

MARKET WATCH

The Value Of Electronic Health Records In Community Health Centers: Policy Implications

Although EHRs are still not paying for themselves, they have helped improve quality of care in community health centers.

by Robert H. Miller and Christopher E. West

ABSTRACT: This paper analyzes the costs and benefits of electronic health records (EHRs) in six community health centers (CHCs) that serve disadvantaged patients. EHR-related benefits for most study CHCs did not pay for ongoing EHR costs, yet quality improvement (QI) was substantial. Compared to private practices, CHCs cannot use EHRs to increase visit coding levels and revenues, yet they likely use EHRs more aggressively for QI, which raises equity questions. The evidence suggests that policies are needed that help CHCs to afford EHRs and produce more EHR-related QI gains, including through grants and QI performance rewards. [*Health Affairs* 26, no. 1 (2007): 206–214; 10.1377/hlthaff.26.1.206]

COMMUNITY HEALTH centers (CHCs) are a major source of primary care for disadvantaged U.S. populations. In 2004, 914 federally qualified health centers (FQHCs) provided medical and dental primary care services to 13.1 million patients, of whom 40 percent were uninsured and 36 percent were covered by Medicaid; 70 percent had below-poverty incomes, and 63 percent were nonwhite.¹ Almost 10,000 full-time-equivalent (FTE) physicians, nurse practitioners, physician assistants, and certified nurse midwives provided care. FQHCs received \$6.7 billion in revenues—mostly from Medicaid reimbursement and grants, especially from the Bureau of Primary Health Care (BPHC) in the Health Resources and Services Administration (HRSA). CHC “look-alikes” that operate without federal grants serve millions more patients.

A small but growing number of CHCs use

electronic health records (EHRs), which promise to improve quality, especially for preventive and chronic care. This paper describes the value of EHRs in six CHCs. We were most interested in EHRs’ effect on finances, given CHCs’ limited financial resources, and on quality improvement (QI), given that their mission has led CHCs to be relatively aggressive in improving quality of care for the disadvantaged.²

Study Data And Methods

We conducted retrospective qualitative case studies of six CHCs with EHRs in six states, obtaining data for May 2004–June 2005. We adapted methods from our prior studies on EHRs in large groups and solo or small group practices.³

We defined the value of the EHR as the ratio of EHR-related benefits to costs—of efficiency, revenue, quality, and access gains to fi-

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nancial, provider time, and management time costs. Although some CHCs provide their own EHR services, others contract with network application systems providers (network ASPs) that help CHCs implement and use EHRs and charge fees for their services.

We selected a purposeful sample of six CHCs with EHRs that were diverse in key characteristics that could affect EHR value, based on previous studies—size (15–50 providers), geography (six states with different Medicaid reimbursement systems), EHR vendors (four), and duration of use—plus whether or not a network ASP provided EHR services. We identified potential cases from public presentations by CHC managers and from discussions with BPHC managers and other CHC experts. Four CHCs implemented EHR services without network ASP support: the Institute for Urban Family Health (IUFH) in New York City (six CHC clinics serve the disadvantaged, and seven IUFH-managed clinics serve privately insured patients); Heart of Texas (HOT) Community Health Center in Waco, Texas; Waianae Coast Comprehensive Health Center in Hawaii; and Community Health Association of Spokane (CHAS), Washington.

Two CHCs were members of network ASPs: Family Health Centers of Southwest Florida in Fort Myers, a member of Health Choice Network (HCN) whose twenty-one CHCs had more than 200 FTE billing providers; and Lamprey Health Systems in New Hampshire, a member of the Community Health Access Network (CHAN) whose members had more than forty FTE providers. Of three other CHCs approached, two provided only initial information, including one that had severe problems implementing an immature software product; one did not respond.

We also obtained data from two network ASPs preparing to implement EHRs, to help estimate EHR replacement costs for CHCs whose historical costs were out of date. Chicago Alliance network data helped estimate CHAN-Lamprey EHR replacement costs, since both had the same EHR, similar size, and network ASP models. We created a composite

case (CHAN-Lamprey/Chicago). Data from the Oregon Community Health Information Network (OCHIN) helped estimate EHR replacement costs for HOT and improve estimates for IUFH, which had the same EHR. Since financial costs were more precise than benefits, we created a range of estimates for some benefit components.

