



## **EMERGENCY DEPARTMENT OPERATIONS IN TOP-PERFORMING SAFETY-NET HOSPITALS**

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**ABSTRACT:** This report profiles five safety-net hospitals—Boston Medical Center, Denver Health, Memorial Regional Hospital, Memorial Hospital West, and Virginia Commonwealth University Health System—that made improvements to curb emergency department (ED) crowding, reduce long waits, and lower the number of hours spent on ambulance diversion. Hospitals used a combination of interventions, including: reconfiguring the ED to maximize efficiency; devising a pre-diversion system to alert staff of ED crowding; installing an electronic tracking system; designating staff members to be responsible for tracking patients; and developing meaningful performance metrics. To be successful, such interventions need to take place within a broader improvement strategy that entails: recognition that ED crowding is a hospital-wide issue; leadership provided by the CEO and other senior staff; vigilance in pursuing change, reviewing outcomes, and working to improve; transparency; and a commitment to quality for safety-net populations.

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## EXECUTIVE SUMMARY

Nationwide, hospital emergency departments (EDs) are in crisis. The demand for ED services has increased steadily while capacity has shrunk, due largely to hospital closures. Many EDs are overcrowded, causing long waits for care and high rates of ambulance diversion. ED crowding may be even more acute at safety-net hospitals because of their historic mission and legal mandate to care for vulnerable and underserved individuals.

All hospitals, including safety-net hospitals, can implement operational management and process improvements to curb ED crowding, reduce long waits, and lower diversion rates. This report profiles five safety-net hospitals that have done so. The hospitals—Boston Medical Center in Boston, Mass.; Denver Health in Denver, Colo.; Memorial Regional Hospital in Hollywood, Fla.; Memorial Hospital West in Pembroke Pines, Fla.; and Virginia Commonwealth University Health System in Richmond, Va.—were selected based on their long-standing commitment to providing quality care for poor and vulnerable patients as well as their current performance on nationally recognized measures of care. These hospitals are maintaining their critical position in the community as the gateway point to care for underserved populations, while reaching and often exceeding state and national benchmarks for quality care.

We collected information from site visits and follow-up interviews to identify strategies to:

- raise ED efficiency;
- reduce the number of hours on diversion (when an ED closes its doors to patients arriving by ambulance because of overcrowded conditions);
- improve ED throughput (the actual operations of the ED); and
- improve ED output (the ability to move patients from the ED to other services or types of care in the hospital or community).

### **Key Findings: Successful Throughput and Output Initiatives**

The study hospitals used a combination of interventions to promote the smooth and timely flow of patients through the ED and other departments, known as “patient flow.” They have seen improvements in a number of measures, including greater patient satisfaction, better patient care, reduced waiting times, decreased costs/increased revenues,

and less time spent on ambulance diversion. We identified five strategies to improve quality and efficiency in the ED. Some do not require significant investment and therefore could be undertaken by many hospitals, including those that are challenged financially.

- 1. Reconfigure the ED to maximize efficiency.** The study sites have undertaken a range of physical improvements in the ED, from a simple reorganization of ED triage and treatment rooms to a whole-scale redesign and rebuild. Even small redesigns such as identically equipping ED exam rooms or color-coding ED treatment room trays can produce efficiencies.
- 2. Devise a pre-diversion system to alert staff of ED crowding.** Several of the study sites devised systems to signal that the ED is nearing diversion status. The alert triggers a communication strategy throughout the hospital that inpatient beds are needed for patients in the ED, in order to make room for incoming ED patients.
- 3. Install an electronic tracking system.** Study sites that have installed electronic tracking systems have found them to be an invaluable tool for managing patient flow. A tracking system enables a manager to easily identify rooms that are empty, those that need to be cleaned, and those that house a patient ready for discharge.
- 4. Identify individual(s) responsible for tracking patients.** Some sites have created a “bed czar,” or bed facilitator position, to oversee patient flow throughout the hospital. This individual is empowered to communicate with the ED, medical departments, and hospital floors to smooth and expedite patient transitions between departments and through discharge.
- 5. Develop meaningful metrics.** The hospitals emphasized the importance of developing metrics to measure, analyze, and improve performance. This strategy is crucial to establishing baseline performance and setting improvement goals. Hospitals can begin this work with a small set of measures, limited to specific departments or conditions, and expand as they gain experience and expertise.

These concrete strategies are key to success in improving ED performance. Yet to be effective, such interventions need to take place within a broader improvement strategy that entails:

- 1. Recognition that ED crowding is a hospital-wide issue.**
- 2. Leadership** provided by the CEO and other senior staff for ED quality improvement initiatives.



- 3. Culture change** that results in a sense of vigilance about pursuing change, reviewing metrics and outcomes, and constantly working to improve.
- 4. Transparency** and a willingness to showcase successes and shortcomings in terms of performance data.
- 5. Commitment to quality for safety-net populations**, with the recognition that safety-net hospitals are capable of aggressively pursuing improvement strategies.

Several lessons emerged that can guide other safety-net hospitals as they develop strategies to improve the quality and efficiency of care provided in their EDs:

- 1. Safety-net hospitals can use performance metrics to improve quality and efficiency in the ED.** Each of the hospitals can point to successful strategies they have implemented to improve an aspect of patient flow in the emergency department, with several identifying savings associated with these initiatives.
- 2. Safety-net hospitals do not use common metrics to track performance in the ED.** Hospital EDs generally lack a common set of metrics that could be used to benchmark their performance against other hospitals in their markets or in similar markets across the country.
- 3. Current sources of publicly reported data should not be used as a proxy for measuring ED quality.** We used two performance measures publicly reported on the Centers for Medicare and Medicaid Services Web site, Hospital Compare, as a proxy for quality in the ED: for heart attack patients, time from arrival to percutaneous coronary intervention (PCI) and, for pneumonia patients, time from arrival to initial antibiotics. However, we found that performance on these measures may not be a good proxy for ED quality because these measures reflect activities that often take place in conjunction with other departments (e.g., cardiac catheterization lab) and do not reflect the wide range of activities that occur solely in the ED. Without standard measures or composite measures of efficiency that include ED care, it is not possible to identify high-performing EDs, either within or outside of the safety net.
- 4. Quality improvement efforts may not be as successful as regional policies in limiting ambulance diversion.** County-wide or regional policies that prevent EDs from diverting ambulances force hospitals to focus on reducing wait times once patients arrive at their doors.
- 5. Quality improvement in the ED requires the participation of the ED team as well as other hospital staff.** Non-ED staff must help improve patient flow. To

encourage them to do so, hospital leaders can underscore how the ED's mission relies on collaboration with other hospital departments.

**6. Quality improvement in the ED requires investment.** All of the hospitals profiled in this report have invested in the process of ED improvement with direct and in-kind resources. Quality improvement requires some investment of resources, is a long-term commitment, and entails the involvement of staff from across the organization.

## **EMERGENCY DEPARTMENT OPERATIONS IN TOP-PERFORMING SAFETY-NET HOSPITALS**

### **INTRODUCTION**

Nationwide, hospital emergency departments (EDs) are in crisis. The demand for ED services has steadily increased while capacity has shrunk, due largely to hospital closures. Many EDs are overcrowded, causing long waits for care and high rates of ambulance diversion. It is not uncommon to find patients boarding in the ED—that is, being held in the ED in anticipation of placement in an inpatient bed—for 48 hours or more.<sup>1</sup>

Despite these significant challenges, EDs must remain open and accessible to all patients because of the Emergency Medical Treatment and Labor Act (EMTALA).<sup>2</sup> This federal law requires hospitals that accept Medicare funding to screen and stabilize all patients presenting for care at the ED, regardless of their health coverage or ability to pay.

