CARING FOR PATIENTS WITH DIABETES
IN SAFETY NET HOSPITALS AND HEALTH SYSTEMS

Marsha Regenstein, Jennifer Huang, Linda Cummings,
Daniel Lessler, Brendan Reilly, and Dean Schillinger

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ABSTRACT: Safety net hospital systems provide health care to a high volume of underserved patients, including uninsured and low-income patients, racial/ethnic minorities, and those with chronic conditions. To assess the effects of programs designed to improve care for the undeserved, the National Public Health and Hospital Institute interviewed administrators about available programs and services and collected information on patient demographics, health care utilization, and clinical outcomes related to diabetes management. Services range from availability of special diabetes clinics to American Diabetes Association–certified classes. Compared with other health care providers, safety net hospital systems provide comparably high quality of care to patients with diabetes, despite serving higher volumes of underserved patients. However, even with programs and services designed to improve access to care for the underserved, disparities in quality of care and patient outcomes persist as a result of demographic risk factors, most notably, lack of insurance.

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ABOUT THE AUTHORS

Marsha Regenstein, Ph.D., is director of the National Public Health and Hospital Institute (NPHHI) and vice president for research of the National Association of Public Hospitals and Health Systems. She is also an associate research professor in the Department of Health Policy at the School of Public Health and Health Services, George Washington University Medical Center. Dr. Regenstein's work focuses on vulnerable populations and the providers who serve them. She has a Ph.D. in health policy from George Washington University.

Jennifer Huang, M.S., is a senior research analyst with NPHHI. Prior to joining NPHHI in 2001, she worked with a state health department on programs for adults and adolescents with disabilities and special health needs. Ms. Huang has also worked on research projects for children with chronic conditions and their families. She has a master's degree from the Harvard School of Public Health in maternal and child health.

Linda Cummings, Ph.D., is director of research for NPHHI. For five years, Dr. Cummings headed a department in the Massachusetts Office of Economic Affairs that was responsible for business relations and training for low-income communities. She worked for 10 years as a health policy and communications consultant in the Washington, D.C., area on issues such as adolescent health, family planning, and Medicaid managed care. During that period, she was a consultant with Radiant Communications as part of a team that trained more than 300 community-based Robert Wood Johnson Foundation grantees across the country. Dr. Cummings received her Ph.D. in political science from the Massachusetts Institute of Technology.

Daniel Lessler, M.D., M.H.A., is the associate medical director of ambulatory care services at Harborview Medical Center and an associate professor of medicine at the University of Washington in Seattle. Dr. Lessler's medical and research career includes significant experience and publications in the areas of health care quality, costs, and utilization; participation in numerous hospital committees; and a Robert Wood Johnson Foundation grant to work on the development and implementation of a curriculum in the management of chronic illness. Dr. Lessler received his M.D. from Stanford University School of Medicine and M.H.A. from University of Washington.

Brendan Reilly, M.D., is chair of the Department of Medicine at Cook County Hospital and the C. Andersen Hedberg Professor of Medicine at Rush Medical College in

Chicago. His current research interests include ambulatory care, end–of–life care, anticoagulation, evidence-based medicine, decision rules, and care for patients with acute cardiac ischemia. Dr. Reilly received his M.D. from Cornell University Medical College.

Dean Schillinger, M.D., is associate professor of medicine at San Francisco General Hospital (SFGH), University of California at San Francisco, where he is a primary care physician. In his administrative capacities, he has directed the Adult Medical Center at SFGH and has served as director of clinical operations for the SFGH Department of Medicine. Since the mid-1990s, Dr. Schillinger has worked to improve chronic disease management in the facilities where he has served and spearheaded systemic changes to promote primary care coordination and improve self-management support for public hospital patients. He is the recipient of numerous awards including the 2003 Institute for Health Care Advancement Research Award for his work on health communication and diabetes care. Dr. Schillinger is a member of the Center for Health and Community and the Center for Medical Effectiveness among Diverse Populations, both at the University of California at San Francisco. Dr. Schillinger received his M.D. from the University of Pennsylvania School of Medicine.

EXECUTIVE SUMMARY

The nation's health care safety net plays a critical role in providing care to millions of Americans who have few options for accessing important health care services. Public hospitals are in a unique position within the health care safety net because they often operate systems of care, including inpatient care, primary and specialty outpatient care, and emergency departments. They therefore can offer patients with chronic conditions coordinated care throughout their life cycles.

In an effort to improve care for patients with chronic conditions, seven large and diverse public hospitals joined with the National Public Health and Hospital Institute (NPHHI) to form the Consortium for Quality Improvement in Safety Net Hospitals and Health Systems. Choosing diabetes as their initial focus because of its prevalence among their patients, the consortium members aimed to learn about the quality of diabetes care in public hospitals, describe mechanisms for delivering diabetes management services, and identify lessons that might apply to other chronic conditions. When the study began, 41.4 percent of the patients with diabetes at these hospitals were uninsured and an additional 15.5 percent were covered by Medicaid.

Consortium hospital systems provided information on laboratory tests commonly given to patients with diabetes to monitor their care over time. These tests record HbA1C values and lipid levels (low-density lipoprotein, or LDL, and total cholesterol). Project staff then compared these values to those found in four other studies of diabetes patients: one study of patients who received care through the Department of Veterans Affairs (VA); another of patients enrolled in commercial managed care plans; and two nationally representative government surveys that provide averages for adults with diabetes in the United States.

Despite the vulnerability of public hospital patients—as evidenced by the high number of uninsured and publicly insured individuals—outcomes for consortium patients are comparable to or, in some cases, better than national averages on standard measures of diabetes management, although they fall short of diabetes-related outcomes for VA patients. At consortium hospitals and managed care plans, 65 and 67 percent of patients, respectively, had HbA1c values below 8.5 percent, indicating moderate control of diabetes. A higher percentage of VA patients had controlled diabetes. At consortium hospital systems, in national surveys, and in managed care populations, about one-fifth (21%, 18%, and 20%, respectively) of patients had HbA1C values of 9.5 percent or above,

indicating very poor glycemic control. This figure was much lower for VA patients: only 8 percent of patients with diabetes in the VA study showed very poor glycemic control.

In addition, consortium patients had similar or better cholesterol levels than patients in the national samples.

These findings may help dispel the perception that patients at public hospital systems receive only episodic care that does not effectively manage long-term chronic conditions. The consortium outcomes are equal to and, in some cases, better than privately covered managed care plan enrollees and the general population. Clearly, public hospitals are doing something right for patients with diabetes. Nevertheless, outcomes in public hospitals, managed care plans, and the general population are far below outcomes for VA patients on key measures of quality. The VA is a large public system with rigorous protocols for quality improvement. Its success in managing patients with diabetes should be studied and, whenever possible, models should be spread to public hospitals and other providers.

Outcomes by Race/Ethnicity and Coverage

There are important differences in health outcomes across subgroups of the NPHHI consortium hospital systems. After controlling for insurance, gender, age, number of outpatient visits, and hospital characteristics, we found significant variation across patient groups by race. For example, compared with white patients, black patients at consortium hospitals were significantly less likely to have well-controlled diabetes (OR=.46).

Insurance coverage also was a significant factor in glycemic control, independent of race, age, gender, hospital characteristics, and outpatient utilization. Medicare enrollees were more likely than Medicaid enrollees to have better diabetes control (OR=1.18), and uninsured patients were significantly less likely than those with any type of insurance coverage to have well-controlled diabetes (OR=.85). Even at safety net hospitals, with services designed to provide access to high-quality care for low-income and other vulnerable patients, insurance and race continue to influence health care utilization and ultimately health outcomes for patients with diabetes.

Conclusions

The consortium project provides important lessons for safety net hospitals and other providers of diabetes services.

- Continuity of care and a range of services are essential. The consortium hospital systems employ various strategies such as education classes, special diabetes clinics, and language services to improve care for at least a subset of their diabetes patients.

- Information management systems are central to providing comprehensive diabetes care. Six of the consortium participants were able to provide substantial race/ethnicity data on their diabetic patients and half were able to provide detailed data on patients' preferred languages. Such data enable safety net hospitals to compare chronic care utilization and outcomes by racial and ethnic groups—an essential first step in addressing disparities.

- Insurance coverage influences patient outcomes even when there are programs to mitigate financial barriers to care. At consortium sites, uninsured individuals receive less care, including critically important outpatient care, than patients covered by Medicaid or Medicare.

CARING FOR PATIENTS WITH DIABETES
IN SAFETY NET HOSPITALS AND HEALTH SYSTEMS

INTRODUCTION

The nation's health care safety net plays a critical role in providing care to millions of Americans who have few other options for accessing important health care services. Public hospitals, federally funded health centers, public health departments, and many private physicians and clinics share a common mission: to deliver health services to individuals in need of care, regardless of their ability to pay.

