COMMISSION ON A HIGH PERFORMANCE HEALTH SYSTEM

DENVER HEALTH: A HIGH-PERFORMANCE PUBLIC HEALTH CARE SYSTEM

Rachel Nuzum, Douglas McCarthy, Anne Gauthier, and Christina Beck

July 2007

ABSTRACT: Denver Health, a comprehensive and integrated medical system that is Colorado's largest health care safety-net provider, has a national reputation as a high-performance organization. Members of The Commonwealth Fund Commission on a High Performance Health System observed Denver Health during a site visit in March 2006, to assess its operation and determine whether it might serve as a model for other public and private health care systems around the country. The Commission concluded that Denver Health is indeed a "learning laboratory." It has succeeded at providing coordinated care to the community, promoting a culture of continuous quality improvement, adopting new technology and incorporating it into everyday practice, taking risks and making mid-course corrections, and providing leadership and support—and accepting accountability—both at the top and throughout the organization. Moreover, it has accomplished these objectives and others in straightforward ways that could be adapted elsewhere.

Support for this research was provided by The Commonwealth Fund. The views presented here are those of the authors and not necessarily those of The Commonwealth Fund or its directors, officers, or staff, or of The Commonwealth Fund Commission on a High Performance Health System or its members. This and other Fund publications are available online at www.commonwealthfund.org. To learn more about new publications when they become available, visit the Fund's Web site and register to receive e-mail alerts. Commonwealth Fund pub. no. 1039.

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ABOUT THE AUTHORS

Rachel Nuzum, M.P.H., is program officer for The Commonwealth Fund's State Innovations program, which aims to improve state and national health system performance by supporting, stimulating, and spreading integrated, state-level strategies for expanding access and promoting high quality, efficient care. Ms. Nuzum also works with the Fund's Commission on a High Performance Health System, coordinating site visits and contributing to Commission reports. Before joining the Fund in January 2007, Ms. Nuzum served as a health policy advisor in the United States Senate. She holds a B.A. in political science from the University of Colorado and an M.P.H. in health policy and management from the University of South Florida.

Douglas McCarthy, M.B.A., president of Issues Research, Inc., in Durango, Colo., is senior research advisor at the Fund. He supports the Commission on a High Performance Health System's Scorecard project, oversees the Performance Snapshots Web site, and is a contributing editor to the bimonthly newsletter *Quality Matters*. He has 20 years of experience in public and private sector research, policymaking, and management. He has authored reports and articles on topics including health care quality, information privacy, technology assessment, and performance reporting. Mr. McCarthy received his bachelor's degree from Yale College and a master's degree in health care management from the University of Connecticut. During 1996–97, he was a public policy fellow at the Humphrey Institute of Public Affairs at the University of Minnesota.

Anne Gauthier, M.S., is senior policy director of the Fund's Commission on a High Performance Health System, based at AcademyHealth in Washington, D.C. Prior to joining the Fund, she was vice president of AcademyHealth where she served as: program director for the Robert Wood Johnson Foundation's Changes in Health Care Financing and Organization initiative, a program that bridges the health policy and health services research communities through grantmaking, convening, and the distribution of useable and timely information; senior advisor for the Foundation's State Coverage Initiative, which works with states to plan, execute and maintain insurance expansions; and a co-project director for a Fund project on administrative simplification in health care. Before joining AcademyHealth in 1989, she was senior researcher for the National Leadership Commission on Health Care, a private commission charged with developing a system-wide public–private strategy to control rising costs, improve the quality, appropriateness, and efficiency of care, and ensure universal access to a basic level of services. She held a position in the congressional Office of Technology Assessment from 1980 to 1986. Ms. Gauthier holds an A.B. in molecular biology from Princeton University and an M.S. in health administration from the University of Massachusetts School of Public Health.

Christina Beck, M.A., has 15 years of experience in scientific writing, communication, and project management. She received her bachelor's degree in public policy from Syracuse University and a master's degree from the Annenberg School of Communication at the University of Southern California. She lives and works in Lafayette, Colo.

ACKNOWLEDGMENTS

The authors of this case study gratefully acknowledge the expertise and contributions of Cathy Schoen, Commonwealth Fund senior vice president for research and evaluation, for her review of the case study and assistance in identifying clinical data indicators. We also thank Patricia Gabow, M.D., chief executive officer and medical director of Denver Health, for her significant investment of time during development and review of the case study; and Karen Adams for her substantive work on its earlier versions.

Editorial support was provided by Steven J. Marcus.

EXECUTIVE SUMMARY

This report documents a case study of Denver Health—a comprehensive and integrated health care system that serves approximately 25 percent of all Denver residents. This organization is the largest health care safety-net provider in Colorado and its major Medicaid provider. It also has a national reputation as a "high-performance" model for developing a sustainable public health care system. In order to witness some of its operations firsthand, members of The Commonwealth Fund Commission on a High Performance Health System visited Denver Health in March 2006.

Streamlining Operations and Eliminating Waste

In 2003, Denver Health embarked on an effort to transform itself and create a culture of deliberate improvement. As a result, the organization adopted specific new processes and tools. For example, it systematically applied the principles of "lean manufacturing" based on Toyota's approach to streamlining its operations and eliminating waste. To develop appropriate in-house expertise, Denver Health invested in the training of 50 staff members in these industrial techniques adapted to health care settings. As a result, five strategic "value streams"—access, inpatient flow, outpatient flow, operating room flow, and billing—were selected as targets for the initial redesign efforts.