EMTALA does not preclude a hospital from charging for services provided in the ED. Nevertheless, by requiring hospitals to screen and stabilize patients without regard to their ability to pay, the law creates an open door to emergent care and gives patients who may not have coverage or funds at the time they need care access to services.

ED crowding may be even more acute at safety-net hospitals. In addition to being bound by EMTALA, safety-net hospitals have a historic mission and often a legal mandate to care for the most vulnerable and underserved individuals in our communities.<sup>3</sup> Compared with all hospital patients, patients who seek services from safety-net providers are disproportionately low income and uninsured.<sup>4</sup> Many patients who receive care within the safety net have complex psychosocial needs that contribute to their poor health care status (e.g., poor living and environmental conditions, inadequate nutrition, lack of access to regular health care services).<sup>5</sup> In response, safety-net hospitals have become especially adept at providing care for vulnerable patients with complex health and social concerns. However, given low and shrinking financial reserves and patients' significant health care needs, some safety-net hospitals struggle to fulfill their mission. In challenging economic times, when increasing numbers of individuals find themselves out of work or without the coverage or resources to seek health care services, safety-net hospitals become even more critical sources of care for communities across the country.

A growing body of evidence indicates that all hospitals, including safety-net hospitals, can implement operational management and process improvements to curb ED

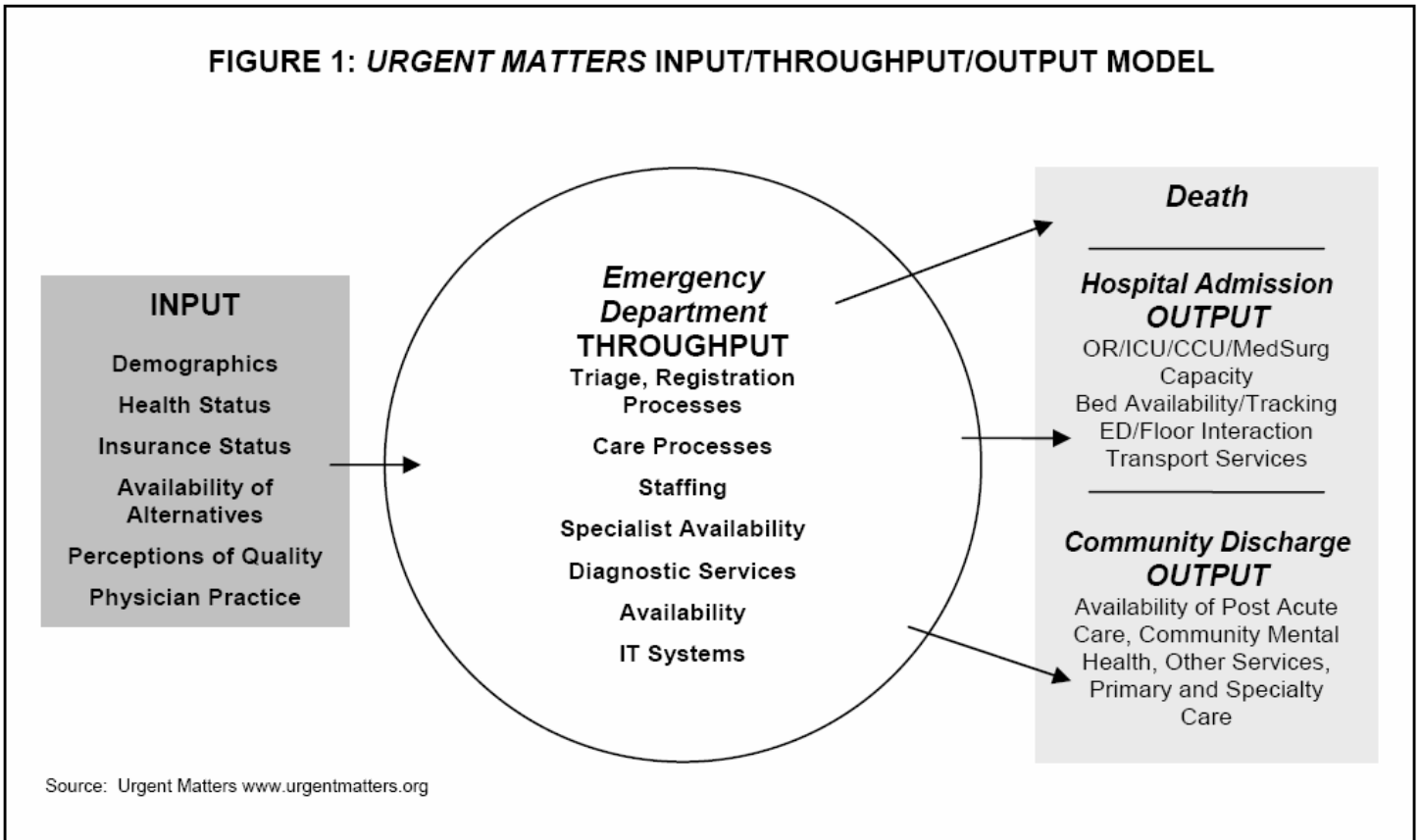
crowding, reduce long waits, and lower diversion rates.<sup>6</sup> These changes also may lead to improved quality of care, greater efficiencies, and increased patient safety. Some recent research suggests that, as a group, safety-net hospitals may have smaller gains over time in quality performance measures than other hospitals.<sup>7</sup> This disparity may be due in part to safety-net providers' inability to invest in quality improvement strategies. Nevertheless, many safety-net hospitals have demonstrated significant quality improvements, in some cases outpacing non-safety-net hospitals. For example, the National Association of Public Hospitals and Health Systems (NAPH) analyzed quality performance data for 21 "core" measures used by the Centers for Medicare and Medicaid Services (CMS).<sup>8</sup> The data revealed that, compared with all reporting hospitals nationally, NAPH members had a higher mean score for 13 of 21 measures, and performed above the median score of all reporting hospitals nationally in most of the heart attack measures.<sup>9</sup>

Hospitals have undertaken efforts to improve ED efficiency and quality of care. One established model is the Input/Throughput/Output (I/T/O) of patient flow. Several I/T/O models have been developed; although each has distinct features, all have certain factors in common.<sup>10</sup> Each of the I/T/O models provides a structure for examining the factors that affect ED access, quality, and outcomes. Input factors include why people present to an ED (e.g., insurance status, availability of services, patient preferences); throughput refers to the actual operations of the ED; and output factors are related to the hospital's ability to move patients from the ED to other services or types of care in the hospital or community.

Our analysis of ED patient flow was guided by the I/T/O model used by the *Urgent Matters* program (Figure 1).<sup>11</sup> This model is useful because it identifies potential ED throughput strategies for improving the quality and efficiency of care. It also identifies output initiatives for admitting patients that can help to relieve ED crowding.

This study focuses on two of the components of this I/T/O model—throughput and output—primarily because these areas are largely under the control of the hospital. A number of throughput and output strategies have proven successful in increasing ED efficiencies while improving the quality of care. These include rapid admission policies for the ED, such as accelerated care at triage and in-room registration.<sup>12</sup> Some hospitals have created ambulance diversion guidelines and designed pre-diversion protocols that are carried out in the ED.<sup>13</sup> Others have added services for inpatients awaiting beds, opened an acute care unit or a satellite laboratory in the ED, and increased intensive care unit capacity.<sup>14</sup>

**FIGURE 1: URGENT MATTERS INPUT/THROUGHPUT/OUTPUT MODEL**



This report profiles five safety-net hospitals that are maintaining their critical position in the community as the gateway to care for underserved and vulnerable populations, while reaching and often exceeding state and national benchmarks for quality of care. How they accomplish these dual tasks—commitment to providing access to care and quality care for all patients—is the subject of this study. It describes the throughput and output interventions these hospitals have implemented to increase the efficiency of ED operations, reduce crowding, and improve patient flow.