Patients who seek care from the health care safety net are among the nation's most vulnerable residents. Many are poor and most belong to racial and ethnic minorities.[1] In addition to providing free or discounted services, most safety net providers offer special programs to improve patients' access to and quality of care. These include interpreter services for patients with limited English proficiency, transportation to and from appointments, case management, patient education, and linkages with social services.

Public hospitals are in a unique position within the health care safety net because they offer uninsured, low-income, or otherwise vulnerable patients a comprehensive set of health services. While federally funded health centers focus on primary care and public health department clinics tend to focus on preventive services, public hospitals commonly offer inpatient care, primary and specialty outpatient care, and emergency departments. In essence, public hospitals operate *systems* of care, offering patients the full complement of services for many health conditions throughout the life cycle.

This structure can provide significant benefits to patients with chronic conditions, who require complex and coordinated care. Public hospitals are well positioned to offer coordinated care management, monitor quality over time, and adjust resources to meet their patients' evolving needs.

A substantial portion of public hospital patients suffer from chronic conditions such as diabetes, asthma, cardiovascular disease, HIV/AIDS, and lung disease. Despite the prevalence of these conditions at safety net hospitals, little is known about the types of services patients receive and the overall quality of their care. To address this question, a group of public hospitals created the Consortium for Quality Improvement in Safety Net Hospitals and Health Systems and chose to begin work by focusing on diabetes. The goals of the consortium were to learn about overall quality of diabetes care, describe

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mechanisms for delivering services to public hospital patients, and identify lessons that were potentially transferable to patient care for other chronic conditions.

Diabetes was chosen as the first condition of study for several reasons:

- Diabetes is extremely prevalent in public hospitals, providing a large study population and ensuring that the findings would be of widespread interest among safety net providers. For example, the Cook County Bureau of Health Services, a public hospital system that includes three acute care hospital systems, primary and specialty outpatient clinics, and a network of more than 30 community-based ambulatory care sites, provides care to about 30,000 diabetes patients. The volume of patients presents an immense challenge to these providers, made greater by the large proportion of patients with limited English proficiency, few economic resources, housing instability, or low literacy.

- Diabetes is a national public health concern. An estimated 18 million Americans have diabetes, and the number is expected to rise to 29 million by 2050.[2] Findings related to quality of care in safety net hospitals will have implications for large segments of the population.

- Blacks, Latinos, Native Americans, and Asian and Pacific Islander patients all have a higher prevalence of diabetes than white Americans.[3] In addition, diabetes is the country's leading cause of end-state renal disease, a condition that is much more prevalent among blacks than whites.

- There is substantial consensus about what constitutes high-quality diabetes treatment, making common measures possible across sites. The most frequent marker of high-quality diabetes care, glycemic control, is a laboratory value that is available in many public hospital electronic data systems.

Consortium for Quality Improvement in Safety Net Hospitals and Health Systems

In 2002, with support from The Commonwealth Fund, the National Public Health and Hospital Institute (NPHHI) created a consortium of safety net hospital systems to work together to address common concerns regarding the care of patients with diabetes. As do many public hospitals, the seven hospitals that participated in the Consortium for Quality Improvement in Safety Net Hospitals and Health Systems include comprehensive diabetes

care as a major clinical focus. Recognizing the complexity of diabetes care, each hospital employs a variety of tools to help patients manage their chronic health conditions.

This was the first effort in the safety-net community to conduct cross-institutional research, share data and analysis, and collaborate across complex systems of care. Therefore, the project also can provide information about the ability to extract clinical and demographic data on a subset of patients across health systems, the willingness of participants to provide such data, and their interest in participating in a shared learning network.

An additional goal of the project was to develop a robust database on a diverse patient population, including patient characteristics, access measures, and clinical outcomes, to enable analysis across racial and ethnic groups.

Consortium Hospital Systems

Potential consortium participants were selected to provide geographic, racial, ethnic, and linguistic diversity and to include a mix of inpatient and outpatient capacity. We developed profiles of a group of hospital systems using survey data from the American Hospital Association and the National Association of Public Hospitals and Health Systems (NAPH). NPHHI invited 12 safety net hospital systems to participate and 11 expressed interest. Of these 11, seven completed the consortium's project requirements by providing a uniform dataset on patients with diabetes. Table 1 provides information on the seven consortium hospital systems and illustrates their variability in terms of service volumes. They are:

- Cambridge Health Alliance, Cambridge, MA (CHA);

- Community Health Network of San Francisco (CHNSF)/San Francisco General Hospital;[4]

- Cook County Bureau of Health Services, Chicago, IL (CCBHS);

- Grady Health System, Atlanta, GA (GHS);

- Harborview Medical Center, Seattle, WA (HMC);

- LSU/Medical Center of Louisiana, New Orleans (LSU); and

- Memorial Healthcare System, Hollywood, FL (MHS).

These hospitals are all public entities with large patient populations and busy outpatient clinics and emergency departments. MHS has the largest number of annual discharges (55,000), while three other hospital systems have more than 25,000 discharges annually. On the outpatient side, CCBHS and GHS have the highest volumes, with more than 750,000 and almost 650,000 outpatient visits in 2002, respectively. These numbers include visits made to hospital campuses, outpatient departments, and off-site community clinics.

Table 1. Patient and Visit Volumes at Consortium Hospital Systems, 2002 (volumes rounded to nearest hundred)

	CHA	CHNSF	CCBHS	GHS	HMC	LSU	MHS
Discharges	15,700	16,500	33,800	29,700	16,800	25,000	55,600
Emergency Dept. visits	80,500	47,000	214,300	155,700	81,600	172,500	182,000
Outpatient visits	527,800	656,400	750,200	647,100	260,000	354,600	468,300
Number of adult diabetic patients in the system**	4,700	6,800	30,000★	21,000★	4,000	5,700	4,800

★ Estimated from interviews with consortium contacts, 2003.

** These patients have a minimum of two outpatient visits at consortium hospital systems recorded during the three-year study period of January 1, 2000, to December 31, 2002.

Source: I. Singer, L. Davison, J. Tolbert et al., *America's Safety Net Hospitals and Health Systems, 2002. Results of the 2002 Annual NAPH Member Survey* (Washington, D.C.: National Association of Public Hospitals and Health Systems, 2004).

DATA COLLECTION METHODS

The study used two methods of data collection to gather information about patients with diabetes in the participating hospitals and profile their treatment.[5]

1. NPHHI staff conducted interviews with key clinical and administrative staff to identify innovative practices or programs to manage patients with diabetes, paying special attention to those targeting patients with low literacy or limited English proficiency and those designed to improve the cultural competence of providers.

2. Consortium hospital systems provided demographic, utilization, and clinical data on patients with diabetes. Consistent with other diabetes studies, patients were included in the dataset if they were 18 years or older and had two or more outpatient visits during the period between January 1, 2000, and December 31, 2002.[6,7] Hospital systems also provided inpatient and emergency department visit data for these patients. To avoid capturing patients whose diabetes was managed

elsewhere in the community but who may have been seen in the consortium hospital system's emergency department or as an inpatient, we excluded patients with fewer than two outpatient visits over the three-year period. Patients were determined to have diabetes if they had a primary or secondary diabetes-related ICD-9 diagnosis code, excluding gestational diabetes. The data were weighted to provide equal numbers of patients from each of the participating hospital systems.[8] (For more information on the regression analysis of factors influencing HbA1c levels, see the Appendix.)

Six of the seven hospital systems provided information on patients' race or ethnicity.[9] These six provided race/ethnicity information on at least 98 percent of patients in the datasets and generally classified patients according to five categories: white, black, Latino, Asian/Pacific Islander, or Native American/Alaskan.[10] Consortium hospitals provided information on patients' insurance coverage for nearly all of the patients in the study. The findings on race/ethnicity, language, and coverage are consistent with other studies on patients who receive care at these hospital systems, although attempts to validate the data were beyond the scope of this project.

FINDINGS: KEY COMPONENTS OF DIABETES CARE DELIVERY
The Chronic Care Model, developed by Wagner and colleagues at the W. A. MacColl Institute for Healthcare Innovation, was used as a framework to identify ways that diabetes-related care was delivered and managed at the participating hospitals.[11] The Chronic Care Model provides a multidimensional roadmap to address complex health conditions and is built around several important health care delivery components. For diabetes management, these include:

1. A clear definition of optimal diabetes care;

2. A supportive health care organization;

3. Delivery system design;

4. Decision support;

5. Clinical information systems;

6. Self-management support;

7. Community resources; and

8. An effective improvement strategy

We identified characteristics of consortium hospital systems that were consistent with this model and were likely to have an impact on the quality of diabetes-related care. While each hospital system has unique features and practices, there are many similarities in their approach to caring for diverse patient populations in urban settings:

- They provide care to all, regardless of their coverage or ability to pay. They operate under varying eligibility and payment criteria, which require patients to qualify for free or reduced cost services. In practice, patients who may not be able to cover copayments for visits or pharmaceuticals continue to receive important health services.