Denver Health then initiated a series of week-long "Rapid-Improvement Events," five of which were conducted each month to improve individual processes within each value stream. The "operating room flow" team, for example, significantly increased the number of patients who received antibiotics within the appropriate time frame before surgery—one hour, as recommended by national guidelines—from 80 percent at baseline to 96 percent in July 2006. Another Denver Health team strongly influenced the design of a new Medical Intensive Care Unit, making it more patient- and family-centered.

The Right Technology, the Right People

Denver Health has also focused on building its infrastructure for high performance in two important areas—information technology (IT) and workforce.

The organization's investment in health-oriented IT, which has totaled $275 million since 1997, has enabled the establishment of a centralized data warehouse that integrates both clinical and financial data and allows for standardized reporting. A single imaged electronic-record format is used across the entire system so that a patient's information can be retrieved in "real time" by any of his or her providers.

To ensure that it has a capable workforce, Denver Health has restructured its hiring practices to recruit and retain the "right people." It implemented a four-part strategy that includes a talent bank, an interview tool that measures "talent intensities," training for key leaders regarding selection, and an employee-engagement survey. It has also demonstrated a strong commitment to the training of health professionals—on average, about 3,000 per year—such as physicians, nurses, pharmacists, and emergency medical technicians.

Four Exemplary Operations

Denver Health's major redesign of its organization, still ongoing, is manifested in multiple strategic initiatives targeted at particular facilities and services, several of which Commission members observed during their on-site visits.

The Westside Family Health Center is a clinic aimed at providing high-quality, culturally sensitive, patient-centered care to the uninsured and low-income populations. Its accomplishments include instituting an "open access" scheduling system that has reduced no-show rates by half, instituting group visits to promote patient self-care, and (together with other Denver Community Health clinics) more than doubling the percentage of young children who are up to date on immunizations.

Denver Health's medical critical care group is a multi-professional team that cares for critically ill patients in an intensive care unit using standardized protocols supported by information technology. The group conducts national and international collaborative clinical and translational research and has been recognized as a top performer by the University HealthSystem Consortium.

The Rocky Mountain Poison and Drug Center (RMPDC) encompasses three call centers—the Rocky Mountain Poison Center, the Rocky Mountain Drug Consultation Center, and the Denver Health NurseLine. The RMPDC also has a dedicated research arm and a medical toxicology consultation service, including a training program for physicians.

Medicaid Choice, Denver Health's Medicaid plan, serves as a business case of how a high-performing safety-net health system can successfully compete in the marketplace. For example, an average inpatient charge per stay at Denver Health for Medicaid patients is one-third lower than at other metro Denver hospitals, even as numerous measures of treatment efficacy score higher.

These and other components of the Denver Health system are briefly described in Appendices 1 and 2.

Lessons from Denver Health

While there are many factors contributing to the overall high quality of care that Denver Health provides to its patients, the Commission highlights the following attributes that other health systems might consider replicating:

- Denver Health is an integrated system, endowed with appropriate tools.
    - An infrastructure exists to provide coordinated care to the community.
    - There is a commitment to adopting new technology and incorporating it into everyday practice.

- Denver Health promotes a culture of improvement, peopled by dedicated staff.
    - The decisions are data-driven and feedback loops allow for continuous quality improvement.
    - There is willingness among the leadership to take risks and make mid-course corrections.

- Innovation at Denver Health has strong support at the top.
    - Leaders at Denver Health clearly communicate their vision that high-quality care derives from a high-quality system. The leadership and staff are bound by a common mission that reflects this vision.
    - The leadership has adopted a market-based strategy with a clearly defined target population. Their approach, which requires strict accountability, aligns incentives to encourage the systems approach.

The authors—along with the Commission on a High Performance Health System—hope that this health system's best practices, and the lessons learned from the significant barriers it has overcome, will constitute a "learning laboratory"—a potential model—from which other institutions and the nation may benefit.

DENVER HEALTH:
A HIGH-PERFORMANCE PUBLIC HEALTH CARE SYSTEM

INTRODUCTION

This report, which documents a case study of Denver Health, highlights the key elements that make the organization a "high-performance" model for developing a sustainable public health care system. The Commonwealth Fund Commission on a High Performance Health System (hereafter referred to as "the Commission") envisions a high-performance health system in terms of four interrelated goals: access to care for all people; high-quality, safe care; efficient, high-value care; and the capacity to improve.[1] Members of the Commission visited Denver Health in March 2006 to observe its capabilities for meeting these goals.

Denver Health is a comprehensive and integrated health care system that provides primary and specialty care, emergency medicine, and acute hospital care to residents of Denver and the Rocky Mountain region. Its mission encompasses five objectives: to provide access to quality preventive, acute, and chronic health care to all the citizens of Denver regardless of ability to pay; to provide emergency medical services to the region; to fulfill the public health needs of the community; to provide education for patients and health care professionals; and to engage in research.