## **METHODOLOGY**

We used several sources to select hospitals that could provide lessons for other safety-net hospitals interested in improving emergency department quality and efficiency. Using data from the American Hospital Association Annual Report of Members, we identified hospitals in which at least 25 percent of discharges are covered by Medicaid.<sup>15</sup> To this group, we added hospitals that had a lower proportion of Medicaid discharges but were members of the National Association of Public Hospitals and Health Systems. Most of these additional hospitals had substantial numbers of discharges by uninsured and self-pay patients. In total, this process identified over 800 safety-net hospitals with large volumes of Medicaid and/or uninsured patient populations.

We refined this list of hospitals based on their performance on two process-of-care measures that are publicly reported on the CMS Web site, Hospital Compare.<sup>16</sup> Because ED performance data are not reported publicly, we used two inpatient performance measures as indicators of ED efficiency: 1) the percent of heart attack patients who are given percutaneous coronary interventions (PCI) within 90 minutes of arrival at the hospital; and 2) the percent of pneumonia patients who receive their first dose of antibiotics within four hours of arrival at the hospital. These two measures were used in the selection process because patients needing these services often enter the health system through the ED, sometimes receive these services in the ED, and/or the delivery of these services requires coordination with ED staff.

We also considered potential sites based on their size, payer mix, patient volumes, and geographic location. Finally, we searched the published literature to identify examples of safety-net hospitals with high-quality emergency department performance and/or a track record of quality improvement activities. The study sites are hospitals that have demonstrated excellence as evidenced by nationally recognized performance measures, a commitment to improvement, and a strategy for raising performance in areas that continue to lag behind national benchmarks. After assessing all of these criteria, we selected the following five safety-net hospitals:

- Boston Medical Center in Boston, Massachusetts
- Denver Health in Denver, Colorado
- Memorial Regional Hospital in Hollywood, Florida
- Memorial Hospital West in Pembroke Pines, Florida
- Virginia Commonwealth University Health System in Richmond, Virginia

Table 1 includes information on our study hospitals' performance on selected publicly reported quality measures related to heart attack and pneumonia care.<sup>17</sup> In nearly all cases, the study sites meet or exceed national averages. On the two measures used as indicators of ED performance, all of the sites exceed the national average for the heart attack care measure, and three of the hospitals outperformed the national average for pneumonia care.<sup>18</sup> Even though Boston Medical Center and Denver Health rank below the national average on the pneumonia care measure, we included them in the study because they are highly integrated health systems that have established records of pursuing quality improvement strategies with proven results.<sup>19</sup>

**Table 1. Study Sites' Performance on Nationally Reported Quality Measures**

Performance Measure	Boston Medical Center	Denver Health	Memorial Regional Hospital	Memorial Hospital West	Virginia Commonwealth University Health System	National Average
<b>Heart Attack Care</b>						
Percent of heart attack patients given PCI within 90 minutes of arrival	91%	100%* <sup>1,2</sup>	90%	97%	98%	78%
<b>Pneumonia Care</b>						
Percent of pneumonia patients given initial antibiotic(s) within six hours <sup>§</sup> after arrival	91% <sup>3</sup>	85%	99%	99%	96%	93%

\* U.S. Department of Health and Human Services, Hospital Compare, [www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov), data last updated Dec. 10, 2008. Accessed March 11, 2009. These data were presented because no quarterly results were presented at [www.qualitycheck.org](http://www.qualitycheck.org) for this institution.

<sup>1</sup> The number of cases is too small (<25) to reliably tell how well a hospital is performing.

<sup>2</sup> The hospital indicated that the data submitted for this measure were based on a sample of cases.

<sup>3</sup> The number of months with measure data is below the reporting requirement.

<sup>§</sup> Site selection was based on the four-hour data point; however, this measure was subsequently replaced by a new, six-hour measure.

Source: The Joint Commission, Performance Measure Data Extract, reporting period July 2007–June 2008, data available as of Jan. 2009 at [www.qualitycheck.org](http://www.qualitycheck.org), accessed March 11, 2009. This information is part of the Hospital Quality Alliance, and can also be viewed at [www.hospitalcompare.hhs.gov](http://www.hospitalcompare.hhs.gov).

We sent the chief executive officer at each site a letter explaining the study and asking for their participation. All of the CEOs agreed to participate and each was interviewed, either in person or over the telephone. CEOs identified the key staff members to participate in the study to discuss the hospital system's emergency department improvement initiatives. Forty individuals across the five sites were interviewed for the study.

We conducted interviews on site at Memorial Regional Hospital, Memorial Hospital West, and Virginia Commonwealth University. Interviews with held by telephone with key contacts from Boston Medical Center and Denver Health. In-person and telephone interviews took place between February and April 2008. Each interview lasted approximately 45 to 60 minutes and addressed the following areas:

- the hospital's motivation to pursue quality improvement strategies in the emergency department;
- ways that quality is defined and embraced across the organization or system;
- structure of the emergency department quality improvement initiative(s) and the process pursued in implementing the initiative(s);

- results of the initiative(s);
- challenges faced in implementation; and
- lessons learned that could be helpful to other safety-net hospitals pursuing improvements in ED efficiency.

We also collected primary and secondary materials on the hospital's emergency department quality initiatives, such as reports and previous case studies. Each site was given the opportunity to review and comment on this report prior to publication.

## **STUDY SITE DESCRIPTIONS**

### **Boston Medical Center**

Boston Medical Center was established in July 1996 as a private, not-for-profit, academic medical center when two public hospitals, Boston City Hospital and Boston Specialty Rehabilitation Hospital, merged with Boston University Medical Center Hospital, a private academic medical center. The hospital system has 6,200 employees, 1,400 physicians, and an annual operating budget of roughly \$2.0 billion.<sup>20</sup> Boston Medical Center partners with 15 community health centers to form Boston HealthNet, a community-based network that serves 280,000 patients annually. The hospital also owns the BMC HealthNet Plan, a statewide Medicaid managed care organization that covers over 240,000 Massachusetts residents with low to moderate incomes.<sup>21</sup> The BMC HealthNet Plan is the state's largest managed care organization for both MassHealth and Commonwealth Care. The hospital is a major teaching affiliate of the Boston University School of Medicine.

Boston Medical Center is the largest provider of care to the indigent in Massachusetts, with 50 percent of its patients qualifying for free care or Medicaid.<sup>22</sup> In 2006, the hospital system provided more than \$233 million in free care to uninsured patients.<sup>23</sup> Boston Medical Center has the largest 24-hour, Level I trauma center in New England, serving more than 126,000 patients annually across two emergency departments and urgent care centers. The ED is vitally important to the hospital since 71 percent of hospital admissions come through the ED.