- All have on-campus pharmacies that diabetes patients can use on an outpatient basis to fill their prescriptions, often for free or at significant discounts. Most of these pharmacies also provide diabetes supplies. These pharmacies tend to be large and busy; the pharmacy at Fantus, CCBHS's outpatient clinic, fills well over 2 million prescriptions a year.

- Consistent with national practices, consortium hospitals provide most diabetes care in outpatient primary care settings. All of the systems have outpatient primary care and family practice clinics on the hospital campus.

- Each utilizes a team approach to diabetes-related care. Generally, teams meet regularly and have clearly defined responsibilities including patient self-management education, proactive follow-up, and resource coordination. Continuity of care is a high priority. For example, at CHA, diabetes care for the entire system is led by the Diabetes Leadership Team. At MHS, clinical care managers coordinate and provide follow-up for a system of care made up of clinical services, behavioral health care providers, and supportive services. MHS targets diabetes through a disease management program and uses a team approach to deliver coordinated care to prevent complications.

- All of the systems offer group classes for diabetes education. Diabetes patients at HMC can participate in "Living a Healthy Life" workshops, which are case management support groups for patients with chronic illnesses. CHNSF provides billable group medical visits to diabetes patients at the hospital campus and several community health centers for patients with poor glycemic control.

- Consortium hospital systems have supplemented their clinical care with non–clinical services that address patients' financial, cultural, language, and educational barriers to care. Consortium hospital systems provide written information about diabetes care, often in multiple languages and designed for patients with low literacy levels. For example, HMC developed EthnoMed, a Web-based clinical tool that helps providers convey information to patients from different cultures and provides them with access to translated patient education materials. LSU developed an "African American Sundays" program to train representatives from church health ministries to provide diabetes education to their congregations. At CHNSF, administrators emphasize staff hiring that serves the patient population, such as Spanish-speaking pharmacists.

Table 2 outlines the specific characteristics of diabetes care at the consortium hospital systems.

Table 2. Characteristics of Diabetes Care at Consortium Hospital Systems*

	CHA	CHNSF	CCBHS	GHS	HMC	LSU	MHS
Special diabetes clinic	✓	✓	✓	✓		✓	✓
International medicine clinic	✓		✓	✓	✓		
Diabetes registry available	✓	✓	✓	✓	✓		✓
Registry integrated w/other electronic information systems	✓	✓		✓	✓		
Registry able to alert providers to needed diabetes care services	✓	✓	✓	✓	✓		✓
Registry used for monitoring and planning diabetes care	✓	✓	✓	✓	✓		✓
Registry incorporates clinical decision-making	✓	✓	✓	✓	✓		✓
Individual class available	✓	✓	✓	✓	✓		✓
Education classes in language(s) other than English	✓	✓	✓	✓	✓		✓
ADA certified program	✓			✓		✓	✓
Satellite clinic pharmacy available		✓	✓	✓	✓		✓
90% or more of patients have record of HbA1c information	✓			✓		✓	
Patients have record of information of eye examinations	✓			✓	✓	✓	

* A check indicates that the hospital system offers the service to at least a subset of its patients.
Source: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005.

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Special Diabetes Clinics

Some consortium hospital systems operate clinics that provide specialized care exclusively to patients with diabetes. Often, these clinics are staffed with providers with advanced knowledge and skills, including diabetologists and certified diabetes educators. GHS operates a diabetes clinic for about 5,000 of its patients. While patients can self-refer to the clinic, the majority are referred by primary care providers. The diabetes clinic is located at the main GHS campus and serves as a resource to other GHS clinics that treat patients whose diabetes is difficult to manage.

International Medicine Clinics

To facilitate care for a culturally diverse patient population, several systems operate international medicine clinics, where patients and providers commonly speak languages in addition to English. At HMC, for example, the International Medicine Clinic is a primary care practice for patients with limited English proficiency. The clinic provides diabetes education in multiple languages, particularly Spanish and Amharic, and for patients with low health literacy.

Diabetes Registries

A patient registry allows health systems to track the care of individuals and groups, organize treatment data such as laboratory results and clinical visits, and provides a resource for the care team. All of the consortium hospital systems use their registries to some extent for monitoring and planning diabetes care, but their systems have varying capabilities. The most comprehensive registries incorporate clinical decision support and are integrated into other electronic information systems used by the health systems.

At CHNSF, a multidisciplinary care team uses the registry to identify patients in poor control and provide self-management support. This support includes automated telephone diabetes management sessions in English, Spanish, or Cantonese and review by a nurse case manager or group medical visits.

Education Classes

Consortium hospital systems use a variety of resources to supplement traditional diabetes education programs and tailor their methods to the needs of their patients. Many of the hospital systems employ certified diabetes educators (CDEs) as part of the diabetes care team and provide targeted support for special needs. For example, at MHS, CDEs lead adult support groups in discussions of nutrition, medical developments in diabetes care, and related topics.

Several of the hospitals have education programs that have been certified by the American Diabetes Association (ADA), which sets national standards for diabetes self-management education.[12] These standards include organizational support for diabetes self-management education programs, involvement of multifaceted instructional teams, a designated coordinator for educational programs, and use of a continuous quality improvement process to evaluate their effectiveness.

Pharmacy Services at Satellite Clinics

Diabetes care requires coordination of medications and supplies. In addition to having outpatient pharmacies on the hospital campuses, several sites also provide pharmacy services at satellite clinics in their communities. Because of the growing costs of pharmaceuticals and their critical importance to care management, consortium hospital systems employ multiple strategies to provide pharmaceuticals for their patients. These strategies include patient assistance programs, discount cards, and participation in the federal 340b program, which allows public hospital pharmacies to purchase drugs at the lowest possible prices.[13]

Availability of Clinical Information

We asked participating hospitals to provide information used in their routine care for patients with diabetes. Because of the importance of managing HbA1c levels and the usefulness of the indicator, we looked at the extent to which patient records included at least one HbA1c value during the study period. Three hospital systems reported at least one HbA1c value for 90 percent or more of their patients. In addition, four systems were able to track whether patients had received eye examinations during the study period.[14]

FINDINGS FROM HOSPITAL DATA

Patient Demographics

Among all seven participating hospitals, 56.4 percent of patients were female and 43.6 percent were male. Only 16.4 percent were under age 45 and more than half (51.9 %) were between the ages of 45 and 64. An additional 20 percent were 65 to 74 and nearly 12 percent were 75 or older.

Six of the seven hospital systems provided information on the race/ethnicity of their diabetes patients. Among these six, race/ethnicity information was available for more than 99 percent of patients. This data shows that most of the patients treated at the participating hospitals are members of racial or ethnic minority groups. As Table 3

illustrates, nearly half (45.7 %) were black, 11.2 percent were Latino, and 7.3 percent were Asian or Pacific Islander. About one-third were classified as non-Latino white.

The racial and ethnic make-up of patients varies considerably across the hospital systems. While the CHA has the lowest percentage of patients from racial or ethnic minorities, there may be significant diversity within CHA's racial/ethnic categories. For example, many of CHA's patients who classify themselves as white were Brazilian and speak Portuguese.

At two systems, blacks composed the majority of diabetes patients.[15] San Francisco's CHNSF was the most diverse, with significant representation from each of the four major racial and ethnic categories.

Table 3. Race/Ethnicity of Consortium Hospital Systems' Patients with Diabetes

	% White	% Black	% Latino	% Asian/ Pacific Islander	% Native American/ Alaskan*	% Other	% Missing
Consortium Average**	30.8	45.7	11.2	7.3	0.5	2.8	1.7
Cambridge Health Alliance	61.4	18.6	9.2	1.2	—	7.2	2.4
Community Health Network of San Francisco	16.9	23.5	27.9	27.7	0.3	2.9	0.8
Grady Health System	4.7	89.8	2.2	0.4	0.6	2.3	—
Harborview Medical Center	42.8	31.5	6.9	13.3	1.7	—	3.7
LSU/Medical Center of Louisiana at New Orleans	10.9	85.4	2.4	0.8	0.1	0.5	—
Memorial Healthcare System	48.1	25.3	18.6	0.7	0.1	4.1	3.0

Notes: Cook County Bureau of Health Services did not provide race/ethnicity information about diabetes patients, and is not included in Table 3. A 2000 survey of ambulatory care practices at NAPH hospitals indicated that approximately 65 percent of CCBHS's total patient population was black and 25 percent was Latino. The remaining 10 percent was white, Asian, or other races. See M. Regenstein and J. Shearer, *NAPH Ambulatory Care Sourcebook: Findings from the 2001 NAPH Ambulatory Care Survey* (Washington, D.C.: National Association of Public Hospitals and Health Systems, October 2001).
★ A total of 127 Native American/Alaskan patients are included in the analysis.
★★ The consortium average is weighted: 3,000 patients from each hospital were randomly sampled in order to account for different sampling strategies from consortium systems. Patients with fewer than two outpatient visits were excluded. Weights were applied such that each hospital contributes 3,000 patients (for overall averages only).
Source: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005.