Founded in 1860, Denver Health now serves approximately 25 percent of all Denver residents; one of every three children in the city is cared for by Denver Health physicians. This organization is the largest health care safety-net provider in Colorado and its major Medicaid provider. In 2005, uncompensated care provided by Denver Health totaled $285 million or, 42 percent of total patient charges. Like many safety-net systems, Denver Health's population is largely uninsured and disproportionately comprised of members of minority groups (see Appendix 1)

Despite many challenges, Denver Health remains fiscally sound and a leader in the delivery of health care. It is a safety-net system that is not a place of last resort but rather a place of first choice. Denver Health has been named one of the top 50 hospitals in the United States in four of the categories in the "America's Best Hospitals" edition of *U.S. News & World Report,* and it has received awards from numerous professional organizations for such things as information-technology use and its efforts to improve immunization rates among low-income Denver children (see Appendix 1). Denver Health is a top performer in the University HealthSystem Consortium, a partner in several critical-care collaborations, and the site of a preeminent medical research program.

In comparison to a select group of 10 peer health organizations and to hospitals nationwide, Denver Health stands out on an array of clinical measures, as indicated in Table 1. Denver Health attributes its success to being an integrated system with one administrative structure overseeing its broad system of care. It has successfully implemented key information technology, staffing, communications, and clinical initiatives to enhance its performance across multiple measures.

Table 1. Percentage of Patients Receiving Select Clinical Measures at Denver Health, Peer Organizations, and the Average Among Hospitals Nationwide, April 2005–March 2006

Measure	Denver Health	Peer Organizations★	Average Nationwide
Heart-Attack Patients			
Aspirin at arrival	96	95	92
Aspirin at discharge	97	96	89
Beta-blocker at arrival	100	94	86
Beta-blocker at discharge	98	95	89
Smoking cessation counseling	89	76†	85
Heart-Failure Patients			
ACE inhibitor or ARB for LVSD★★	88	88	81
Evaluation of LVSD	99	96	82
Discharge instructions	60	26†	57
Smoking cessation counseling	77	56	79
Pneumonia Patients			
Pneumococcal vaccination	75	27	64
Initial antibiotics within four hours after arrival	75	53	78
Most appropriate initial antibiotics	88	76	81
Smoking cessation counseling	74	47	76
Surgery Patients			
Antibiotics one hour before incision	83	79†	75
Antibiotics stopped within 24 hours after surgery	62	70†	70

★ Peer organizations, selected on the basis of their overall correlation with Denver Health's 2004 utilization and financial data, include: Cambridge Health Alliance, Boston Medical Center, Maricopa Integrated Health System, University of New Mexico Health Sciences Center, Grady Health System, LAC-Harbor/UCLA Medical Center, Hennepin County Medical Center, John H. Stroger Jr. Hospital of Cook County, Harborview Medical Center, and JPS Health Network.

Nationwide Average includes: Average for all reporting hospitals in the United States.

★★ ACE = angiotensin-converting enzyme; ARB = angiotensin receptor blocker; LVSD = left ventricular systolic dysfunction.

† Average for peer organizations based on available data (data missing for some measures).

Source: U.S. Department of Health and Human Services, Hospital Compare, 2007.

Denver Heath has also shown strong clinical performance, as illustrated by its results on HEDIS 2006 childhood and adolescent quality measures. As shown in Table 2, Denver Health exceeded the benchmark 2006 NCQA 90th percentile rates for child and adolescent immunizations and access to primary care as well as appropriate testing and treatment for children with respiratory infections.

Table 2. Denver Health's HEDIS 2006 Childhood and Adolescent Immunization Rates Meeting the 2006 NCQA 90th Percentile

Measure	Denver Health HEDIS 2006 (percent)	NCQA HEDIS 2006 90th Percentile
Child and adolescent access to primary care physician	99	98
Appropriate testing for children with pharyngitis	80	75
Appropriate treatment for children with upper respiratory infection	94	92
Childhood immunizations★	85	83
Adolescent immunizations★★	84	70

Note: HEDIS = Health plan Employer Data and Information Set; NCQA = National Committee for Quality Assurance.
★ The childhood immunization status measure estimates the percentage children who turned 2 years old during the measurement year and received the following vaccinations by their second birthday: 4 doses DTP or DTaP; 3 doses OPV or IPV; 1 dose MMR; 3 doses Hib; 3 doses hepatitis B; and 1 dose VZV.
★★ The adolescent immunization status measure estimates the percentage of enrolled adolescents who turn 13 years old and who had a second MMR, three Hepatitis B, and one VZV vaccinations by their 13th birthday.
DTaP/DTP = Diphteria/Tetanus/Pertussis; OPV/IPV = Polio; MMR = Measles/Mumps/Rubella; Hib = Haemophilus influenza type b; VZV = Varicella (chicken pox).

Having observed Denver Health's systems approach for providing high-quality health care to underserved populations in Denver and throughout the region, the Commission concludes that many of these innovations are transferable to other settings.

STREAMLINING OPERATIONS AND ELIMINATING WASTE

In 2003, Denver Health embarked on an effort to transform itself and create a culture of deliberate improvement. This effort was initially facilitated by a grant—"Getting It Right: Perfecting the Patient Experience"—from the Agency for Healthcare Research and Quality.[2] An important role in the transformation was played by an external steering committee that included members from non-medical corporations such as Fed Ex Center for Supply Chain Management, the Ritz Carlton, and Microsoft. Meanwhile, staff at Denver Health were doing their homework. The organization's CEO/Medical Director and its Director of Health Services Research conducted an extensive literature review on such topics as quality of health care, patient safety, efficiency, customer service, workforce

development, and tools for redesign. Senior staff also made site visits to national and international organizations to learn about success factors and barriers in efforts to rapidly implement process improvements.[3] In addition, they hired an industrial engineer to examine in detail the clinical and support-services processes within the organization.