### **Denver Health**

Denver Health is the primary safety-net hospital serving the Denver area. The hospital system includes an acute care hospital with a Level I trauma center, the 911 emergency medical response for Denver and a neighboring city, eight community health centers, 11 school-based clinics, the public health department, a correctional care service, a health



maintenance organization (HMO), and a call center that includes a regional poison control and drug center. Denver Health operates on a \$602 million budget, employs 5,200 people, including 324 physicians, and provides health care to a quarter of all Denver residents. The health system has a formal affiliation with the University of Colorado School of Medicine. In total, the system served approximately 156,000 people and provided \$318 million in care to the uninsured in 2008, an amount that represented 30 percent of charges.<sup>24</sup>

### **Memorial Regional Hospital and Memorial Hospital West**

Two of the study hospitals—Memorial Regional Hospital and Memorial Hospital West—are part of the same health system, Memorial Healthcare System (MHS). MHS, also known as the South Broward Hospital District, is a special taxing district created by Florida’s legislature in 1947 to serve the South Broward community. MHS is a public, nonprofit health care provider governed by a seven-member board of commissioners appointed by the governor of Florida. MHS’ mission is to provide quality, cost-effective, customer-focused health care services to its patients regardless of their ability to pay, with a goal of improving the health status of the community it serves. MHS has more than 8,000 employees and operates five hospitals: Memorial Regional Hospital, which houses the Joe DiMaggio Children’s Hospital; Memorial Hospital West; Memorial Hospital Pembroke; Memorial Hospital Miramar; and Memorial Manor. In addition, MHS owns and operates numerous other facilities, including primary care centers, same-day surgery centers, an urgent care center, home health services, fitness and rehabilitation centers, a women’s health and resource center, and a nursing home.

*Memorial Regional Hospital*, located in Hollywood, is MHS’ flagship facility. It opened in 1953 and is today one of the largest hospitals in Florida. The hospital has approximately 37,000 admissions each year and provides nearly 330,000 outpatient visits annually. Memorial Regional offers an extensive array of tertiary services, including a Cardiac and Vascular Institute that treats more inpatients than any other in Broward County. It is also a Level I trauma center, one of only six in the state.

*Memorial Hospital West*, located in Pembroke Pines, opened in 1992 and has more than 23,000 admissions and nearly 263,000 outpatient visits each year. The hospital features advanced cardiac, oncology, and neurology programs through a fully equipped Cardiovascular Interventional Suite, Memorial Cancer Institute, and the Neuroscience Center. In addition, Memorial West has an Intensive Care Unit with a Level II Neonatal Intensive Care Unit, a Family Birthplace, and a Fitness and Rehabilitation Center. Both Memorial Regional and Memorial West have Rapid Response Heart Attack and Brain

Attack Teams available 24 hours per day for emergency treatment of heart attack and stroke.

### **Virginia Commonwealth University Hospital System**

The Virginia Commonwealth University Hospital System (VCUHS) is a public academic medical center that has served central Virginia for over 160 years.<sup>25</sup> Known as the Medical College of Virginia Hospitals until 2000, the hospital system now comprises the teaching hospital component of VCUHS, outpatient clinics, and a 600-physician faculty group practice.

VCUHS has over 7,000 employees with 779 licensed beds and serves approximately 20 percent of the Richmond inpatient market.<sup>26</sup> The system has more than 30,000 admissions and nearly 500,000 outpatient visits annually. VCUHS has long served as the principal safety-net provider in Central Virginia, with nearly one-fifth of its patients insured through Medicaid and more than 30 percent uninsured.<sup>27</sup> Each year VCUHS treats nearly 80,000 patients in the hospital's emergency department, the region's only Level I trauma center.

### **STUDY SITE CHARACTERISTICS**

Table 2 provides information on the governance, teaching status, volumes, and payer mix at the study sites. Four of the sites (Denver Health, Memorial Regional, Memorial West, and VCUHS) are separate, public entities; Boston Medical Center is a nonprofit organization. All but Memorial West are teaching hospitals. While they vary in size from 290 beds at Memorial West to 779 at VCUHS, all of the hospitals provide large volumes of inpatient and outpatient care. Many of the patients who receive care at these organizations are poor: between 5 percent and 39 percent are uninsured or self-paying and an additional 13 percent to 37 percent are covered by Medicaid. The majority of their uninsured, self-pay, and Medicaid discharges come through the ED before they are admitted to an inpatient unit.

**Table 2. Characteristics of Study Sites**

<b>Characteristic</b>	<b>Boston Medical Center</b>	<b>Denver Health</b>	<b>Memorial Regional Hospital</b>	<b>Memorial Hospital West</b>	<b>Virginia Commonwealth University Hospital System</b>
Governance	Nonprofit	Public	Public	Public	Public
Teaching hospital?	Yes	Yes	Yes	No	Yes
Total beds, staffed	582*	379**	700*	290*	704*
Total admissions to the hospital	29,471*	18,902**	36,999*	23,446*	31,778*
Total outpatient visits	925,966*	444,569**	329,248*	262,796*	458,513*
Gross revenues (thousands)^	\$1,307,654	\$890,465	\$2,428,790	\$1,143,995	\$2,037,758
Payer mix (percent of discharges, 2007):					
Private coverage	17	9	37	58	30
Medicare	32	15	29	25	21
Medicaid	33	37	22	13	18
Self-pay/uninsured	18	39	11	5	31
Number of ED visits, 2007	126,039	43,990	125,000	85,000	79,259
Number of acute ED beds	54	36	70	51	46
Percent of hospital admissions from the ED	71	53	12	15	48

Sources:

\* 2006 AHA Hospital Database.

\*\* Denver Health Data supplied to the American Hospital Association's 2007 Hospital Database.

^ 2007 Medicare Cost Reports, [www.ahd.com](http://www.ahd.com).**STRATEGIES TO IMPROVE EFFICIENCY IN THE ED**

Each of the five hospitals profiled here implemented many different strategies to improve ED efficiency. One of the hallmarks of their efforts is the multiplicity of interventions undertaken and the extent to which myriad processes and protocols were put under the microscope for potential change and improvement. Some of the interventions and initiatives described below were tried and implemented across the hospitals. Others are less common but have proven to be helpful in supporting efficiency efforts. All of these interventions appear to be worthy of testing at other safety-net hospitals.

**Efforts to Reduce the Number of Hours on Diversion**

Three of the five hospitals actively pursue strategies to limit diversion, which occurs when an ED closes its doors to patients arriving by ambulance because of overcrowded conditions (Table 3).<sup>28</sup> The two hospitals in the Memorial System in Broward County, Florida, have implemented a “no diversion” policy.

**Table 3. Emergency Department Initiatives at Selected Safety-Net Hospitals to Reduce or Eliminate Diversion Hours**

- 
- Instituted diversion policy with trigger points that sequence alerts system-wide
  - Developed internal diversion plan
  - Developed pre-diversion protocol alerting key staff that the ED is on pre-diversion status
  - Implemented no-diversion policy
- 

Source: Author interviews, 2008.

The three hospitals that use diversion as a strategy to manage demand struggle to limit the number of diversion hours and have implemented a variety of initiatives to anticipate and mitigate excessive crowding. For example, when Boston Medical Center is in danger of going on diversion, an alert goes out to key staff on their handheld or palmtop computers that the ED is on “pre-diversion status.” These staff members make phone calls to their subordinates and other departments to get patients moving through the hospital to relieve the stress on the ED. When Boston Medical Center does go on diversion, nursing supervisors place phone calls and send e-mails to find out why bottlenecks are occurring, and the bed facilitator is alerted. When on diversion, the ED’s highest priority is to identify which patients in the waiting room can be seen in Urgent Care, which can safely wait to be seen in the ED, and which are boarding, as well as take steps to open inpatient beds.