We used a detailed, semistructured questionnaire to conduct more than sixty interviews of key CHC personnel most knowledgeable about EHRs in their CHC/network, including medical directors, executive directors, chief financial/operating officers, EHR project team leaders, and QI staff leaders. We summarized more than eighty hours of taped and transcribed interviews into tables, using concept categories developed in prior work (for example, implementation method and QI activities). Pattern-matching and explanation-building techniques helped identify new themes and patterns in the data.⁴

Study Results

■ **CHC characteristics.** Study CHCs were larger than average and had diverse characteristics (Exhibit 1). EHR experience varied from one to eight years among the five fully implemented CHC cases; half of the Fort Myers providers were using fully implemented capabilities as of spring 2005.

Study cases used four EHR software products: EpicCare from Epic Systems (IUFH, HOT); NextGen from NextGen Healthcare Systems (Quality Systems Inc.) (Waianae, CHAS); Centricity from GE (CHAN-Lamprey/Chicago); and Intergy from Emdeon (WebMD) Practice Services (HCN-Fort Myers). Software had similar capabilities, although Fort Myers' EHR lacked reporting capabilities, except in beta. Most CHCs created two-way data exchange between EHR and practice management systems for billing, scheduling, and registration data and between EHR and lab information systems.

Network ASP staff provided a layer of services between CHC members and vendors: They selected the EHR, negotiated vendor contracts, configured and hosted central soft-

EXHIBIT 1
Characteristics Of Study Community Health Centers (CHCs), 2004

	IUFH (CHC sites only) ^a	HCN-Fort Myers	HOT	CHAN-Lamprey	CHAS	Waianae	National average
No. of sites	6	11	8	3	4	4	
No. of encounters	57,968	139,642	118,188	60,120	66,924	102,054	43,301
No. of FTE providers	15.6	33.5	40.9	15.6	21.3	37.0	11.3
MDs	11.9	17.1	18.6	8.1	4.7	24.4	7.3
Mid-levels	3.7	16.4	22.3	7.5	16.6	12.6	4.0
Ratio MDs/mid-levels	3.2	1.0	0.8	1.1	0.3	1.9	1.8
Encounters per FTE	3,715	4,081	2,889	3,854	3,075	2,758	3,395
Encounters							
Medicaid	43%	30%	41%	16%	42%	50%	36%
Uninsured	19	51	36	34	47	17	40
Patient revenues (percent of total)							
Private insurance	18%	5%	11%	37%	3%	16%	11%
Medicare	4	8	15	13	4	10	10
Medicaid	70	53	63	41	74	71	64
Self-pay	6	26	7	9	6	2	11
Total	98	92	96	100	87	99	96
Cost per encounter—medical	\$141	\$89	\$114	\$124	\$101	\$132	\$109
Total revenues (millions)	\$11.205	\$17.300	\$18.245	\$8.640	\$12.671	\$21.540	\$7.310
Patient revenues (millions)	\$6.944	\$10.930	\$12.128	\$3.970	\$9.484	\$16.690	\$4.170
Time since first implementation (years)	2.5	1.5 ^b	8	6	4	2	— ^c
Software used	EpicCare	Intergy	EpicCare	GE Centricity	NextGen	NextGen	— ^c

SOURCE: Authors' study data.

NOTES: IUFH is Institute for Urban Family Health. HCN-Fort Myers is Health Choice Network—Family Health Centers of Southwest Florida. HOT is Heart of Texas Community Health Center. CHAN-Lamprey is Community Health Access Network/Lamprey Health Systems. CHAS is Community Health Association of Spokane (Washington). Waianae is Waianae Coast Comprehensive Health Center. FTE is full-time-equivalent.

^a CHC sites only—IUFH managed seven clinics that serve privately insured patients.

^b Still implementing.

^c Not applicable.

ware, developed templates (electronic forms), trained providers/staff, installed EHR software, provided help-desk support, and assisted with EHR-related process/workflow redesign and QI activities.

CHCs (including those using network ASPs) financed EHRs through operating funds and such sources as federal government grants (five CHCs) and vendor-supplied free software licenses and discounts to CHC “early adopters” or software codevelopers (two CHCs).

■ **Financial costs and benefits.** Initial EHR costs per FTE billing provider averaged almost \$54,000 (\$16.20 per visit), with much variation among CHCs and within each cost category (Exhibit 2). Ongoing costs per FTE

provider per year averaged \$20,610 (\$6.21 per visit). One case reported sizable financial benefits (\$20,000 per billing provider per year, which covered ongoing costs), three reported benefits that were less than ongoing costs, and two reported few or no benefits.