These preparatory efforts culminated in the concept of an integrated five-piece puzzle held together by information technology: right environment, right people, right process, right communication and culture, and right reward.

As a result, Denver Health adopted specific new processes and tools. For example, it systematically applied the principles of "lean manufacturing" based on Toyota's approach to streamlining its operations and eliminating waste.[4] To develop appropriate in-house expertise, Denver Health invested in the training of 50 staff members to become "black belts" in lean-manufacturing techniques adapted to health care settings. These professionals then identified five strategic "value streams"—access, inpatient flow, outpatient flow, operating room flow, and billing—as targets for their initial redesign efforts.

For each value stream, a detailed map (proverbially, "as seen from 10,000 feet") was created to diagram its current state, ideal state, and likely future state. These maps pinpointed waste within the system. Denver Health then initiated a series of week-long "Rapid-Improvement Events" (RIEs), five of which were conducted each month to improve individual processes within each value stream. These events were led by an external expert—called, consistent with the black-belt imagery, a sensei (accomplished teacher)—and involved a multidisciplinary team of eight to 10 Denver Health employees. The standardized procedure was that the team completed detailed value stream maps of the specific targeted process on day one; began to define new processes to eliminate the waste on day two; implemented the change on day three; and made it part of standard work on day four. On the fifth day, the teams reported out their findings to the CEO, executive staff, and other teams. This process was followed up with a long-term evaluation component involving collection of individual RIE metrics such as those listed in Figure 1.

Figure 1. Examples of Individual RIE Metrics

- Access — telephone-call abandonment rate
- Inpatient flow — time from bed emptied to bed cleaned
- Outpatient flow — number of patients per clinic session
- Operating Room flow — percent of patients receiving pre-op antibiotics at correct time
- Billing — number of bills in holding

The "operating room flow" team, for example, significantly increased the number of patients who received antibiotics within the appropriate time frame before surgery—one hour, as recommended by national guidelines—from 80 percent at baseline to 96 percent in July 2006. In the past, patients were given their antibiotic on their floor before being taken to surgery; however, if they were delayed for surgery for some reason, such as the arrival of a trauma case, too much time would elapse from the initial preoperative antibiotic administration to when they had their procedure performed. Such delays would put patients at increased risk of developing a post-operative infection. By critically analyzing the current process and working though an "ideal" process, the team recommended that the anesthesiologist administer the medication on-site once the patient came to the operating room area, thus circumventing the previous design flaw.

Another Denver Health team strongly influenced the design of a new Medical Intensive Care Unit (MICU), making it more patient- and family-centered. Patient rooms became much larger, including a comfortable area for accommodating families wishing to stay overnight. Large interior windows were installed so that nurses could easily view and monitor their patients. But as the space was much more extensive than that of the previous MICU, communication among staff was initially challenging—a mapping exercise demonstrated that staff was spending considerable amounts of time searching for each other. To remedy this problem, the staff received wireless devices that allowed them to locate each other more efficiently. This change led to less time spent searching for each other and more time available for MICU patients' care.

THE RIGHT TECHNOLOGY, THE RIGHT PEOPLE

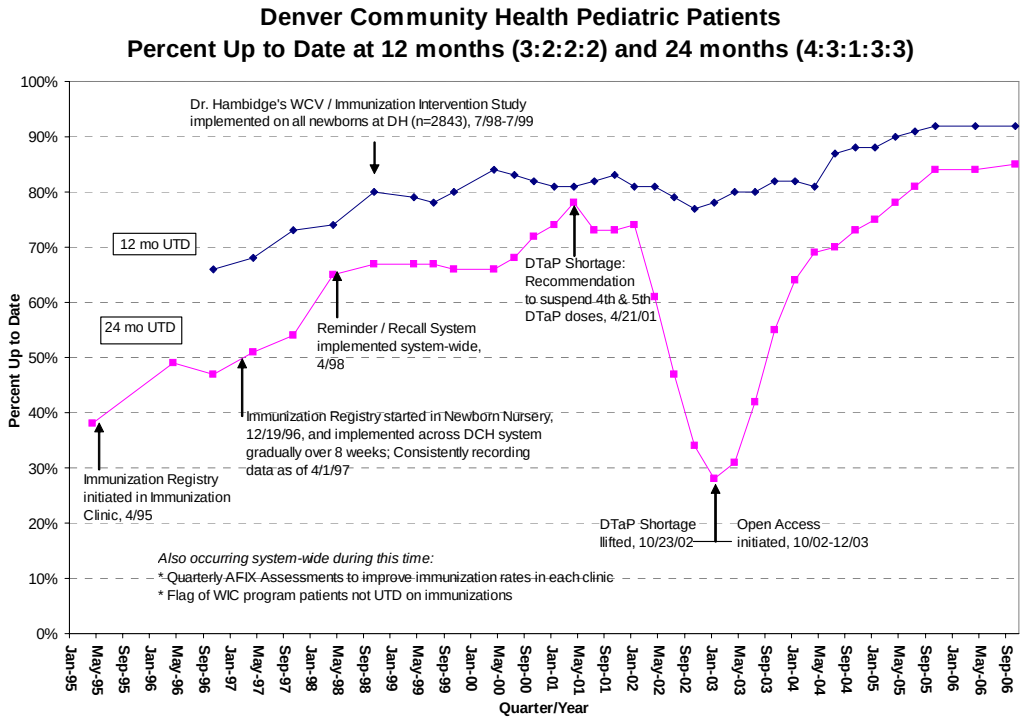
Denver Health has also focused on building its infrastructure for high performance in two important areas—information technology (IT) and workforce.