VCUHS instituted a diversion policy with trigger points that send a series of alerts to key staff in the health system as the likelihood of diversion increases. Ultimately, the decision to go on diversion is made jointly by the ED’s attending physician and clinical coordinator, in collaboration with the throughput coordinator or her designee. ED capacity is reviewed every two hours to determine when the diversion order can be lifted.

Denver Health issues “yellow alerts” to signal a certain level of ED crowding—before it reaches a level that will trigger diversion. ED staff, nursing supervisors, staff on the nursing floors, and others throughout the organization receive the alerts through the hospital’s computer system and follow standard response plans for yellow alerts and ED diversion.

Denver Health also implemented several strategies to reduce the length of stay for nonadmitted patients and increase bed turnovers. These strategies included identifying fast-track patients (those with acute but not life-threatening conditions who can be treated quickly and released), streamlining the ordering process for radiology, and increasing the frequency of rounding. The hospital created a fast-track system in which mid-level

providers care for low-acuity patients in a central evaluation unit for a portion of the day when the ED experiences the greatest numbers of incoming patients.

Since implementing these strategies, Denver Health has significantly reduced the length of stay for ED patients and the percentage of time the ED is on diversion—despite experiencing an increase in ED volume during this time period. Results also show that revenues per ED encounter increased. There has not been improvement in the number of patients who leave the ED without being seen or without completing their treatment (Table 4). Although data are not available at this time, staff report that these two metrics have improved considerably since the ED opened a central evaluation unit with the ability to directly “room” patients.

**Table 4. Denver Health Emergency Department:  
Results of Strategies to Reduce Length of Stay and Time Spent on Diversion**

<b>Metrics</b>	<b>Baseline*</b>	<b>Targeted Reduction (Target)</b>	<b>Post-QI Activity 6/2007</b>	<b>As of 6/2008</b>
Average ED length of stay (minutes)	256	-10% (231)	241	240
Gross revenue/encounter	\$1,177	10% (\$1,295)	\$1,295	
Time on ED diversion	15%	-10% (13.5%)	4.7%	~5%
AMA/LWBS/AWOL (number of patients)	257	-5% (244)	297	
ED volume (number of patients)	4,167	N/A	4,369	

\* All baseline metrics derived from mean monthly numbers 1/2006–5/2007 except ED volume. ED volume based on monthly rate for budgeted 50,000 patients annually. Data were generated for a one-time quality improvement project; no ongoing data are available.

AMA is “against medical advice,” LWBS is “left without being seen,” AWOL is “absent without leave” (e.g., without completing treatment).

Source: June 2007 Denver Health Black Belt Monthly Report, ED Internal Divert Plan, and current Denver Health data.

### **Throughput Initiatives**

All of the hospitals have taken a close look at patient flow in the ED and have implemented a variety of triage, care redesign, and other improvement processes to elevate the overall efficiency and quality of care (Table 5). These throughput initiatives include efforts to improve the triage process, use information technology, hire additional nursing and physician staff, and expand ED capacity (e.g., by adding beds or other infrastructure).

**Table 5. Emergency Department Throughput Initiatives at Selected Safety-Net Hospitals**

- 
- Installed new IT system creating a near-paperless ED
  - Administrative attending physicians on call in the ED 24 hours a day
  - Reengineered triage process to create a faster track for noncritical patients
  - Redesigned urgent care area with additional capacity
  - Built new stat lab in the ED
  - Added ED beds
  - Revised urgent care protocols to decrease wait times and percent of patients who leave without being seen
  - Empowered nurses to order tests based on system-based complaints in the ED
  - Added ED nursing capacity
  - Formed Patient Throughput Committee
  - Created separate observation and admissions units with dedicated bed capacity in the ED
- 

Source: Author interviews, 2008.

***The Triage Process.*** Hospitals often seek to redesign the triage process in an attempt to move patients with lower acuity out of the ED as quickly as possible. And, since triage enables hospital staff to identify patients with critical needs as quickly as possible, it is an important factor in the efficiency and quality of ED care.

The study hospitals implemented a number of strategies to improve triage, including:

- undergoing a full redesign of the process;
- using experienced triage nurses to screen patients, thereby decreasing the likelihood that someone in need of emergent care is mistakenly sent to urgent care;
- adding urgent care capacity;
- creating processes to streamline the transition from ED triage to urgent care; and
- redesigning the triage waiting area and desk to enable them to accommodate comprehensive patient intake.

***Information Technology.*** According to the study sites, it is not possible to overstate the importance of having a sophisticated system for data collection and analysis of performance measures. As a senior staff member at Denver Health stated, “Without data, how can you engage your employees in this process? If you don’t measure it, you can’t manage it.” Staff also suggested that hospitals use customized performance measures, in addition to the standard measures reported to CMS.

Boston Medical Center has invested heavily in a new information technology (IT) system that has resulted in a near-paperless ED. Boston Medical Center’s two EDs now

have electronic order entry, ED tracking, prescriptions, physician orders, lab results, and X-rays. The new system gives ED staff more ways to communicate with other departments, and to move patients through the ED. It also has greatly enhanced Boston Medical Center's ability to recover charges; the ED generated \$1 million more for the hospital in the first year after implementation.

***Staffing Changes.*** Each of the hospitals has increased staffing capacity by adding more physicians, nurses, and/or administrative staff, as well as reconfiguring and changing staff responsibilities within the ED. Boston Medical Center has “administrative attendings,” physicians who have management responsibilities associated with quality and efficiency. The administrative attendings are on call in the ED 24 hours a day to troubleshoot and help relieve crowding. As one Boston Medical Center clinician put it, “the administrative attendings rotate call when it gets crowded, and they head to the ED and try to take a 30,000-foot bird’s-eye view, look at the problems, and pick up the phone. Since they have influence, they can light a fire under people to get things moving. It takes people with clout to make it work.” In addition, other attending physicians help to alleviate backups in the ED. For example, on Mondays and other extremely busy times, an attending from Urgent Care works in the ED for two to three hours to identify patients who can be seen in a triage room, to keep them from leaving the ED without being seen. Often, patients need only simple interventions such as a prescription refill. Boston Medical Center has also increased physician staffing at the busiest times of the day.

Funding for the administrative attending positions was provided after staff successfully argued that the new IT system requires an additional five to seven minutes to complete each chart. Also, carving out nonclinical time for administrative attendings is clearly justified by the increased ED volume and admissions. As one clinician said, “the more admissions you can pull in, the more transfers you can make, the more hours you stay off diversion, it all goes toward paying for these attendings.”

At MHS, senior leaders have made a commitment to provide “whatever is necessary” to advance and improve patient care. Requests for added resources must be accompanied by a description of how the enhancements will improve service delivery and patient care. As one senior staff member at Memorial Regional stated, “Give your staff the tools they need to implement the quality improvement changes.” Substantial investments have been made to increase the number of nurses and other staff, limit the number of contract nurses necessary to operate the ED, and add an additional swing shift of physician coverage. The hospital also created a hospitalist program of 20 physicians that is dedicated to care for the 48 percent of inpatients who are uninsured or self-pay.

About eight years ago, Memorial Regional implemented Advanced Interventions, an initiative that empowers nurses to order tests based on symptom-based complaints in the ED. Some physicians initially resisted this idea; however, it has proven to reduce patients' wait times. Staff in the ED also "pull to full" by filling every empty ED bed, even for patients with minor issues, rather than holding a bed for a potential emergent or acute case. This expedites patients' progress through the ED.

***Investments in ED Infrastructure.*** The study sites have made substantial investments to their infrastructure that affect ED quality and patient safety. Boston Medical Center added a stat laboratory in the ED to decrease the turnaround time for lab results. The hospital system also built 11 additional bays in the ED to increase capacity, and is currently working on redesigning the urgent care area to create up to six extra beds.