Financial benefits were attributable mostly to efficiency gains, especially reduced medical record and transcription costs; some medical record efficiency gains might have been masked by a shift of resources into QI. For example, IUFH medical record staff that no longer pulled charts (an efficiency gain) spent freed-up time obtaining more complete information from consultants and other sources (a QI gain). Documented provider productivity gains were negligible, although two cases

EXHIBIT 2
Initial And Ongoing Electronic Health Record (EHR) Costs Per Full-Time-Equivalent (FTE) Provider In Six Community Health Centers (CHCs), By Cost Category, 2004-05

	IUFH	HCN-Fort Myers	HOT	CHAN-Lamprey/Chicago	CHAS	Waianae	Average	
							Cost	Percent
Initial								
Hardware	\$27,591	\$ 6,820	\$30,389	\$ 8,575	\$15,000	\$13,757	\$17,022	30.6
Software	26,342	11,650	22,954	12,159	8,560	12,514	15,697	28.2
Installation, training	10,248	10,922	6,826	24,213	11,085	8,700	11,999	21.6
Productivity loss	10,000	2,000	1,976	8,000	5,226	3,378	6,763	12.2
Other (including telecom)	0	985	4,491	11,860	5,630	2,019	4,164	7.5
Total	74,181	32,379	66,637	64,804	45,501	40,368	53,978	100.0
(Total per medical encounter)	19.96	7.93	23.06	16.81	14.79	14.63	16.20	
Ongoing								
Hardware	4,828	1,705	7,597	2,144	3,750	3,439	3,911	19.0
Software maintenance	5,532	2,607	3,054	2,267	1,541	3,054	3,009	14.6
IS staff, contractors, training	14,621	9,061	6,557	15,160	10,250	11,932	11,263	54.6
Other	1,710	1,408	2,283	2,507	4,574	2,081	2,427	11.8
Total	26,691	14,780	19,491	22,077	20,115	20,507	20,610	100.0
(Total per medical encounter)	7.18	3.62	6.75	5.73	6.54	7.44	6.21	

SOURCE: Authors' study data.

NOTES: For CHC information, see Exhibit 1. IS is information services.

speculated about possible (but not confirmed) gains of 1-5 percent. CHAS reported \$6,000 per FTE billing provider in utilization savings for Medicaid patients capitated for hospital and full professional services; other CHCs had few capitated CHC patients.

Revenue enhancement benefits were negligible. CHCs could not use EHRs to increase visit coding levels because Medicaid paid most CHCs a flat rate per visit, while the BPHC paid CHCs an annual lump sum for uninsured care; meanwhile, CHCs received few pay-for-performance (P4P) incentives.

Overall, evidence suggests that all but one study case incurred ongoing net financial losses, ranging from a few thousand to more than twenty thousand dollars per FTE billing provider, and that no case had yet paid for any initial EHR costs, excluding special EHR grant funding. Using optimistic assumptions about financial benefits, at least three CHCs incurred substantial ongoing financial losses. To establish the "true" value of EHRs to CHCs, other costs and benefits must be considered.⁵

■ **EHR use for QI.** *Overview.* Study CHCs made many QI changes that incorporated methods learned in Health Disparities Collaboratives (HDCs). HDCs encourage implementation of the Care Model, which reorients clinical practice toward chronic/preventive care; clinical information systems (CIS) (such as EHRs) are a key Care Model component.⁶

All CHCs extensively used basic EHR capabilities—that is, virtually all providers electronically viewed data (such as lab results); maintained coded lists of patient problems, services provided, medications, and allergies; used templates (electronic forms) to generate prescriptions and lab orders and to document treatment progress.

Five of six CHCs extensively used EHR registry and chronic disease management/preventive care capabilities in at least several clinical priority areas: Health Plan Employer Data and Information Set (HEDIS) reporting requirements and HDC participation influenced priority area choices (Exhibit 3).