Information Technology

IT has been critical to facilitating the flow of data across the organization, thereby helping to maintain Denver Health's systems approach, high rate of innovation, and high-quality and efficient care. The organization's investment in health-oriented IT, which has totaled $275 million since 1997, has enabled the establishment of a centralized data warehouse that integrates both clinical and financial data and allows for standardized reporting. A single imaged electronic-record format is used across the entire system so that a patient's information, adhering to appropriate privacy guidelines, can be retrieved in "real time" by any of his or her providers—regardless of their point of entry into the system. The IT system also provides patient alerts, such as reminders for needed preventive services and immunizations. In addition, providers have on-line access to medical literature so they can stay abreast of current research and best practices.

Prior to the establishment of an imaged electronic record, a paper record had to be driven around the geographically dispersed system. This cumbersome system often resulted in the absence of a record for the patient encounter, which created both a safety and efficiency issue. The investment in electronic records has eliminated this problem and now every provider has access to patient data from his or her computer. Similarly, the establishment of computerized registries and alerts in community clinics has allowed the number of fully immunized two-year-olds to rise from 38 percent in 1995 to 85 percent in 2006 (Figure 2). Computerized physician order entry in the hospital has improved the timeliness of fulfilling physician orders for ancillary services; for example, the time required to fill medication orders was reduced by 85 percent.

Figure 2. Denver Community Health Childhood Immunization Rates: 1995–2006



Other health information technology initiatives under way include the implementation of:

- A computerized physician-order entry (CPOE) system for all inpatient intensive-care, medical/surgical, and behavioral units.

- A picture archiving and communications system (PACS) that allows for digital imaging and viewing.
- A medication administration checking system to increase the likelihood that the "five rights" of drug administration—right patient, right drug, right dose, right time, and right route—are adhered to at the bedside.

Workforce

To ensure that it has a capable workforce, Denver Health restructured its hiring practices to recruit and retain the "right people." It wanted to establish a clear and sustained quality focus on the employee-selection process, with the explicit goals of reducing turnover rates and improving customer service, employee relations, and employee productivity and work quality. To do so, Denver Health implemented a four-part strategy that includes a talent bank, an interview tool that measures "talent intensities," training for key leaders regarding selection, and an employee-engagement survey.

Central to this undertaking is the "Quality Selection Process" (QSP), a structured interview that focuses on the themes and attributes listed in Figure 3. From the data obtained in the interview, the candidate's talent-intensity index is tabulated for each theme and compared against the indices of other performers, including top performers.

Figure 3. Quality Selection Process

Denver Health has also demonstrated a strong commitment to the training of health professionals—on average, about 3,000 per year—such as physicians, nurses, pharmacists, and emergency medical technicians. For example, interns and residents from the University of Colorado benefit from receiving clinical training in 28 medical specialties. In providing such opportunities, Denver Health is building the needed infrastructure to support its state's growing health care needs. In addition, it is exposing a new generation of health professionals to the benefits and rewards of practicing in an integrated delivery system capable of uniformly providing high-quality care to traditionally underserved populations.[5] This investment in medical education provides Denver Health and other local providers with a talent pool of clinicians who have been trained to understand the challenges faced by such populations.

FOUR EXEMPLARY OPERATIONS

Denver Health's major redesign of its organization, still ongoing, is manifested in multiple strategic initiatives targeted at particular facilities and services, several of which Commission members observed firsthand during their on-site visits. In this section, four such initiatives are described: the Westside Family Health Center, the Medical Critical Care Group, the Rocky Mountain Poison and Drug Center, and the "Medicaid Choice" plan. (For an overview of Denver Health's integrated multi-component system, see Appendix 2.)

Westside Family Health Center

This clinic, aimed at providing high-quality, culturally sensitive, patient-centered care to the uninsured and low-income populations, has instituted "open access" scheduling: 60 percent of appointments are reserved so that patients can call in on the same day to be seen. This more streamlined approach saves patients time, avoids overcrowded waiting rooms, and has reduced no-show rates to 15 percent (as compared to about 30 percent under traditional scheduling protocols).

The clinic aspires to provide respectful patient care to its diverse population by hiring a culturally diverse and dedicated staff. Seventy-five percent of the providers at the clinic are fluent in Spanish. Staff members work as an integrated team, with expanded roles for nurses in coordinating patient care.

Using Denver Health's system of imaged electronic health records, the provider quickly retrieves the patient's complete medical history, compiled from previous outpatient, inpatient, and ancillary visits. For the present visit, a one-page electronic encounter form is produced that includes a snapshot of vital information on the patient, provider notes, and the latest date of recommended preventive services such as mammograms and colorectal screenings.