Memorial Regional doubled the size of its ED facility. Similarly, Denver Health is undertaking a \$40 million capital project to double the size of their ED to 80,000 square feet. The renovated ED will take over the first floor of the hospital, with four separate departments: adult ED with three treatment zones, pediatric ED, adult urgent care, and a central evaluation unit. Each exam room will be identically configured as resuscitation rooms or treatment rooms to provide maximum flexibility for ED patients to overflow from urgent care to the ED and vice versa.

### **Output Initiatives**

The study hospitals have implemented many different strategies to move patients out of the ED and into hospital beds (Table 6). These "output" activities include designating individuals to be responsible for bed management, implementing systems to facilitate movement of patients from the ED to inpatient units, and redesigning care processes.

**Table 6. Emergency Department Output Initiatives at Selected Safety-Net Hospitals**

- 
- Created a bed facilitator/"bed czar" position
  - Created critical care resource nurse position for better coordination of patient care
  - Created intermediate care ICU to increase ICU capacity and reduce ED crowding
  - Opened nurse-staffed discharge lounge
  - Created discharge center using Teletracker system
  - Hired additional physicians and nurses
  - Changed work schedules of housekeeping staff to accommodate patient movement from ED to inpatient unit
  - Created transfer center/call center linking referring physicians (in the ED) to receiving physicians (on the hospital units)
  - Instituted policy allowing ED physicians to directly admit patients
- 

Source: Author interviews, 2008.



***Inpatient Bed Management.*** Several of the hospitals created a bed facilitator or “bed czar” position to coordinate patient flow throughout the hospital and make sure that patients are discharged and moved out of hospital beds as soon as they are ready, thereby freeing up beds for patients coming from the ED. At Boston Medical Center, the bed facilitator coordinates with all departments to accept scheduled admissions, admissions from the ED, and transfers from other hospitals. An organizational mandate requiring that all departments cooperate with the bed facilitator provides support for this function. One staff member said of the bed facilitator, “she has real-time knowledge of who can be moved, who’s getting out, what’s available, who is the most urgent patient and where to place them, what’s been in the ED, and what’s coming.”

Boston Medical Center’s bed facilitator has considerable authority to make decisions about bed availability and the processes necessary to move patients out of beds when they are ready to be discharged. This is a senior-level administrator position that reports directly to the vice president of nursing. Boston Medical Center staff found that it is essential for the bed facilitator to be a nurse to ensure he or she has a clinical background and is not viewed strictly as an administrator. The hospital has also developed a “bed board,” an electronic interface between registration and housekeeping that shows which rooms have patients; who the patients are, their sex, and any special precautions (e.g., telemetry); which rooms are cleaned and ready for new patients; which patients are waiting for rooms; and which patients are ready for discharge.

At VCUHS, a nurse manager serves as a “throughput coordinator” to facilitate movement across departments; several other clinical staff (including at least one physician) help move patients across care settings.

At Denver Health, a nurse manager position was added to monitor patient flow throughout the entire hospital and oversee a command center, from which bed turnover can be monitored. Denver Health has also purchased a computerized bed-tracking system that indicates the status of all beds in its facilities. Memorial Regional and Memorial West each hired a bed czar to oversee patient flow throughout the hospital and monitor bed turnover.

VCUHS’ Bed Management Department uses a tracking system to identify inpatient bed availability. The hospital also has a clinical decision unit with 10 beds, where patients can be observed for up to 23 hours before the hospital decides to admit them to an inpatient bed or safely discharge them. They also operate an admissions unit with nine telemetry beds to assist in transferring admitted patients from the ED. The

admissions unit is open 24 hours a day, Monday through Friday. Also, a transfer center staffed by telepage operators, working in collaboration with bed management, serves as a call center linking referring physicians to receiving physicians on the inpatient units. The transfer center has helped shorten the time it takes to place patients transferred from other hospitals to the appropriate unit at VCUHS.

***Focus on Critical Care and Intensive Care Units (ICUs).*** Several of the study hospitals have enhanced or modified critical care and/or ICU capacity to improve patient flow from the ED to the inpatient units and to move very sick patients from the ED to critical care or intensive care beds as quickly as possible. Boston Medical Center has created a new position, the critical care resources nurse, to provide support to the ICUs, critical care areas, and the ED during episodes of high acuity and surge in patient volume.<sup>29</sup> The critical care resources nurse is deployed by the director of nursing of critical care, bed facilitator, or off-shift nurse manager to ensure the coordination of patient care. The role encompasses nursing assessment, intervention, and evaluation of care for patients.

In early 2008, Boston Medical Center used six of the Telemetry Unit's 16 beds to create an intermediate care unit (IMCU).<sup>30</sup> The hospital expects to increase this to a total of 10 step-down beds. This new unit is designed for patients who need more than eight but less than 20 hours of critical care per day. The IMCU helps to decrease ED crowding by increasing the ICU's capacity, since some of the ICU patients can be stepped down to the IMCU. Creating the IMCU took a tremendous amount of commitment, training, and trust-building between departments, and was a cooperative effort between several departments. The telemetry nurses were not trained to staff this unit, so they went through extensive training in both critical and intensive care. Initially, some physicians were resistant to the idea of the IMCU because they were concerned that it would not be safe for patients. Nevertheless, the IMCU has proven to be an effective way to improve patient flow while ensuring patient safety.

***Strategies for Timely Discharge.*** Both Memorial Regional and VCUHS opened discharge lounges for patients awaiting discharge. Memorial Regional's discharge lounge is staffed by a nurse and used by approximately 20 to 30 patients a day. VCUHS created a discharge lounge for patients who are able to be discharged from an inpatient unit but need to wait in the hospital for transportation home. Separate transporters bring patients from the inpatient units to the discharge lounge, so that nurses on inpatient units do not have to leave their unit to discharge patients. A discharge center also assists by opening beds on inpatient units to help move patients out of the ED.

In 2003, Denver Health opened a 14-bed admission and discharge unit to enable timely hospital discharges. The unit's hours of operation are 8:00 a.m. to 8:30 p.m. Patients who no longer need to occupy an inpatient bed but are in the process of arranging follow-up care, discharge medications and services, and transportation are placed in this unit, thus freeing up an inpatient bed for an incoming patient. Similarly, the admission and discharge unit can be used to hold patients who are awaiting the availability of an inpatient bed, rather than boarding them in the ED.

VCUHS made changes to its housekeeping schedules to provide more coordinated and timely responses to patients arriving from the ED to inpatient units. A review of ED and inpatient operations revealed that peak times, in terms of the ED's need for inpatient beds, were between 11:00 a.m. and 4:00 p.m. Several housekeeping staff ended their shifts during this peak time period. To ease patient flow, the hospital created housekeeping shifts from 10:00 a.m. to 6:00 p.m.

### **PERFORMANCE MEASUREMENT AND FINANCIAL INCENTIVES**

Each of the study hospitals has shown outstanding performance in many of the hospital quality measures that are publicly reported on the CMS Web site, Hospital Compare, particularly those related to performance in the ED. These hospitals have implemented strategies to measure, analyze, and improve performance on a routine basis; several also have created incentive programs to reward individuals and teams on quality-related achievements related to ED care (Table 7).