QI changes in priority areas. (1) Data capture

EXHIBIT 3
Quality Improvement (QI) Priority Areas In Six Community Health Centers (CHCs) With Electronic Health Records (EHRs), 2004–05

	IUFH	HCN-Fort Myers	HOT	CHAN-Lamprey	CHAS	No. of CHCs
Preventive care						
Lead screening	●			●		2
Childhood development screening	●					1
Childhood immunizations ^a	●	●	●	●	●	5
Flu vaccine ^a	●	●	●	●	●	5
Pneumonia vaccine						
Pneumonia vaccine	●	●	●	●		4
Metabolic syndrome screening			●	●		2
Hypertension screening	●					1
LDL screening—for general population	●					1
Colon cancer screening^a						
Colon cancer screening ^a	●	●				2
Mammograms (breast cancer screening) ^a	●	●	●	●		4
Pap smear (cervical cancer screening) ^a	●	●	●	●		4
Mental health/depression screening		●			●	2
Gynecological infections^a						
Gynecological infections ^a			●	●		2
OB patients and dental visits					●	1
Childhood obesity					●	1
Chronic care (with selected measures)						
Asthma (peak flow) ^a	●	●		●	●	4
Depression/mental health ^a	●	●			●	3
Kidney function/creatinine measurement	●					1
HIV						
HIV	●	●			●	3
Hepatitis C						
Hepatitis C					●	1
Cardiovascular disease						
Hypertension ^a	●	●		●		3
LDL screen/hyperlipidemia/statin use ^a	●	●		●		3
Antithrombotic agent (aspirin) use		●		●		2
Diabetes						
HbA1c testing ^a	●	●	●	●	●	5
Retinopathy screenings ^a	●	●	●	●	●	5
Foot checks		●	●	●	●	3
Foot checks		●	●	●	●	4
Nephropathy/renal testing ^a	●	●	●	●		4
LDL screening ^a	●	●	●	●		4
Hypertension checks	●	●	●	●	●	5
Total priority areas ^b	17	14	8	13	10	62

SOURCE: Authors' study data.

NOTES: For CHC information, see Exhibit 1. LDL is low-density lipoprotein. OB is obstetrical.

^aHealth Plan Employer Data and Information Set (HEDIS) focus area.

^bDiabetes is counted as a single area.

using templates: In addition to coded lists, providers in all CHCs routinely used condition-specific templates (electronic forms) to document at least some chronic or preventive care visits; providers in three CHCs routinely used templates to capture coded encounter data useful for reporting. (2) Reminders at the point of care: Most providers received CHC-set reminders for patients needing services in at least some priority clinical areas. IUFH used

reminders most heavily, most of which resulted in measurable performance gains.

(3) Lists of patients needing services: Four CHCs generated lists of patients needing chronic/preventive care services, and three CHCs systematically followed up with patients on lists. For example, CHAN-Lamprey case managers contacted patients needing diabetic services, immunizations, and flu vaccinations. (4) Performance reports: Managers saw

performance reports as pivotal for QI. Four CHCs regularly generated reports for at least some priority clinical or efficiency areas. CHAS used performance reports to create QI financial incentives for staff and providers in five clinical areas, while CHAN-Lamprey provided smaller incentives to individual physicians. (5) Patient self-management: CHCs made limited use of patient self-management capabilities. Two provided printed patient visit summaries; another provided individualized self-care plans to asthma and depression patients.

Combinations and focus of QI changes. Typically, CHCs made several systematic QI changes in each priority area, and they emphasized some changes more than others. For example, HOT encouraged providers to use diabetes templates, “turned on” reminders for overdue diabetes tests, sent providers reports comparing their performance treating diabetics with that of peers, generated lists of diabetics needing services, and assigned nurse case managers to follow up with patients on lists. Despite their satisfaction with sizable EHR-related QI gains, interviewees felt that they were only beginning to use the EHR effectively for QI.

■ **Other benefits.** Interviewees also mentioned using improved data and analysis tools to obtain new grants, attract new research funding, better manage satellite clinics, expand to new sites, and coordinate care for patients visiting several sites.

■ **Value of EHRs without policy changes.** Most or all of the CHCs we studied incurred net financial losses from EHR use, as a result of high initial and ongoing EHR costs and limited financial benefits. Yet most CHCs also launched EHR-enabled QI changes that likely generated sizable QI gains. As a result, EHR value to CHCs was mixed, with a trade-off of financial losses for QI gains.

In contrast, EHRs in CHCs were a clear value to patient and payer stakeholders, since patients received better care, and payers likely reaped some EHR-related downstream benefits in avoided specialist, emergency room (ER), and hospital spending—at no added cost to them. The value of such benefits was

mixed for hospitals receiving fee-for-service payment—decreased revenues for the insured, decreased costs for the uninsured.