Care for the clinic's patients goes beyond individual office or lab visits. The center conducts group visits for patients with diabetes, for example, to help them with the management of their self-care, such as proper diet and regular blood-testing at home. Special rooms are dedicated to this activity on-site, and the session usually includes a cohort of seven to 10 patients who share a particular chronic condition. The staff has found that group visits are most effective when a cohort is able to progress together, building on participants' shared experiences.

The clinic focuses on breaking down common barriers that low-income individuals often face when trying to gain access to health care services, such as lack of reliable transportation. It is conveniently located next to a bus line and directly next door to the Department of Human Services, so interrelated social services can be addressed conveniently. Clinic patients also have access to a 24-hour call line that is available in Spanish. Patients further benefit from Denver Health's annual investment of $800,000 in interpreters and translation services. Because low-wage earners as less likely to be able to take off time from work, phone access allows them to have their questions or concerns addressed right away—regardless of the time of day or night—and can steer them to venues for appropriate medical attention.

Medical Critical Care Group

Denver Health's medical critical care group is a nationally recognized, multi-professional team of board-certified intensive care physicians (intensivists), critical care nurses, respiratory therapists, critical care pharmacist, social workers, and rehabilitation and chaplaincy workers. Critical care physicians are specialists in pulmonary and renal medicine and serve on the faculty at the University of Colorado Health Sciences, as researchers and educators.

The medical critical care group is based in a state-of-the-art 24-bed medical intensive care unit (MICU) that opened in June 2004. All rooms house a single patient and provide space for family members to comfortably spend the night. The MICU operates a "closed" intensivist and critical care nurse-led academic model. Multi-disciplinary ward rounds are led seven days a week by the intensivist and pulmonary/critical care fellow with four house-staff teams using a patient care goal sheet to help ensure understanding and attainment of care goals.

Care is highly standardized and supported by an integrated critical care information system, including electronic medical records and CPOE, bedside and portable computers, PACS radiology, and a clinical decision-support infrastructure. Implementation of standard orders has been associated with improvements such as a 35 percent reduction in length of

stay among diabetic ketoacidosis patients treated according to a standard protocol, with no increase in adverse outcome (hypoglycemia).

Rocky Mountain Poison and Drug Center (RMPDC)

The RMPDC encompasses three call centers—the Rocky Mountain Poison Center, the Rocky Mountain Drug Consultation Center, and the Denver Health NurseLine—each serving its own distinct purpose but using the same infrastructure (IT staff, for example) to achieve economies of scale. The RMPDC also has a dedicated research arm and a medical toxicology consultation service, including a training program for physicians.

The Rocky Mountain Poison Center (PC) and the Rocky Mountain Drug Consultation Center (DCC) provide valuable information to consumers, health care providers, and organizations that contract with Denver Health. The PC focus is on poison and venom treatment and prevention, while the DCC offers guidance on medication management and information on drug interactions and their potentially dangerous effects. The Denver Health NurseLine is a 24-hour service designed to triage patient calls and to make recommendations for appropriate next steps, as deemed necessary, for medical attention. Not only is this service responsive to patients, particularly during off hours, it also directs them to the right level of care, whether that be a 911 response, urgent care visit, or self care at home.

Additionally, the RMPDC is committed to continuous quality improvement, with a quality assurance division that conducts tape reviews of incoming calls to monitor the accuracy of information dispensed and to screen for any possibly missed adverse events.

Medicaid Choice

Denver Health's Medicaid plan serves as a business case of how a high-performing safety-net health system can successfully compete in the marketplace. Denver Health's current Medicaid contract enables the organization to invest gains, made by providing more efficient care, back into the system.

In 1996, Denver Health and three other safety net providers in Colorado entered into a joint venture called Colorado Access to contract with the state to provide Medicaid coverage to low-income patients. As a result of a successful lawsuit filed against the state by three other Colorado HMOs, who subsequently terminated their risk contracts with the state, the state eliminated default assignment of patients into Colorado Access, causing enrollments to plummet. This action was particularly debilitating to Denver Health, as Medicaid represented 29 percent of its patient population and 26 percent of net revenue in 2006.

In 2004, Denver Health re-entered the Medicaid market by entering into a direct contract with the state of Colorado in the form of a capitated risk agreement, Medicaid Choice, whereby it would receive a set fee per patient. Denver Health was able to convince the state that there were potential benefits of enrolling in Medicaid Choice with four indicators: shorter lengths of stay, lower inpatient charges, lower prescription drug pricing, and better chronic disease management.

By using its capitated payments effectively, Denver Health not only was able to secure market share but also provide high quality care at lower costs to the residents of Colorado. For example, the average length of stay at present for an acute-care stay at Denver Health for Medicaid patients is 4.4 days, as compared to 5.2 days at other metro Denver hospitals.[6] And an average inpatient charge per stay is $19,331, versus $30,253. In regard to Medicaid managed care pharmacy utilization, Denver Health captured $2.5 million in savings during the 2006 contract year: the average cost per prescription at Denver Health pharmacies was $24.56, versus $66.47[7] for outside pharmacies.