Languages

One of the most striking characteristics of the patient populations is that a high proportion speaks a language other than English. Safety net providers face great challenges in developing programs to provide culturally and linguistically appropriate care to their patients.

Table 4 shows the percent of patients at each hospital system estimated to speak a language other than English as their primary language and lists the various languages spoken by patients at each system. While only 5 percent of patients primarily spoke a language other than English at GHS, 66 percent did so at MHS. At each of the systems, English was the most commonly spoken language, since many patients who spoke another language also spoke English. Spanish was the second most common language.

Table 4. Languages of Diabetes Patients at Consortium Hospital Systems

	CHA	CHNSF	CCBHS	GHS	HMC	LSU	MHS
% patients who speak language other than English as primary language	36%	40%	40%	5%	23%	5%	66%
Top Languages (in order)	English Portuguese Haitian Creole Spanish Hindi	English Spanish Cantonese	English Spanish Polish Hindi	English Spanish	English Vietnamese Cambodian Somali Amharic Tigrinyan	English Spanish Vietnamese Chinese French	English Spanish Haitian Creole

Notes: Figures represent an initial random sample of 3,000 patients from each consortium hospital. Patients with fewer than two outpatient visits were excluded from the sample. As a result, two hospitals include fewer than 3,000 patients in the final sample.
Source: Interviews with Consortium Hospital Systems, 2003.

Health Insurance Coverage

The hospital systems care for disproportionately high numbers of uninsured patients (Figure 1). Two-fifths (41.4%) of patients with diabetes were uninsured, approximately one of seven (13.7%) were privately insured, and more than one-quarter (27.9%) were covered by Medicare. Only 15.7 percent were covered by Medicaid.

Medicaid coverage among patients with diabetes at the consortium hospital systems was substantially lower than overall Medicaid coverage at these and other safety net hospital systems. For example, about 42 percent of inpatient discharges and 24 percent of outpatient visits at NAPH member hospitals were covered by Medicaid.[16] This finding

may be due to the limitations of Medicaid coverage for certain groups of adults. While Medicaid eligibility varies significantly across states, middle-aged men and women with diabetes or other chronic diseases are less likely to be covered by Medicaid, regardless of their state of residence, since they do not fall into Medicaid-eligible groups and are not automatically eligible by virtue of having diabetes.

Not surprisingly, coverage of patients with diabetes varies greatly across hospital systems. At CCBHB, more than 76 percent of patients with diabetes were uninsured, while only 7.6 percent of patients were covered by Medicaid. By comparison, 38.2 percent of diabetes patients at CHNSF were covered by MediCal, California's Medicaid program, because of California's more generous enrollment policies for low-income patients.

Figure 1. Insurance Coverage of Diabetes Patients at Consortium Hospitals

Percent

Category	Percent
Private	13.7
Medicaid	15.5
Medicare	27.9
Uninsured	41.4
Other/Missing	1.5

Source: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005.
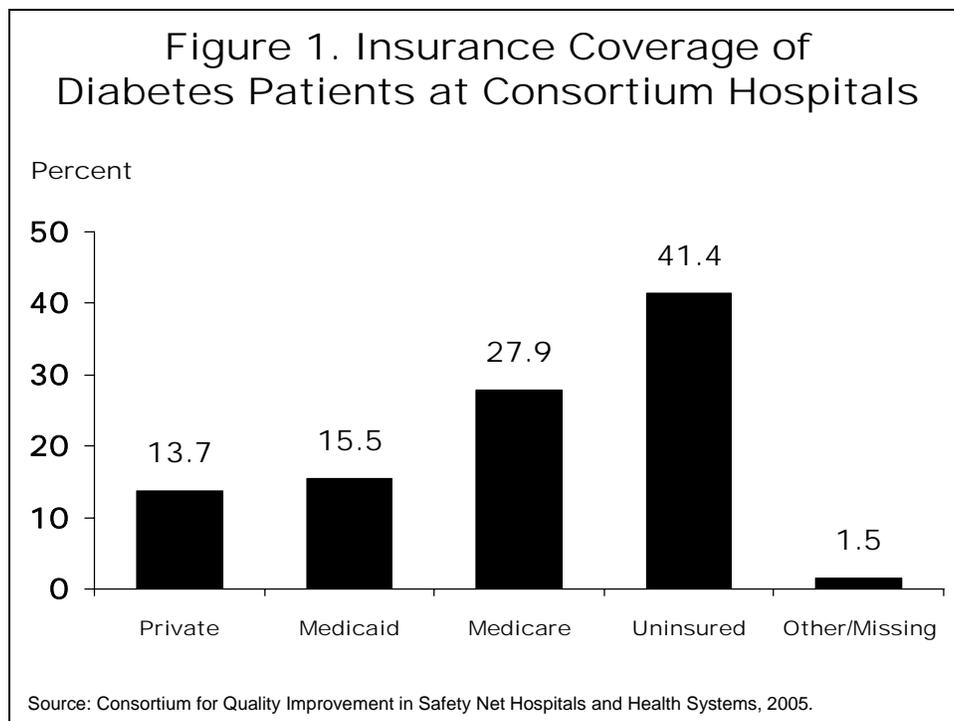
Utilization of Health Services
The consortium hospital systems provided data on their diabetes patients' use of ambulatory care, emergency department services, and inpatient stays.

Use of Ambulatory Care
We analyzed use of services for all eligible patients who had two or more ambulatory care visits during the three-year study period.[17] About one-third (34.3%) of all patients had relatively few outpatient visits (two to four). The remaining two-thirds had five or more

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outpatient visits: 26.3 percent had between five and 10 visits and 39.4 percent had 11 or more visits.

Asian/Pacific Islander patients were most likely to have multiple outpatient visits. Nearly nine of 10 (88.3%) Asian/Pacific Islander patients had five or more outpatient visits, compared with 78.8 percent of Native American/Alaskans, 72.5 percent of Latinos, 68.7 percent of blacks, and 61.5 percent of whites.

Medicaid and Medicare patients were most likely to have five or more outpatient visits during the study period (78.0% and 73.4%, respectively), compared with 47.2 percent of privately insured patients. Uninsured patients also had lower rates of outpatient care compared with Medicaid and Medicare patients. Less than one-third (30.5%) of uninsured patients had 11 or more outpatient visits during the study period, compared with 54.1 percent of Medicaid patients and 51.2 percent of Medicare patients.

Use of Emergency Departments

More than half (57.9%) of the patients did not visit the emergency department (ED) at all during the three-year study period. A small proportion (9.3%) of patients used the ED frequently, visiting five or more times. Privately insured and uninsured patients were most likely to have no ED visits. Medicaid patients were twice as likely as other patients to have five or more ED visits (19.5% versus 9.3%).

ED use was particularly high among certain groups of patients. Nearly one-third (31.8%) of Native American/Alaskan patients used the ED five or more times over the study period—a rate more than twice as high as black patients (14.2%) and six times as high as Asian/Pacific Islander patients (5.4%).

Use of Inpatient Services

Nearly one-third (30.8%) of patients were hospitalized at some point during the study period, evidence of the high burden of illness and costs associated with diabetes. Most of these patients had one or two admissions during the three-year period. However, as with ED use, a small percentage of patients (3.2%) had five or more inpatient admissions. Medicaid patients were more than six times as likely as uninsured patients to have five or more admissions.

Latino and Asian/Pacific Islander patients were less likely than other patients to use inpatient services, with 74.9 percent and 68.9 percent, respectively, having no admissions

during the study period. More than one of 10 Native American/Alaskan patients had five or more inpatient admissions during the study period—a rate more than three times as high as black and white patients and more than five times as high as Latino and Asian/Pacific Islander patients.

Summary of Utilization

Table 5 provides information on the average number of ambulatory, emergency department, and inpatient visits by patients' coverage and race/ethnicity. Overall, privately insured and uninsured patients had lower rates of service utilization than patients covered by Medicaid or Medicare.

It is not surprising to find that uninsured patients use fewer ambulatory services. Even in safety net institutions that offer care to all in need, uninsured patients may face copayments or other financial barriers to services. Medicaid enrollees with diabetes are likely to have co-morbid conditions or suffer from complications—factors that may enable them to become eligible for Medicaid. This helps to explain why Medicaid enrollees had greater use of services.