Several trends are likely to increase EHR value to CHCs without policy changes. EHR costs will decrease and benefits increase as more network ASPs reap economies of scale in IS staffing, software pricing, and learning; as later adopters benefit from earlier implementation investments and lessons learned; as CHCs learn to use EHRs more effectively; and as CHCs, network ASPs, and learning groups identify and disseminate “best practices” for reaping benefits. CHC managers were optimistic about further EHR-related gains. Nevertheless, despite promising trends and QI gains, in the near future EHRs likely will remain a mixed or poor financial value for many CHCs, absent policy changes.

■ **EHR value in CHCs compared to private practices.** Compared with another study of fourteen solo or small group practices with EHRs that we conducted using similar methods, CHCs had higher EHR costs and lower financial benefits, and they made much greater QI efforts. EHR initial costs for CHCs were about \$10,000 higher per FTE provider, and ongoing costs were more than double those of solo or small group practices (because of greater complexity). Meanwhile, flat-rate or lump-sum reimbursement methods prevented CHCs from obtaining substantial billing coding gains available to private practices, while concerns about staff layoffs and QI meant that CHCs often invested efficiency gains in QI, rather than pocketing gains.⁷ Finally, although differences in sample size and selection between studies make precise comparisons impossible, five of six study CHCs made substantial, multifaceted systematic QI changes, compared with only two of fourteen solo or small group practices with EHRs. Without P4P incentives, CHCs could not turn this QI advantage into financial gains.

Discussion And Policy Implications

■ **Barriers to improved EHR value specific to CHCs.** Most barriers to improving EHR value are not unique to CHCs—for ex-

ample, high EHR cost, difficulty in effecting changes, and lack of regional electronic data exchange.⁸ In addition to the inadequate reimbursement methods discussed above, two other barriers are attributable to the CHCs' focus on disadvantaged patients.

Complexity. Compared with most private practices, CHCs serve more-challenging patients with less education, income, insurance, and English language proficiency and more chronic care, psychological, and other health problems.⁹ As a result, CHCs are organizationally more complex, with more small sites to increase access and more "one-stop shopping" for medical, dental, mental health, and substance abuse services and "wraparound" nutrition, health education, and other services.¹⁰ Meanwhile, aggressive focus on QI requires process changes, which adds to complexity. This complexity increases EHR-related costs for CHCs, because it increases the complexity of CIS changes, staff training, and complementary process changes.

Resources. Compared with similar-size private organizations, CHCs tend to be chronically short of financial resources, which slows EHR adoption; among EHR adopters, it makes it more difficult to afford appropriate information systems and other staff needed to make the many CIS and process changes required to effectively use EHRs for QI.¹¹

■ **Facilitators for increasing EHR value in CHCs.** Compared with most private practices, unique CHC advantages—mission and HRSA/BPHC-promoted networks and collaboratives—can reduce EHR-related costs and increase benefits. Mission to serve the disadvantaged focuses CHCs' attention on QI and motivates grants for new CIS/QI initiatives from foundations and government funding agencies. As a result of HRSA/BPHC efforts to facilitate cooperative efforts among organizations, networks of CHCs have begun providing members common services (including for EHRs) that benefit from economies of scale and more "learning-by-doing" opportunities.¹² Moreover, HRSA/BPHC efforts to promote QI, including through HDCs, have helped CHCs to acquire QI organizational

change tools, use less complex registry CIS, and create more systematic processes, laying the groundwork for EHR use for QI.

■ **Implications for policy changes.**

Without policy changes, most CHCs adopting EHRs likely will struggle to pay for them, even while improving quality, which inevitably would lead to cutbacks in EHR use or in other areas. Given limited resources, many CHCs will delay adopting EHRs because they cannot produce sufficient EHR-related QI gains rapidly enough to justify the unfavorable financial return on investment, reducing potential QI gains for the disadvantaged.

Equity questions arise because EHRs in private medical groups might make sense financially and yet might have a limited effect on increasing social good, whereas EHRs in CHCs might not make sense financially (to CHCs) and yet might do more social good.¹³ By "social good," we mean net EHR-related benefits to all stakeholders combined, including reduced health disparities for the disadvantaged. These findings suggest the need for innovative ways to fund EHRs in CHCs through public and foundation means.