As shown in Table 3, by providing evidence-based diabetes care to its Medicaid Choice enrollees, Denver Health achieved better results on blood glucose control, cholesterol levels, and nephropathy screening as compared to Colorado Medicaid, and it either met or exceeded national median scores.[8]

Table 3. Denver Health Medicaid Choice Select HEDIS Measures

Measure	Denver Health Medicaid Choice 2004 (percent)	Colorado Medicaid 2004 (percent)	NCQA median 2004
Poor blood glucose control (HbA1c > 9)	47	59	47
Cholesterol control (LDL < 130)	52	36	50
Cholesterol control (LDL < 100)	42	23	29
Nephropathy screening	65	34	44

Note: HEDIS = Health plan Employer Data and Information Set; NCQA = National Committee for Quality Assurance.

Sources: Denver Health; National Committee for Quality Assurance.

LESSONS FROM DENVER HEALTH

While there are many factors contributing to the overall high quality of care that Denver Health provides to its patients, the Commission highlights the following attributes that other health systems might consider replicating:

- Denver Health is an integrated system, endowed with appropriate tools.
    - An infrastructure exists to provide coordinated care to the community.
    - There is a commitment to adopting new technology and incorporating it into everyday practice.

- Denver Health promotes a culture of improvement, peopled by dedicated staff.
    - The decisions are data-driven and feedback loops allow for continuous quality improvement.
    - There is willingness among the leadership to take risks and make mid-course corrections.

- Innovation at Denver Health has strong support at the top.
    - Leaders at Denver Health clearly communicate their vision that high-quality care derives from a high-quality system. The leadership and staff are bound by a common mission that reflects this vision.
    - The leadership has adopted a market-based strategy with a clearly defined target population. Their approach, which requires strict accountability, aligns incentives to encourage the systems approach.

Denver Health possesses many of the essential components of a high-performance health system, as defined by the Commission at the beginning of this report. Its best practices, and the lessons learned from the significant barriers it has overcome, can form a "learning laboratory"—a potential model—from which other states and the nation may benefit.

In the future, the Commission will be conducting other site visits to select locales that are also considered laboratories of innovation in the health safety-net arena. During these visits, it will observe what the organizations are doing to expand the public's access to care and to improve the quality and efficiency of that care.

NOTES

[1] Commonwealth Fund Commission on a High Performance Health System, *Framework for a High Performance Health System for the United States* (New York: The Commonwealth Fund, Aug. 2006).

[2] http://www.ahrq.gov/qual/toolkit/toolkit.pdf.

[3] Sites visited include: Federal Express, Dell Computers, Baptist Hospital Inc., and Jonkoping Sweden.

[4] http://www.leansolutions.net.

[5] Denver Health receives direct funding only for its medical interns and residents and tuition for its paramedic students.

[6] 2005 Colorado Hospital Association Data.

[7] 2006 Medicaid Choice data.

[8] 2004 NCQA HEDIS median (50th percentile).

APPENDICES

Appendix 1. Denver Health at a Glance, 2005

Financing

Total operating revenues: $448,264,355.

Total operating income: $16,436,662.

Net patient service revenue: $214,194,117.

Medicare represents 37 percent of patients and 26 percent of net revenue.

Medicaid disproportionate share and other safety net reimbursement revenues were $69,749,342.

The City of Denver's payment for hospital services was $27,000,000; and it purchased services totaling $13,705,552.

Federal and state grants received by the health system totaled $27,918,537.

Other grants came to $14,599,580.

Patient Population

Seventy percent of patients seen at Denver Health are members of minority groups. The city of Denver's minority population is 34 percent; statewide, that population is 17 percent.

Forty-two percent of patients are uninsured.

Outpatient visits by payer source included 69,238 Medicare patients, 202,987 Medicaid patients, and 338,528 Self Pay/Other patients.

The emergency department saw 37,809 visits; the overall number of outpatient visits totaled 694,911.

Staff

There are over 4,000 full-time employees; all physicians are salaried. Full-time physicians have faculty appointments with the University of Colorado School of Medicine; and they receive nearly $40 million in grant funding for research.

Examples of two grants that foster Denver Health's high-performance system are:

—A two-year $600,000 grant, received by the hospital's Nursing Department from the U.S. Department of Health and Human Services' Agency for Healthcare Research and Quality, to develop a model for improving communication among caregivers.

—A four-year $600,000 grant received by the Department of Medicine from the American Heart Association to develop and implement a multidisciplinary, culturally appropriate intervention to improve quality of care for underserved patients with heart failure.

Recognition

Hospital care: Denver Health was named one of the top 50 hospitals in the United States in four categories by *U.S. News & World Report* in its "America's Best Hospitals" issue. Denver Health Critical Care is a top performer in the University HealthSystem Consortium. The cardiology division was recognized by the American Heart Association for achievement in using the "Get with the Guidelines" quality improvement program for patients with coronary heart disease and heart failure.

Information technology: The American Hospital Association's *Hospitals & Health Networks* magazine recognized Denver Health with the Top 25 Most Improved Award for Information Technology Use. Denver Health also received the 2005 Apex Award for Best Use of Technology from the Colorado Software and Internet Association.

Ambulatory care: Denver Health's network of community health centers received the 2006 Ernest A. Codman Award from the Joint Commission on Accreditation of Healthcare Organizations in recognition of efforts to improve immunization rates among low-income Denver children.

Appendix 2. An Overview of Denver Health's Integrated System

Denver Health Medical Center

This Center is an approximately 500-bed urban hospital, located in downtown Denver, that also houses the Rocky Mountain Regional Level 1 Trauma Center (described below).