Table 5. Average Number of Visits, by Insurance Coverage and Race/Ethnicity January 2000–December 2002

	Ambulatory Visits	Emergency Department Visits	Inpatient Admissions
Insurance Coverage			
Medicaid	20.2	3.0	1.3
Medicare	18.9	1.7	.9
Private	9.5	.7	.4
Uninsured/Self Pay	10.5	1.1	.4
Race/Ethnicity			
White	14.7	1.3	.8
Black	13.6	2.2	.7
Latino	18.3	1.2	.5
Asian/Pacific Islander	23.6	1.1	.7
Native American	16.9	5.5	1.8

Notes: Cook County Bureau of Health Services did not provide race/ethnicity information about diabetes patients and is therefore not included in race/ethnicity values. Insurance coverage values include all consortium hospital systems.
Source: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005.

The lower rates of service use among privately insured patients was a more surprising finding, and especially noteworthy because the rates were lower than those for uninsured patients. There are several possible explanations. Privately insured patients may receive care from a variety of providers, thereby resulting in lower utilization rates at the consortium hospitals. What's more, all public hospital patients tend to be low-income, regardless of their coverage. Privately insured patients may be underinsured and face significant out-of-pocket costs, thus discouraging them from seeking services. Their use patterns may result from a combination of factors and are worthy of further study.

Asian/Pacific Islanders had high rates of outpatient utilization combined with low ED and inpatient utilization, a pattern of care that may indicate effective diabetes management. Native Americans, on the other hand, had disproportionately high rates of ED use and inpatient care, signaling a need for more targeted strategies to effectively manage their care for diabetes and other health services.[18]

Health Outcomes as Reported by Clinical Test Values and Comparisons with National Averages, the Department of Veterans Affairs, and Managed Care Populations

Consortium hospital systems provided information on certain laboratory tests commonly given to patients with diabetes to monitor their care over time. These laboratory tests recorded HbA1C values and lipid levels (low-density lipoprotein, or LDL, and total cholesterol).

Table 6 compares outcomes of consortium patients with outcomes reported in four other studies of large groups of patients with diabetes. These studies include patients who received care through the Department of Veterans Affairs (VA), commercial managed care plans, and two nationally representative surveys that provide a measure of diabetes control among the general population. Despite the vulnerability of public hospital patients—as evidenced by the high numbers of uninsured and publicly insured individuals—outcomes for consortium patients are comparable to or, in some cases, better than national averages on standard measures of diabetes management.[19] Quality measures for patients at consortium hospitals, however, fall short of those for patients who receive care through the VA.

Table 6. Key Outcomes for Selected Populations with Diabetes

Characteristics	NPHHI Consortium Participants (n=19,406)	VA Participants (n=1,285)	Commercial Managed Care Participants (n=6,616)	NHANES III and BRFSS (n=4,086)
Age (mean)	58	65	61	NA
Men (%)	44	98	46	45
Race/Ethnicity (%)				
White	32	67	51	70
Black	45	11	20	16
Hispanic	12	13	19	10
Asian or Pacific Islander	8	1	4	NA
Other	3	8	6	4
Quality of Care Measures (%)				
HbA1c value < 8.5%	67	83	65	NA
HbA1c value ≥ 9.5%	21	8	20	18
LDL cholesterol level < 130 mg/dL	72	86	72	42
LDL cholesterol level < 100 mg/dL	40	52	36	11

Notes: Figures represent an initial random sample of 3,000 patients from each consortium hospital. Patients with fewer than two outpatient visits were excluded from the sample. As a result, two hospitals include fewer than 3,000 patients in the final sample.

Sources: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005; E. A. Kerr, R. B. Gerzoff, S. L. Krein et al. "Diabetes Care Quality in the Veterans Affairs Health Care System and Commercial Managed Care: The TRIAD Study," *Annals of Internal Medicine* 141 (August 17, 2004): 272–81; J. B. Saaddine, M. M. Engelgau, G. L. Beckles et al., "A Diabetes Report Card for the United States: Quality of Care in the 1990s," *Annals of Internal Medicine* 136 (April 16, 2002): 565–74.

Patients with diabetes at consortium hospital systems are younger than patients with diabetes in the VA and in managed care studies. They are also much more likely to be members of racial and ethnic minorities. Sixty-eight percent of patients in the consortium hospitals were non-white, compared with 33 percent of VA patients, 49 percent of the managed care diabetic population, and 30 percent of two nationally representative surveys combined: the Third National Health and Nutrition Examination Survey (NHANES III) and the Behavioral Risk Factor Surveillance System (BRFSS).

All of the studies gauge glycemic control by measuring percent of patients with HbA1c values greater than or equal to 9.5 percent, and three of the studies also measure the percent of patients with HbA1c above or below 8.5 percent.[20] At consortium hospital systems and in the managed care study, 65 and 67 percent of patients, respectively, had HbA1c values below 8.5 percent, indicating moderate control of diabetes. VA patients

were more likely to have controlled diabetes. At consortium hospital systems and in national surveys, about one-fifth of patients had HbA1C values greater than or equal to 9.5 percent indicating very poor glycemic control.[21] This figure was much lower for VA patients—only 8 percent exhibited very poor glycemic control.

Consortium patients had similar or better cholesterol levels than patients in the national surveys. The National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults recommends that LDL levels for high-risk patients should be <100 mg/dL and for moderately high-risk patients should be <130 mg/dL.[22] Seventy-two percent of consortium patients had LDL levels below 130 mg/dL, the same rates as managed care enrollees.[23] Patients in the VA survey had higher rates: 86 percent, or more than twice the rate seen among the general population with diabetes, had LDL levels below 130 mg/dL. Consortium patients were more likely than managed care enrollees and much more likely than the general population to have LDL levels below 100 mg/dL. Again, the VA's rates were the best of the group.

The outcomes seen among consortium hospital patients are noteworthy for several reasons. First, the findings may help dispel the perception that patients at public hospitals receive only episodic care that does not effectively manage long-term chronic conditions. Even though the patients in the study group are disproportionately low income and uninsured, they had diabetes outcomes equal to or better than privately covered managed care enrollees and the general population. This is even more remarkable since public hospitals provide care to a diverse group of patients who require varying strategies to enhance self-management and ensure adequate access to health services. Clearly, public hospitals are doing something right for patients with diabetes.

Nevertheless, outcomes within public hospitals, managed care plans, and the general population are far below outcomes for patients at the VA on key measures of quality. The VA is a large public system that has developed rigorous protocols for quality improvement. Its success in managing patients with diabetes should be studied and, whenever possible, models should be spread to public hospitals and other providers.

Outcomes by Race/Ethnicity and Coverage
Overall, diabetes patient outcomes in the consortium hospitals were similar to those from other studies. However, the study uncovered important differences across subgroups of consortium patients. Uninsured patients had poorer HbA1c levels than Medicare and

privately insured patients and black, Latino, and Native American/Alaskan patients had worse glycemic control than white and Asian/Pacific Islander patients. These disparities are similar to those found in national surveys, and yet they present particular challenges for safety net hospitals because these institutions serve so many uninsured and racial/ethnic minority patients.[24]

Glycemic Control

Overall, 38.3 percent of consortium hospital patients had HbA1c levels below 7 percent—the level identified by the American Diabetes Association as well-controlled diabetes—and another 35.3 percent had levels between 7 and 8.9 percent.[25] One-quarter of consortium patients (26.4%) had levels above 9 percent.

Medicare patients appear to have the best glycemic control among the consortium patients. Nearly half (47.4%) of these patients had HbA1C levels below 7 percent and only about one of seven (17.1%) had values over 9 percent. Uninsured patients had the worst glycemic control; one-third (33.3%) of uninsured patients had HbA1C levels above 9 percent—twice the rate of patients with Medicare coverage.

White patients were most likely to have HbA1c values less than 7 percent, with 45.6 percent in this range. By comparison, 41.5 percent of Asian/Pacific Islander, 37.5 percent of black, 33.9 percent of Latino, and 30.6 percent of Native American/Alaskan patients had values of less than 7 percent. Compared with black, Latino, and Native American patients, Asian/Pacific Islander and white patients were significantly less likely to have HbA1c levels over 9 percent.

Lipid Values: LDL, Total Cholesterol

More than one-third (39.9%) of diabetes patients in consortium hospital systems had LDL levels below 100 mg/dL and an additional one-third (32.0%) had LDL levels between 100 and 129 mg/dL. Two-thirds (64.1%) also had total cholesterol levels below 200 mg/dL. Cholesterol levels under 200 mg/dL represent desirable levels of total cholesterol.[26] Uninsured patients were least likely to have optimal LDL levels (<100 mg/dL) and were most likely to have very high LDL levels (160 mg/dL or higher).

While there were differences in the lipid values across racial/ethnic groups, no clear pattern emerged. Native Americans had the best values for LDL and total cholesterol. As with glycemic control, blacks were more likely than all other patients to have very high LDL levels (160 mg/dL or higher).

Summary of Clinical Tests

Table 7 displays the mean of patients' three clinical test results during the three-year study by race/ethnicity and insurance coverage. Overall, Medicare patients demonstrated the best values and uninsured patients had the worst. Black and Latino patients had the highest HbA1c and LDL cholesterol levels.