Making some rough assumptions, CHCs will need \$550 million–\$1.1 billion, or \$55–\$110 million per year spread over ten years, to pay for EHRs, including technical and organizational assistance. Assumptions include a ten-year EHR implementation period in the CHC sector, \$35,000–\$50,000 per FTE provider in initial costs, and an average \$5,000–\$15,000 per provider net annual loss (cost) in the first four years post-implementation.

Policy approaches need to help CHCs pay for EHRs while accelerating CHCs' use of EHRs for QI, where much of the benefit lies. One policy approach puts great emphasis on Health and Human Services (HHS) leadership and financial resources.¹⁴ However, in an era of budget deficits, few domestic program initiatives, and relatively little federal funding for CIS initiatives, it is prudent to also look elsewhere for funding.

Grants with QI incentives. Funding agencies can use grants with QI incentives to help pay for EHRs in CHCs, while increasing the pace

of EHR-enabled QI. Although only the federal government has the potential resources to play an important national role in EHR funding, large national foundations could help finance demonstration projects. Regional foundations, including ones formed from health care conversions, and state legislative programs with line items for CIS in CHCs could help fund EHRs in CHCs, ideally partnering with HRSA.¹⁵ Funding-agency consortia that coordinate funding could finance larger projects for networks of CHCs.

Pay-for-performance. Centers for Medicare and Medicaid Services (CMS) and state Medicaid P4P policies can help finance EHRs by rewarding CHCs for EHR-related QI benefits that create “downstream” benefits for Medicaid payers. This would increase the pace of CHCs’ EHR use for QI, creating even more “downstream” benefits. Some Medicaid managed care health plans have begun to provide rewards, but more initiatives are needed.¹⁶ Absent P4P, Medicaid agencies should include CHCs’ EHR costs in prospective payment system (PPS) reimbursement calculations.

Network ASPs. Network ASPs can compensate for individual CHC resource shortages by enabling CHCs to “buy” services that they could not “make” or make efficiently—which is especially important for the many CHCs that are smaller, have fewer organizational resources, and have less capacity for organizational learning than the CHCs we studied. Network ASPs can help CHCs benefit from economies of scale (especially for software pricing and IS staffing), from more efficient learning through sharing of insights about what “works,” and from services that go beyond those typically offered by commercial ASPs, especially for ongoing training, process change and technical support, and QI. Funding agencies can provide grants for some network costs and for some CHC fees paid to network ASPs—with QI incentives attached.¹⁷

Improved CHC preparation for EHRs. Policies that help CHCs increase their “readiness” for EHR implementation can assist more CHCs to produce EHR-enabled QI rapidly enough to justify the cost.¹⁸ Implementing increasingly

sophisticated registry CIS software—that is less robust than EHRs but still supports QI—can help prepare CHCs for greater changes needed for effective EHR use for QI.¹⁹

More effective data use. HRSA and other funding agencies should support CHCs’ efforts to use common QI performance measures and methods that enable performance benchmarking, public performance reporting, performance incentives, improved population management, and research/evaluation. *Consumer Reports*-style assessments could compare network ASP and EHR vendor performance.

Cooperative learning efforts. Learning groups consisting of CHCs/network ASPs with EHRs can facilitate systematic learning and “push the envelope” of effective EHR use for QI. Grant-making agencies should fund staff time to support learning groups and manager time to share their insights.

■ **Study limitations.** This retrospective, qualitative study obtained data from a small, purposeful sample of six CHCs, with additional information from two network ASPs. Study CHC cases likely were more successful than cases that declined to participate. These “early adopter” cases might be more successful than the next layer of CHCs, although CHC EHR costs likely will decrease and benefits increase somewhat over time. Data were mostly self-reported, were more precise for costs than benefits, and might not have captured some EHR-related effects on visit productivity. CHCs are dynamic, growing organizations, which complicated our determination of EHRs’ effects. Urgently needed are studies that use qualitative and quantitative methods to evaluate CHCs with EHRs and network ASPs and that determine “downstream” financial benefits attributable to EHR-related QI.

THE HEALTH CENTERS in this study incurred EHR-related financial losses, even while substantially increasing quality for the disadvantaged. The evidence suggests that for CHCs to afford EHRs—and produce more EHR-related QI gains—CHCs will need much external support, including through grants and P4P incentives that re-

ward CHCs for EHR-enabled QI gains and “downstream” financial benefits.

Analyzing the value of EHRs in CHCs inevitably raises questions about the overall value of CHCs. The need to determine, increase, and fairly pay for the value of EHRs in CHCs can help the effort to determine, increase, and fairly pay for the value of CHCs in the health care system.