**Table 7. Emergency Department Quality Measure Initiatives at Selected Safety-Net Hospitals**

- 
- Focus on CMS quality measures includes strict adherence to data collection, record review, and data analysis
  - Developed STEMI protocols with page system modeled after trauma alert system
  - Created color-coded dashboard to provide visual display of performance
  - Posted dashboard on units to encourage transparency
  - Created pocket reminder cards and posters with simplified algorithm for antibiotic selection for pneumonia
  - Provided awards and incentives to individuals and teams that identify and conduct successful quality improvement projects
  - Introduced incentive-based pay for ED physicians in physician groups
  - Created multidisciplinary teams to work on various quality initiatives, including cardiology, stroke, and pneumonia
  - Periodically review performance of individuals, teams, and initiatives and provide follow-up on progress
- 

Source: Author interviews, 2008.

Staff at both Memorial Regional and Memorial West emphasized the importance of having both a sophisticated system for monitoring performance metrics and a careful process of reviewing outcomes. Quality staff at both hospitals meet regularly with multidisciplinary departmental teams to review performance and identify problems or delays. When problems do arise, education sessions are quickly conducted to provide communication and correct mistakes.

VCUHS has a Steering Committee that has oversight responsibility of quality initiatives and a Project Team to analyze and implement recommendations for improvement on all throughput issues in the ED, inpatient units, and ancillary areas. The Project Team developed a color-coded dashboard that provides a visual representation of performance in these areas. The dashboard is used as a tool to monitor progress on quality improvement and throughput initiatives in the ED and across the organization, as well as to identify areas for future interventions (see [Appendix A](#)). Other hospitals have developed pocket reminders of various protocols, created teams dedicated to quality improvement in high-opportunity conditions (such as cardiology, stroke, and pneumonia), and conducted individual and team follow-up meetings to review progress on targeted measures.

Performance metrics are taken so seriously at Memorial Regional and Memorial West that they drive employee compensation. MHS introduced incentive-based pay for ED physicians in physician groups. More than 50 percent of physicians' pay is based on throughput time, documentation of patient records, patients seen per hour, and relative value units per hour. Efficiency has increased since these incentives were put in place. For a time, staff also were paid a bonus if patient satisfaction scores were over 90 percent. However, obtaining regular patient satisfaction reports was cost prohibitive, so this bonus was discontinued. It has been replaced by a bonus system based on performance on seven of the core quality measures collected by CMS, plus available information on patient satisfaction and patient complaints.

To highlight individual achievement, Denver Health modeled its bonus system on one used by Federal Express. Denver Health managers can present outstanding employees with a Star Award, which is a card that states that the employee will receive a \$50 bonus check at the next payroll period. As of spring 2008, Denver Health had presented more than 2,000 Star Awards. In addition, Team Awards are given to self-directed teams that identify a problem, design a proposal to address it, and outline the expected savings. Winning teams are awarded 5 percent of the savings from their proposal, capped at \$500 per employee per award. Awards are limited to \$1,500 per individual per year, and \$2,000 per team for teams focused on nonfinancial awards.

## KEY FINDINGS: SUCCESSFUL THROUGHPUT AND OUTPUT INITIATIVES

The hospitals profiled in this report have seen improvements in a number of measures that indicate high quality in ED operations (Table 8). These include improvements in patient satisfaction and process-of-care measures, reduced wait times, hours spent on diversion, and numbers of patients leaving the ED without being seen; and cost savings or increased revenues because of increases in patient volume.

**Table 8. Emergency Department Improvements at Selected Safety-Net Hospitals**

Improvements in patient Care	<ul style="list-style-type: none"><li>• Achieved 95% patient satisfaction for past 18 months (MRH)</li><li>• Increased collaboration between ED and other departments (BMC)</li><li>• Improved PCI time (VCUHS, MRH, MHW)</li><li>• Reduced percent of patients who leave without being seen from more than 10% to 2% (MHW)</li><li>• Reduced ratio of patients to nurses from 7:1 to 4:1 (MHW)</li></ul>
Decreased wait times	<ul style="list-style-type: none"><li>• Maintained wait times despite increases in volume (BMC)</li><li>• Reduced time to admit from 14 hours to just over 6 hours (MRH, VCUHS)</li><li>• Reduce percentage of patients who leave without being seen from 10%–20% to 2% (MHW); from 12%–14% to 1%–1.5% (MRH)</li><li>• Decreased holdover hours from 12,000 to 4,000 per month, despite increasing volume (MRH)</li><li>• Reduced ED length of stay (DH)</li></ul>
Decreased costs/ Increased revenues	<ul style="list-style-type: none"><li>• New IT system in ED generated additional \$1 million in revenue in year 1 (BMC)</li><li>• Achieved \$14 million in savings, hospital-wide (DH)</li><li>• Increased useable square footage by 20%–25% (DH)</li><li>• Reduced system supply budget (DH)</li></ul>
Decreased time on diversion	<ul style="list-style-type: none"><li>• Reduced diversion hours by up to 20% per year (BMC); by 30% (VCUHS)</li><li>• Cut diversion time by 50%–75% (DH)</li></ul>

Source: Author interviews, 2008.

Our study sites' experiences suggest that hospitals can take concrete steps to improve quality and efficiency in the ED. In many cases, these steps do not require significant investment and therefore could be undertaken by any hospital, including those that are struggling financially. Our study sites have demonstrated that even low-cost strategies can affect change and result in increased capacity and/or savings. Certain strategies require a modest upfront investment, but can result in significant returns. We identified five such strategies:

**1. Reconfigure the ED to maximize efficiency.** Our study sites have undertaken a wide range of physical improvements in the ED, from a simple reorganization of ED triage and treatment rooms to a whole-scale redesign and rebuild. These redesigns and/or renovations are tailored to the hospitals' needs and available

resources. However, even small redesigns, such as identically equipping ED exam rooms and color-coding ED treatment room trays, can prove extremely beneficial.

**2. Devise a pre-diversion system to alert staff of ED crowding.** Several of our study sites devised systems to signal staff that the ED is nearing diversion status. The alert triggers communication strategy throughout the hospital that inpatient beds are needed for patients already in the ED, in order to make room for incoming ED patients.

**3. Install an electronic tracking system.** Study sites that have installed electronic tracking systems have found it an invaluable way to manage patient flow. A tracking system allows a manager to easily identify rooms that are empty, need housekeeping, or house a patient ready for discharge.

**4. Identify individual(s) responsible for tracking patients.** Some of our study sites created a bed czar or bed facilitator position to oversee patient throughput throughout the hospital. This individual is empowered to communicate with the ED, medical departments, and hospital floors to smooth and expedite patient transitions between departments and through discharge. At Boston Medical Center, administrative attending physicians are on call in the ED 24 hours a day to troubleshoot and help relieve crowding.

**5. Develop meaningful performance metrics.** Our study sites emphasized the importance of developing metrics to measure, analyze, and improve performance. This strategy is crucial to establishing baseline performance and setting improvement goals. Hospitals can begin this work with a small set of measures, limited to specific departments or conditions, and expand as they gain experience and expertise.

The strategies identified above are key to success in improving ED performance. However, they must be implemented within a context of substantial organizational change. Our study sites have demonstrated that quality improvement in the ED, and throughout the hospital, requires enthusiastic leadership and a shared commitment by all staff to pursue systemic change. Although each of our study sites has taken its own path toward improving quality, several common themes have emerged that address how to implement and foster a commitment to organizational change.

### **Recognition That ED Crowding Is a Hospital-Wide Issue**

Interviewees at all of the study sites stressed the importance of viewing the hospital as a continuum that includes the ED. Clinicians, staff, hospital administrators, and others have come to view ED crowding as a patient flow problem throughout the hospital and an

indication of overall hospital resources being stretched. As one interviewee at Memorial Regional said, “Originally, EDs were viewed as a standalone part of the hospital, but in reality the ED is the most important key to the hospital’s overall functioning. You need to look at it as one continuous system.”