Table 7. Mean Values of Clinical Tests by Race/Ethnicity and Insurance Coverage, January 2000–December 2002

	HbA1c	LDL	Total Cholesterol
White	7.6	109.7	187.3
Black	8.1	113.3	188.1
Latino	8.1	112.5	194.2
Native American	8.2	106.0	187.9
Asian/Pacific Islander	7.6	109.5	191.0
Medicaid	8.0	110.1	188.0
Medicare	7.5	107.3	184.9
Private	7.9	112.3	187.3
Uninsured	8.3	116.0	195.8

Notes: Cook County Bureau of Health Services did not provide race/ethnicity information about diabetes patients and is therefore not included in race/ethnicity values. Insurance coverage values include all consortium hospital systems. Values refer to average of three laboratory values per patient. Figures represent an initial random sample of 3,000 patients from each consortium hospital. Patients with fewer than two outpatient visits were excluded from the sample. As a result, two hospitals include fewer than 3,000 patients in the final sample.
Source: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005.

ANALYSIS OF FACTORS AFFECTING HbA1c LEVELS

The data provided by the consortium hospital systems indicate that relationships exist between insurance coverage and health outcomes and between race/ethnicity and outcomes. We performed additional analyses to determine the effects of race and insurance coverage on health after controlling for other factors. (For information on regression analysis of factors influencing HbA1c, see the Appendix.[27]) We focused on HbA1c levels because of their importance for diabetes management and because of their established relationship to diabetes complications. For the purposes of regression analysis, patients with HbA1c values below 7.0 percent were considered to have well-controlled diabetes.

In addition to adjusting by demographic characteristics, we performed analyses to determine whether various diabetes-related activities, as described in Table 2, influenced patients' health outcomes.[28] We wanted to see whether variation in diabetes-related activities across the hospitals, such as the existence of special diabetes clinics, international clinics, or off-site pharmacies, could explain variations in patient outcomes.

We also conducted analyses to determine whether outpatient utilization influenced clinical outcomes. We hypothesized that greater numbers of outpatient visits signaled improved continuity of care and thereby influenced patients' clinical outcomes.

Significant Demographic and Hospital Program Characteristics

After controlling for insurance, gender, age, the number of outpatient visits, and hospital characteristics, there was significant variation in HBA1c levels across patient groups by race (Table 8). Compared with white patients, black patients at consortium hospital systems were significantly less likely to have well-controlled diabetes (OR=.46).

Table 8. HbA1c by Race, Health Insurance, Outpatient Utilization, and Hospital Characteristics

	HbA1c < 7.0%		
Characteristic	OR	95% CI	
Race			
White	Reference		
Black	.464★	.313	.689
Hispanic	1.413	.796	2.508
Native American/ Alaskan Native	.092	.004	2.143
Asian/Pacific Islander	1.408	.678	2.925
Other Race	1.254	.461	3.412
Insurance			
Medicaid	Reference		
Medicare	1.182★	1.058	1.321
Private/Commercial	1.023	.889	1.177
Uninsured	.854★	.770	.948
Outpatient Utilization			
2–4 visits	Reference		
5–10 visits	1.715★	1.109	2.651
11 or more visits	2.531★	1.676	3.823
Pharmacy services available in satellite clinics	1.487★	1.313	1.684
ADA-certified education program	1.350★	1.187	1.536

★ p < .05

Note: OR > 1 indicates a greater probability of HbA1c level < 7.0% compared with the reference group.

Source: Consortium for Quality Improvement in Safety Net Hospitals and Health Systems, 2005.

We also found that, after controlling for race, age, gender, hospital characteristics, and outpatient utilization, insurance coverage was a significant factor in HbA1C levels. Medicare patients were more likely than Medicaid patients to have better diabetes control (OR=1.18) and uninsured patients were significantly less likely than patients overall to have well-controlled HbA1c (OR=.85).

These findings highlight the persistent barriers to care for uninsured patients as well as health disparities among minority patients, in this case black patients. Even at safety net hospitals, with services designed to provide access to care for low-income and other vulnerable populations, insurance and race continue to influence health care utilization and ultimately outcomes for diabetes patients.

The number of outpatient visits during the study period was also a significant factor in patients' health outcomes. After controlling for race, insurance coverage, age, gender, and hospital characteristics, patients with 11 or more outpatient visits were more than twice as likely (OR=2.53) to have lower HbA1c values than patients with fewer than five visits. Continuity of care appears to be strongly associated with successful diabetes management. This finding has important implications for uninsured patients, who have lower utilization of outpatient services than patients covered by Medicaid.

We also examined the extent to which various hospital characteristics influence HbA1C values.[29] Two hospital characteristics, ADA-certified diabetes education programs and pharmacy services in satellite clinics, were significantly associated with better outcomes.[30] After controlling for insurance, gender, race/ethnicity, age, and the number of outpatient visits, patients who received care at consortium hospital systems with ADA-certified education programs were 35 percent more likely to have lower mean HbA1c levels than patients at sites without such programs (OR=1.35). Also, patients receiving care at consortium hospital systems with pharmacy services available at satellite clinics were 1.49 times more likely than patients at sites without such services to have well-controlled diabetes.

In sum, the analyses demonstrate that HbA1c levels were significantly associated with race, insurance coverage, age, continuity of care, the availability of ADA-certified diabetes education programs, and the availability of pharmacy services at satellite clinics. Yet, though statistically significant, all of these factors explain only a small amount of the variation in HbA1c values observed among consortium hospital system patients.[31] This is

consistent with Wagner's Chronic Care Model and reflects the multiple determinants of diabetes care.[32]

These findings suggest that, although demographic, hospital, and utilization characteristics are significantly associated with HbA1c levels, other factors also are important. Each of the consortium hospital systems is a public entity with a clear and well-articulated mission; each has a commitment to caring for the underserved; and each has developed systems to care for their patient populations, including those with low incomes and those who face cultural or linguistic barriers to care. These factors are not easily measured. To clarify whether these common characteristics are associated with better disease management, further research would be needed to compare health outcomes in safety net health systems with outcomes in health systems that have different governance, financing, and patient populations.

Limitations

Consortium hospital systems were able to provide a substantial amount of data about their diabetes patients, including data on race/ethnicity; preferred or spoken language; inpatient, outpatient, and emergency department utilization; and clinical results. Even so, this analysis has several limitations.

The study was designed to enable comparisons across similar organizations, not to compare outcomes between safety net and other types of health systems. With only seven study sites, analyses of program characteristics, such as availability of special diabetes clinics, pharmacy services, or an international medicine clinic, are limited. In addition, the analyses did not allow us to determine the extent to which these characteristics are independent of each other, or the extent to which having multiple program characteristics has an effect on patient outcomes.

With regard to clinical outcomes, there was limited data on whether patients received eye or foot examinations, largely because of limitations in participating hospitals' systems of capturing and reporting this information. In addition, not all quality indicators, such as blood pressure and aspirin use, were included and patients' use of services outside of the consortium hospital systems was not taken into account. Finally, the study does not examine the possible reasons for health disparities (e.g., intensity of treatment, duration of diabetes, self-management behavior, communication/trust in providers, processes of care, unmeasured socioeconomic variables, neighborhood-level characteristics, and biological differences).

CONCLUSIONS AND RECOMMENDATIONS

This was the first project in which a group of safety net hospital systems came together to examine quality of care for patients with a chronic condition. It demonstrated that safety net hospital systems can equal or outperform national standards on indicators of high-quality diabetes management, even with resource constraints and vulnerable patient populations. The project also identified areas for further study and opportunities for advocacy and quality improvement efforts to reduce health disparities. It is notable that patients in the VA—many of whom share the same risk factors as patients in safety net health systems—on average appear to fare better than consortium patients with regard to diabetes outcomes.[33] There may be important lessons to learn from the VA's recent national integration of chronic disease management, approach to drug coverage, and investment in information technology.[34]

The work of the consortium underscores the critical role of safety net hospital systems in delivering high-quality diabetes care to a patient population that is primarily low income, ethnically and racially diverse, and has high rates of low health literacy.[35] The study reveals that while a patient's race, insurance coverage, and age may influence diabetes-related health outcomes (in the form of HbA1C values), these characteristics explain only a small part of the variation in outcomes across patient populations and institutions. In addition, while specific diabetes-related interventions can influence outcomes, the findings indicate that their influence in consortium hospital systems is modest.

Yet, the study also found that health disparities by race/ethnicity and insurance coverage exist. Such disparities appear to be affected by the continuity of patients' care and the commitment of health systems to chronic disease management as evidenced by the services they provide. These results suggest that safety net hospitals have room for improvement in providing medical homes and continuous sources of care for patients with chronic diseases, particularly the uninsured and black and Latino populations.