Rocky Mountain Regional Level 1 Trauma Center

This Center serves nearly all the counties in Colorado and six surrounding states, with an average survival rate of 96 percent for its patients. In addition, the physicians who make up the trauma team are active in research, education, and outreach to other professionals and the community. For example, the Center provides trauma surgeons to other hospitals, presents lectures to rural hospitals, and hosts conferences on emergency medicine.

911 Medical Response

The Denver Health Paramedic Division, with a staff of 170 and a fleet of 31 ambulances, responds to nearly 80,000 911 calls a year. This paramedic unit was among the first in the nation to enroll patients in a clinical trial that tested the efficacy of administering the blood substitute PolyHeme® at the scene to seriously injured trauma patients who are bleeding and at risk of shock in pre-hospital settings.

Rocky Mountain Poison and Drug Center

Operational for more than 50 years, this Center is one of the oldest poison-control operations in the nation. It also provides drug and industrial-products consultations and a nurse health line. In addition, there are two support departments, one for poison treatment research and the other providing physician consultation to the call-in centers on issues related to medical toxicology.

Denver Health Medical Plan

This Plan is a health insurance coverage option offered to the employees of Denver Health and the City of Denver. Denver Health also administers three other products, which target low-income populations: "Medicaid Choice," a managed care plan tailored to the needs of Medicaid patients; Medicare Select for patients eligible for Medicare Low-Income Subsidy; and "Child Health Plan Plus," a low-cost insurance plan that covers children of families that do not meet eligibility requirements for Medicaid.

Family Health Centers

Denver Health, the largest federally qualified community health-center program in the United States, includes eight primary care centers located in economically disadvantaged neighborhoods of Denver as well as two urgent-care centers providing after-hours care at

the main campus. Denver Health has a 40-year history of serving disadvantaged populations in its community health centers. Its first center, Gipson Eastside Family Health, opened in 1966, making it now the second-oldest in the country.

School-Based Health Centers

Denver Health has 12 school-based clinics, located within Denver public schools, that offer access to a range of services. These include vaccinations, sports physicals, health assessments, behavioral health counseling and treatment programs, and health education. These centers fill a significant void; they present an opportunity to treat children and adolescents whose physical and mental health care needs may otherwise not have been sufficiently met.

Correctional Care

Denver Health provides medical care for individuals incarcerated by the City and County of Denver. Care is also provided for prisoners from several nearby counties, the State of Colorado; and the federal government in a secure 16-bed facility. Services comprise both acute inpatient care and outpatient clinical services, including dental care. Denver Health also offers correctional telemedicine services.

Denver CARES

Denver CARES is a 100-bed non-medical detoxification center for adults 18 years or older who are experiencing an acute episode of intoxication or withdrawal. The Center also provides referrals to community-based alcohol-recovery services.

Rocky Mountain Center for Medical Response to Terrorism

This Center is recognized by the federal government, through its awarding of various grants, as a leader in counterterrorism training and preparedness. It has received a total of more that $13 million in external funding, including two grants from the U.S. Centers for Disease Control and Prevention—one to provide training for local health departments to manage disasters and the other to plan for widespread vaccinations in the event of an infectious-disease outbreak resulting from bioterrorism.

Denver Public Health

In addition to fulfilling traditional public health outreach such as tuberculosis screenings, Denver Public Health also serves as the office for vital statistics (birth and death records) for the City and County of Denver. Additionally, the health department runs an immunization clinic, HIV and sexually transmitted disease clinics, an infectious-disease clinic, a dental clinic focused on HIV patients, and tobacco-prevention and -cessation programs for adolescents and adults.

RELATED PUBLICATIONS

Publications listed below can be found on The Commonwealth Fund's Web site at www.commonwealthfund.org.

Aiming Higher: Results from a State Scorecard on Health System Performance (June 2007). Joel C. Cantor, Cathy Schoen, Dina Belloff, Sabrina K. H. How, and Douglas McCarthy.

Hospital Performance Improvement: Trends in Quality and Efficiency (April 2007). Eugene A. Kroch, Michael Duan, Sharon Silow-Carroll, and Jack A. Meyer.

Hospital Quality Improvement: Strategies and Lessons from U.S. Hospitals (April 2007). Sharon Silow-Carroll, Tanya Alteras, and Jack A. Meyer.

The Dynamics of Improvement (April 2007). Dale K. Bratzler.

Hospital Performance Improvement: Are Things Getting Better? (April 2007). Ashish K. Jha and Arnold M. Epstein.

The Best Health System in the World (March 2006). Karen Davis.

The Agency for Healthcare Research and Quality's 2006 National Healthcare Quality Report (March 2007). Stephen C. Schoenbaum, Douglas McCarthy, and Cathy Schoen.

The National Committee for Quality Assurance's The State of Health Care Quality 2006 (November 2006). Stephen C. Schoenbaum and Alyssa L. Holmgren.

Why Not the Best? Results from a National Scorecard on U.S. Health System Performance (September 2006). Commonwealth Fund Commission on a High Performance Health System.

Framework for a High Performance Health System for the United States (August 2006). Commonwealth Fund Commission on a High Performance Health System.

Achieving a High Performance Health System: High Reliability Organizations Within a Broader Agenda (August 2006). Anne K. Gauthier, Karen Davis, and Stephen C. Schoenbaum. *Health Services Research,* vol. 41, no. 4, part 2.