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NOTES

1. Bureau of Primary Health Care, *Section 330 Grantees Uniform Data System (UDS), Calendar Year 2004 Data, National Rollup Report* (Washington: Health Resources and Services Administration, 2005).
2. On finances, see, for example, National Association of Community Health Centers, *The Safety Net on the Edge* (Bethesda, Md.: NACHC, 2005). On quality, see, for example, D.R. Rittenhouse and J.C. Robinson, “Improving Quality in Medicaid: The Use of Care Management Processes for Chronic Illness and Preventive Care,” *Medical Care* 44, no. 1 (2006): 47–54; L. Shi et al., “America’s Health Centers: Reducing Racial and Ethnic Disparities in Perinatal Care and Birth Outcomes,” *Health Services Research* 39, no. 6, Part 1 (2004): 1881–1901; and A.E. Shields et al., “Process of Care for Medicaid-Enrolled Children with Asthma: Served by Community Health Centers and Other Providers,” *Medical Care* 40, no. 4 (2002): 303–314.
3. R.H. Miller and I. Sim, “Physicians’ Use of Electronic Medical Records: Barriers and Solutions,” *Health Affairs* 23, no. 2 (2004): 116–126; and R.H. Miller et al., “The Value of Electronic Health Records in Solo or Small Group Practices,” *Health Affairs* 24, no. 5 (2005): 1127–1137.
4. R.K. Yin, *Case Study Research: Design and Methods*, 3d ed. (Thousand Oaks, Calif.: Sage Publications, 2003).
5. Interviewees reported that providers worked longer (another cost) for a few months to over a year post-implementation, mostly as a result of getting used to documenting electronically.
6. For more information about the Care Model, see the Health Disparities Collaboratives home page, <http://www.healthdisparities.net>; the Improving Chronic Illness Care home page, <http://improvingchroniccare.org>; and the Institute for Healthcare Improvement home page, <http://www.ihi.org>; and E.H. Wagner, B.T. Austin, and M. Von Korff, “Organizing Care for Patients with Chronic Illness,” *Milbank Quarterly* 74, no. 4 (1996): 511–544.
7. Miller et al., “The Value of Electronic Health Records.”
8. Ibid.
9. R.P. Blankfield et al., “Addressing the Unique Challenges of Inner-City Practice: A Direct Observation Study of Inner-City, Rural, and Suburban Family Practices,” *Journal of Urban Health* 79, no. 2 (2002): 173–185.
10. N. Falkenberg and E. Friedman, *A National Health Information System: An Opportunity to Improve Health Care in All Communities* (San Francisco: Tides Foundation, 2005).
11. On resources shortages, see NACHC, *The Safety Net on the Edge*.
12. L.P. Casalino, “Disease Management and the Organization of Physician Practice,” *Journal of the American Medical Association* 293, no. 4 (2005): 485–488.
13. On health IT equity, see K. Fiscella and H.J. Geiger, “Health Information Technology and Quality Improvement for Community Health Centers,” *Health Affairs* 25, no. 2 (2006): 405–412.
14. Ibid.; past HRSA-funded programs—including the Integrated Services Development Initiative (ISDI) and the Shared Integrated Management Information Systems (SIMIS)—aided some CHC EHR “early adopters” and network ASPs.
15. Grantmakers In Health, *The Business of Giving: Governance and Asset Management in Foundations Formed from Health Care Conversions*, February 2005, http://www.gih.org/usr_doc/Conversion_Report_2005.pdf (accessed 15 November 2006).
16. J. Verdier et al., *Quality-Related Provider and Member Incentives in Medicaid Managed Care Organizations*, July 2004, http://www.chcs.org/usr_doc/quality_incentives.pdf (accessed 15 November 2006).
17. Nevertheless, network ASPs are no “silver bullets,” since they demand a challenging level of cooperation and governance, vary in effectiveness, and still require local CHC resources.
18. Community Clinics Initiative, “EHR Readiness Assessment,” May 2005, <http://www.communityclinics.org/content/general/detail/783> (accessed 20 November 2006).
19. For registry systems, see J. Metzger, *Using Computerized Registries in Chronic Disease Care*, February 2004, <http://www.chcf.org/documents/chronicdisease/ComputerizedRegistriesInChronicDisease.pdf> (accessed 20 November 2006).