The finding that lack of insurance serves as a barrier to adequate care for diabetes management is particularly important. Even though safety net hospitals offer programs to ameliorate financial and non-financial barriers to care, their uninsured diabetes patients fare worse than diabetes patients with public or private insurance.

Although the study findings indicate that care in the consortium hospital systems is on par with national samples, outcomes in the hospital systems and in national studies fall

well below recommended levels. In addition, patient outcomes in consortium hospital systems appear to vary by sociodemographic characteristics. For example, nearly one-fifth of consortium patients had HbA1C levels at 9.5 percent or above and more than one-third had fewer than five outpatient visits over the three-year study period. At some of the hospital systems, laboratory tests to monitor diabetes appear not to have taken place for substantial numbers of patients.

In spite of some weaknesses in information management, the consortium hospital systems were able to provide a substantial amount of data about their diabetes patients. The race and ethnicity data were surprisingly robust given that collection of these data had been untested across this group of institutions. Six hospital systems provided race/ethnicity data for nearly all of their diabetes patients. Three provided detailed data on their patients' preferred languages.

Given their ability to report clinical information by race and ethnicity, safety net hospitals have an opportunity to monitor care for many different chronic conditions and to compare outcomes and utilization by racial and ethnic subgroups. To date, however, few hospital systems have taken advantage of this opportunity, instead monitoring and tracking their progress across all patient groups.

Overall, the study found that race/ethnicity, insurance coverage, continuity of care, and chronic disease management programs at the system level, influence patient outcomes, and that health disparities exist within and across these institutions. In particular, uninsured individuals received less care—including critically important outpatient services—than patients covered by Medicaid or Medicare. Even though safety net systems offer programs to mitigate financial barriers to care, uninsured patients may have worse outcomes because of barriers to accessing a comprehensive and stable set of services over time, as demonstrated in recent studies.[36]

Privately insured patients also received less care at the study sites, although their health outcomes were not worse. Medicare patients had better test values than their younger counterparts with Medicaid. This may be due to some Medicaid patients having more complex, disabling diabetes combined with other chronic conditions, or more difficulties managing their health conditions.

The results suggest that, even in safety net settings, uninsured patients with diabetes have difficulty accessing care, worse glycemic control, and are likely to be at

greater risk of developing long-term complications. This illuminates a paradox in our health care system. Eligibility for public insurance is determined, in part, by the extent of disability. Because they face barriers to care, the uninsured are likely to develop diabetes complications—thus becoming eligible for coverage only after their condition has worsened.

Black and Latino patients appear to fare worse than white and Asian/Pacific Islander patients, although for the most part they use similar amounts and types of services. Detailed examinations of hospital records and patient interviews would be needed to explain these differences.[37] Studies might take into account differences in intensity of treatment, duration of diabetes, self-management behavior, communication/trust in providers, processes of care, unmeasured variables related to socioeconomic status, neighborhood-level characteristics, and possible biological differences.[38]

The consortium project provides important lessons for safety net hospitals and other providers who serve patients with diabetes:

- Continuity of care and a range of services are essential. Even though the consortium hospital systems did not offer identical diabetes-related services, they all employed multidimensional strategies and programs for at least a subset of their patients with diabetes. They all had, for example, supportive payment policies to assist patients with little or no ability to pay and onsite outpatient pharmacies that offer free or deeply discounted medications. All reported using a team approach to diabetes care with an emphasis on education and patient self-management. Most used patient registries to track their diabetes patients and supplemented routine clinical care with language assistance, social supports, and other services to improve access to care, increase patient satisfaction, and improve quality.

- Information management systems are central to providing comprehensive diabetes care. Six of the consortium participants were able to provide a substantial amount of race/ethnicity data on their diabetic patients and half were able to provide detailed data on their patients' preferred languages. Robust race and ethnicity data enable safety net hospitals to compare chronic care utilization and outcomes by racial and ethnic groups—the essential first step in addressing disparities. Most hospital systems do not monitor and track progress by racial and ethnic groups and are thus missing critical opportunities.

- Insurance coverage influences patient outcomes, even at safety net hospitals with programs to mitigate financial barriers to care. At consortium sites, uninsured individuals received less care, including critically important outpatient care, than patients covered by Medicaid or Medicare. Uninsured patients also had poorer diabetes management compared with Medicaid patients. Uninsured patients with chronic conditions such as diabetes may have worse outcomes because of barriers to accessing a comprehensive and stable set of services over time, even in safety net systems. Policy and advocacy efforts should focus on the benefits of health insurance in providing continuous care and managing chronic conditions.

- Collaboration among multiple sites offering care to patients with similar needs enables exchange of best practices and helps participants identify areas of further research. Such collaboration can lead to multi-site interventions that eventually could produce efficiencies and improve outcomes.

APPENDIX. LOGISTIC REGRESSION MODEL

Logistic Regression Model: Well Controlled Diabetes (< 7.0% = 1)
Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Genderdummy	−.429	.167	6.567	1	.010	.651	.469	.904
	insdummy			43.071	4	.000			
	insdummy(1)	.167	.057	8.766	1	.003	1.182	1.058	1.321
	insdummy(2)	.023	.072	.104	1	.747	1.023	.889	1.177
	insdummy(3)	−.094	.222	.179	1	.672	.910	.589	1.407
	insdummy(4)	−.157	.053	8.875	1	.003	.854	.770	.948
	Racedummy			31.891	6	.000			
	Racedummy(1)	−.031	.375	.007	1	.934	.969	.465	2.022
	Racedummy(2)	.342	.373	.843	1	.358	1.408	.678	2.925
	Racedummy(3)	−.767	.202	14.470	1	.000	.464	.313	.689
	Racedummy(4)	.346	.293	1.397	1	.237	1.413	.796	2.508
	Racedummy(5)	−2.381	1.604	2.204	1	.138	.092	.004	2.143
	Racedummy(6)	.226	.511	.196	1	.658	1.254	.461	3.412
	Age	.019	.004	22.979	1	.000	1.019	1.011	1.027
	OP_3cat			19.537	2	.000			
	OP_3cat(1)	.539	.222	5.890	1	.015	1.715	1.109	2.651
	OP_3cat(2)	.929	.210	19.507	1	.000	2.531	1.676	3.823
	OP_3cat ★ age			15.102	2	.001			
	OP_3cat(1) by age	−.009	.004	6.252	1	.012	.991	.983	.998
	OP_3cat(2) by age	−.014	.003	15.043	1	.000	.987	.980	.993
	Racedummy ★ age			34.404	6	.000			
	Racedummy(1) by age	−.014	.006	4.762	1	.029	.986	.974	.999
	Racedummy(2) by age	−.009	.006	2.217	1	.137	.991	.980	1.003
	Racedummy(3) by age	.007	.003	4.543	1	.033	1.007	1.001	1.014
	Racedummy(4) by age	−.014	.005	7.692	1	.006	.986	.977	.996
	Racedummy(5) by age	.032	.028	1.299	1	.254	1.032	.977	1.090
	Racedummy(6) by age	−.011	.009	1.704	1	.192	.989	.972	1.006
	Genderdummy by age	.008	.003	7.395	1	.007	1.008	1.002	1.013
	specdiab_clinic(1)	.103	.066	2.434	1	.119	1.109	.974	1.262
	Registry(1)	−.062	.074	.716	1	.397	.940	.813	1.085
	class_ADA(1)	.300	.066	20.831	1	.000	1.350	1.187	1.536
	pharmacy_satellite(1)	.397	.064	38.906	1	.000	1.487	1.313	1.684
	Constant	−1.803	.248	52.967	1	.000	.165		

[a] Variable(s) entered on step 1: Genderdummy, insdummy, Racedummy, age, OP_3cat, OP_3cat ★ age, Racedummy ★ age, Genderdummy ★ age, specdiab_clinic, registry, class_ADA, pharmacy_satellite.

NOTES

[1] M. Regenstein and J. Shearer, *NAPH Ambulatory Care Sourcebook: Findings from the 2001 NAPH Ambulatory Care Survey* (Washington, D.C.: National Association of Public Hospitals and Health Systems, October 2001).

[2] National Institute of Diabetes and Digestive and Kidney Diseases, National Diabetes Information Clearinghouse, *National Diabetes Statistics,* NIH Publication No. 04-3892, April 2004; J. P. Boyle, A. A. Honeycutt, K. M. Narayan et al., "Projection of Diabetes Burden Through 2050: Impact of Changing Demography and Disease Prevalence in the U.S.," *Diabetes Care* 24 (November 2001): 1936–40.

[3] J. W. Lucas, J. S. Schiller, and V. Benson, "Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2001," *Vital and Health Statistics* 10 (January 2004): 1–134, Tables 7, 8.

[4] San Francisco General Hospital (SFGH) is part of the Community Health Network of San Francisco.

[5] Four consortium hospitals systems participated in a telephone survey of a stratified random sample of patients to determine patient perceptions related to quality, access, and satisfaction with diabetes care. These findings are reported in a separate report.

