among Health Centers: A Digital Divide in the Making?* National Health Policy Forum: July 2005.

26. Shields, A.E., Shin, P., Leu, M.G., and others. "Adoption of health information technology in community health centers: Results of a national survey." *Health Affairs* 2007;26(5): 1373–1383.

27. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.

28. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.

29. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.

30. Moiduddin, A., Gaylin, D.S. *Health Information Technology Adoption Among Health Centers: A Digital Divide in the Making?* National Health Policy Forum: July 2005.

31. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.

32. Miller, R.H., West, C.E. "The value of electronic health records in community health centers: Policy implications." *Health Affairs* 2007;26(1): 206–214.

33. Moiduddin, A., Gaylin, D.S. *Health Information Technology Adoption Among Health Centers: A Digital Divide in the Making?* National Health Policy Forum: July 2005.

34. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.

35. Congressional Budget Office. *Evidence on the Costs and Benefits of Health Information Technology.* May 2008.

36. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.

37. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.

38. Congressional Budget Office. *Evidence on the Costs and Benefits of Health Information Technology.* May 2008.

39. Miller. R.H., Sim, I. "Physicians use of electronic medical records: Barriers and solutions." *Health Affairs* 2004;23(2): 116–126.

40. DesRoches, C.M., Campbell, E.G., Rao, S.R., and others. "Electronic health records in ambulatory care—a national survey of physicians." *New England Journal of Medicine* 2008;359(1): 50–60.

41. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.

42. Congressional Budget Office. *Evidence on the Costs and Benefits of Health Information Technology.* May 2008.

43. Bates, D.W. "Physicians and ambulatory electronic health records." *Health Affairs* 2005;24(5): 1180–1189.

44. Ackerman, K. "EHR adoption efforts should focus on small practices." iHealthBeat: January 8, 2007 (www.ihealthbeat.org/Features/2007/EHR-Adoption-Efforts-Should-Focus-on-Small-Practices.aspx).

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