[6] E. A. Kerr, R. B. Gerzoff, S. L. Krein et al. "Diabetes Care Quality in the Veterans Affairs Health Care System and Commercial Managed Care: The TRIAD Study," *Annals of Internal Medicine* 141 (August 17, 2004): 272–81.

[7] We excluded patients with fewer than two outpatient visits during the three-year study period, regardless of their use of other services.

[8] The size of the patient populations with diabetes varied considerably across the consortium hospitals, from a low of about 3,000 to more than 30,000 patients. We adjusted the hospital data so that all participants would contribute the same weight to the aggregate data. The weighting did not alter the demographic representation of the hospital's patient population. Without the weighting, the aggregate findings would be skewed by the size of the particular hospital's diabetes population.

[9] The Cook County Bureau of Health Services did not provide data on the race/ethnicity of their patients.

[10] Three consortium hospital systems also identified the patient's primary language for 98 percent or more of their patients. Because only three of the seven systems were able to provide this information, the analyses do not address utilization of services or outcomes by the primary language of the patient.

[11] E. H. Wagner, "The Changing Face of Chronic Disease Care," *Curing the System: Stories of Change in Chronic Illness Care* (Washington, D.C.: National Coalition on Health Care and the Institute for Healthcare Improvement, 2002).

[12] C. Mensing, J. Boucher, M. Cypress et al., "National Standards for Diabetes Self-Management Education. Task Force to Review and Revise the National Standards for Diabetes Self-Management Education Programs," *Diabetes Care* 23 (May 2000): 682–89.

[13] In 1990, Congress created the Medicaid rebate program to lower the cost of pharmaceuticals reimbursed by state Medicaid agencies. For each brand name outpatient drug covered under the Medicaid plan, the manufacturer of the drug must pay a rebate to Medicaid based on the manufacturer's "best price" for that drug. When manufacturers began raising their prices, the Medicaid savings achieved through the rebate program were offset by increased government spending on drugs purchased by other federal- and state-supported providers. To correct this

situation, Congress enacted Section 340B of the Public Health Service Act in 1992, requiring pharmaceutical manufacturers participating in the Medicaid program to provide discounts on covered outpatient drugs purchased by specified government-supported facilities, called "covered entities," which serve the nation's most vulnerable patient populations.

[14] Our data did not allow us to draw any conclusions about whether patients at the three hospital systems that were unable to provide this information received these services or to distinguish whether lack of electronic data regarding laboratory results or eye exams was due to patients a) not receiving laboratory or consultative services, b) receiving these services outside of the health system, or c) receiving these services within the health system, but these services not getting entered into the electronic datasets.

[15] This is also most likely the case at the Cook County Bureau of Health Services, where approximately 68 percent of outpatient visits are estimated to be made by patients who are black. See Regenstein and Shearer, 2001.

[16] I. Singer, L. Davison, J. Tolbert et al., *America's Safety Net Hospitals and Health Systems, 2002. Results of the 2002 Annual NAPH Member Survey* (Washington, D.C.: National Association of Public Hospitals and Health Systems, 2004).

[17] Patients with fewer than two outpatient visits are likely to be either receiving care from providers in the community other than consortium hospital systems or forgoing care altogether. Because the focus of the study was on the quality of diabetes care within safety net hospitals, we excluded non-users of a threshold level of outpatient care.

[18] Native Americans composed less than 1 percent of the sample of patients with diabetes seen at consortium hospital systems. Still, because of the large sample size across the hospitals, information on more than 100 Native Americans was included in the data. Even though these numbers are small, we describe them separately in our findings because there is very limited information on Native Americans in national studies.

[19] Kerr et al., "Diabetes Care Quality," 2004; A. J. Karter, A. Ferrara, J. Y. Liu et al., "Ethnic Disparities in Diabetic Complications in an Insured Population," *Journal of the American Medical Association* 287 (May 15, 2002): 2519–27, erratum in *Journal of the American Medical Association* 288 (July 3, 2002): 46.

[20] National survey numbers are reported for patients with HbA1c levels > 9.5, while NPHHI Consortium data, the VA, and managed care population data are reported for patients with HbA1c levels $\geq$ 9.5.

[21] J. B. Saaddine, M. M. Engelgau, G. L. Beckles et al., "A Diabetes Report Card for the United States: Quality of Care in the 1990s," *Annals of Internal Medicine* 136 (April 16, 2002): 565–74.

[22] *Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on: Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III), Executive Summary,* NIH Publication No. 01-3670, May 2001; S. M. Grundy, J. I. Cleeman, C. N. Bairey Merz et al., "Implications of Recent Clinical Trials for the National Cholesterol Education Program Adult Treatment Panel III Guidelines," *Circulation* 110 (July 13, 2004): 227–39, erratum in *Circulation* 110 (August 10, 2004): 763.

[23] Kerr et al., "Diabetes Care Quality," 2004.

[24] Saaddine et al., "Diabetes Report Card," 2002; A. F. Brown, R. B. Gerzoff, A. J. Karter et al., "Health Behaviors and Quality of Care Among Latinos with Diabetes in Managed Care," *American Journal of Public Health* 93 (October 2003): 1694–98; Karter et al., "Ethnic Disparities in Diabetic Complications," 2002.

[25] American Diabetes Association, "Standards of Medical Care for Patients with Diabetes Mellitus," *Diabetes Care* 25 (January 2002): 213–29.

[26] American Heart Association. "What Are Healthy Levels of Cholesterol?" Downloaded May 17, 2005, from http://www.americanheart.org/presenter.jhtml?identifier=183.

[27] Binary Logistic Regression was run in SPSS 13.0. For the purposes of regression analyses, HbA1c < 7.0% = 1.

[28] Limitations of the dataset do not allow for regression models that test all significant hospital program characteristics in one model.

[29] All significant characteristics could not be analyzed simultaneously in the regression model because of the small number of sites and because the hospital characteristic variables were created based on whether a consortium hospital system offers the program or service. As a result, hospital characteristics are frequently very similar to each other and are confounding.

[30] Presence of a special diabetes clinic and use of a diabetes registry were significant predictors of well-controlled diabetes when entered into the model individually. However, in the final model, including all significant characteristics, the effect of special diabetes clinics and use of diabetes registry is not significant.

[31] Nagelkerke R-squared < .06 for these factors combined.

[32] Wagner, "Changing Face," 2002.

[33] Kerr et al., "Diabetes Care Quality," 2004.

[34] J. D. Piette, T. H. Wagner, M. B. Potter et al., "Health Insurance Status, Cost-Related Medication Underuse, and Outcomes Among Diabetes Patients in Three Systems of Care," *Medical Care* 42 (February 2004): 102–9; A. K. Jha, J. B. Perlin, K. W. Kizer et al., "Effect of the Transformation of the Veterans Affairs Health Care System on the Quality of Care," *New England Journal of Medicine* 348 (May 29, 2003): 2218–27.

[35] D. Schillinger, K. Grumbach, J. D. Piette et al., "Association of Health Literacy with Diabetes Outcomes," *Journal of the American Medical Association* 288 (July 24–31, 2002): 475–82; M. V. Williams, D. W. Baker, R. M. Parker et al., "Relationship of Functional Health Literacy to Patients' Knowledge of Their Chronic Disease. A Study of Patients with Hypertension and Diabetes," *Archives of Internal Medicine* 158 (January 26, 1998): 166–72; Institute of Medicine, *Health Literacy: A Prescription to End Confusion* (Washington, D.C.: National Academies Press, 2004).

[36] S. J. Weiner, M. Laporte, R. I. Abrams et al., "Rationing Access to Care to the Medically Uninsured: The Role of Bureaucratic Front-Line Discretion at Large Healthcare Institutions," *Medical Care* 42 (April 2004): 306–12; Piette et al., "Health Insurance Status," 2004; T. P. O'Toole, J. J. Arbelaez, R. S. Lawrence, and the Baltimore Community Health Consortium, "Medical Debt and Aggressive Debt Restitution Practices: Predatory Billing Among the Urban Poor," *Journal of General Internal Medicine* 19 (July 2004): 772–78; M. Heisler, K. M. Langa, E. L. Eby et al., "The Health Effects of Restricting Prescription Medication Use Because of Cost," *Medical Care* 42 (July 2004): 626–34.

[37] M. Heisler, D. M. Smith, R. A. Hayward et al., "Racial Disparities in Diabetes Care Processes, Outcomes, and Treatment Intensity," *Medical Care* 41 (November 2003): 1221–32.

[38] A. F. Brown, S. L. Ettner, J. Piette et al., "Socioeconomic Position and Health Among Persons with Diabetes Mellitus: A Conceptual Framework and Review of the Literature," *Epidemiologic Reviews* 26 (2004): 63–77; A. J. Karter, "Race and Ethnicity: Vital Constructs for Diabetes Research," *Diabetes Care* 26 (July 2003): 2189–93.

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