Each of the hospitals implemented strategies outside of their EDs to improve flow within the ED. These include: adding spaces for patients to wait for beds or discharge outside of the ED; incorporating medical, nursing, and other staff from throughout the hospital into quality improvement activities addressing ED flow; streamlining processes involving patient flow anywhere in the hospital; and adding new positions to support efficiencies that affect ED operations. The hospitals have taken the stance that, if it affects the ED, it affects the whole hospital.

At some of the sites, non-ED staff initially did not accept the idea that the ED’s problems were a reflection of patient flow problems hospital-wide. In these cases, CEO support and strong commitment were critical to engaging staff in improvement activities. Once on board, many of these former skeptics become enthusiastic supporters of a comprehensive approach to improvement.

### **Leadership**

Leadership from the CEO and other senior staff is essential to pursuing ED improvement initiatives. Success requires hospital leaders’ commitment to implementing interventions, providing direction hospital-wide, motivating clinicians and staff, and creating an environment conducive to change. As one interviewee stated, “Leaders must walk the walk and show the staff how [the initiative] will improve patient care. If the leadership is not directly involved, the initiative will not be successful.”

At Boston Medical Center, the CEO and senior staff have been integrally involved in quality efforts and supportive of staff’s efforts to improve performance in the ED. As one staff member put it, “The CEO is instrumental; [she] sets the stage to make this possible. The CEO must make sure people are aligned and engaged, and that staff share a sense of curiosity to make it better.”

Denver Health’s CEO searched for a strategy to remedy a financial crisis and an impending increase in volume because of the closure of three downtown hospitals. The CEO identified Toyota Production Systems’ Lean methodology as a model for improvement to reduce waste, increase efficiencies, and improve patient safety hospital-wide. The CEO and senior staff championed the Lean model and employees have

embraced the process after witnessing its impressive results. In slightly over two years, the health system has saved \$14 million dollars as a result of implementing Lean.

At Memorial Health System (MHS), the CEO made a commitment to “putting patients first” at all five hospitals in the system, including Memorial Regional and Memorial West. Substantial changes were made to operations, staffing, and protocols to increase patient satisfaction and safety. Senior leaders also have made resources available to support virtually any initiative or procurement that can be shown to improve patient care and safety. As a result, MHS has seen a dramatic increase in patient satisfaction scores—now placing them among the top 10 percent of hospitals in the country. On some measures of patient satisfaction, they rank in the top 1 percent.

A new CEO’s arrival at VCUHS in 2003 brought a renewed and strengthened commitment to quality and quality improvement. The CEO defined quality along key domains of activity and created an atmosphere of transparency across care delivery teams, senior management, and the board. A comprehensive dashboard (see [Appendix A](#)) monitors performance on many different quality measures and serves as a management tool, enabling clinical and administrative staff, managers, board members, and patients to see whether the hospital is meeting its objectives.

### **Culture Change**

Creating an ED and hospital-wide culture in which staff are vigilant about pursuing change, reviewing metrics and outcomes, and constantly working to improve is essential to sustain performance improvement.

At VCUHS, culture change, focusing on quality and safety as core values, is one of the seven strategic goals led by the performance improvement department. At Denver Health, instituting the Lean quality improvement strategy meant changing the culture of the entire hospital. As one staff member reported, “it takes a commitment, aggressively pushing for improvements, but it is also very rewarding.” Denver Health staff reported that they were constantly searching for new ways to reduce waste and increase efficiencies. One staff member stated, “There are no sacred areas; there’s nothing that Denver Health will ... avoid [in order] to improve.”

Memorial Regional and Memorial West have found that culture change often takes time to mature. Success requires organization-wide change, starting at the top, as well as commitment, patience, and vigilance from all staff. As one staff member reported, “At the executive level it’s a benevolent dictator; it’s up to the CEO to bring a new



culture to the hospitals. It took four to five years for the patient-satisfaction culture to mature, with less emphasis on money, more on patients. The safety initiative has taken three years so far.” Culture change is only possible when all staff are expected to participate. As one Memorial Hospital West staff member stated, “We have a very transparent environment, there are no excuses, no one is allowed to say ‘I’m different.’”

### **Transparency**

High-quality safety-net organizations have taken the bold step of showcasing their successes as well as their shortcomings. Each study hospital has made a commitment to transparency within the four walls of the hospital, sharing performance data broadly with staff and board members. Reporting strong as well as poor performance is necessary to promote positive outcomes in the ED and other areas of the organization. Disseminating department-specific performance data can be a powerful motivator for staff. At the same time, careful monitoring of progress can help identify areas needing further improvement and spur investment, attention, and dedicated work.

Boston Medical Center’s CEO regularly broadcasts data (e.g., department discharge times, length of stay) to all departments. This public disclosure often motivates change and encourages departments to improve their performance. One Boston Medical Center staff member advised other hospitals, “Be transparent about results, even if they’re ugly.” According to VCUHS’ CEO, transparency “cures all things.” Performance measures on color-coded dashboards, some of which are tied to specific services or departments, are widely disseminated throughout the organization. Performance targets that are met are shown in green, marginal performance is shown in yellow, and poor performance is highlighted in red. The dashboards are reviewed regularly by staff, clinicians, hospital leadership, and the health system’s board of directors to showcase successful interventions and underscore areas in need of improvement.

### **Commitment to Quality for Safety-Net Populations**

Leaders, clinicians, and staff at each of the study hospitals addressed concerns about quality and efficiency with noteworthy enthusiasm. While the CEOs were keenly aware of the financial challenges associated with providing high-quality care to vulnerable populations, they were unwavering in their support of strategies to provide the best possible care to their patient populations. In their view, being a safety-net hospital does not provide a reason not to aggressively pursue improvement strategies. Among the hospital leaders, there is a common perception that investment in quality improvement in the ED and throughout the hospital will result in cost savings and increased market share in the long term.

Likewise, physicians and nurses in these organizations are actively engaged in improving efficiency in the ED. Clinicians and staff heard “loud and clear” that improvement was a value of their organization and they were expected to participate in improvement activities. Throughout our interviews, very little discussion centered on the challenges commonly associated with caring for safety-net populations. More often, discussions focused on customizing patient flow improvements to a particular ED or hospital setting.

## **CHALLENGES**

We identified several challenges that safety-net hospitals may face in implementing quality improvement programs in the ED. These include employees’ initial skepticism, the need for staff to be open to change, and the incongruity of the ED and other hospital departments. Notably, the safety-net hospitals profiled here did not point to a shortage of resources as a principal impediment to improving quality.

### **Skepticism**

The most common challenge to pursuing quality improvement initiatives in the ED was staff members’ initial skepticism and resistance to change. At Denver Health, the enthusiasm and dedication of the CEO served to mitigate much of this concern and many staff members credit her with being the driving force in pursuing change. The availability of performance data and measurement, particularly data that clearly demonstrates progress, was also critical to overcoming resistance. If staff are able to see how a program has improved patient care, increased efficiency, or reduced waste, they are likely to become excited by the process and energized to make additional improvements. Boston Medical Center, Memorial Regional, Memorial West, and VCUHS had similar experiences with early successes encouraging greater support among staff.

Staff at all hospitals agreed that early successes engender support for a new initiative. However, they cautioned hospitals not to tackle problems that are too big. For example, one Boston Medical Center staff member said, “Don’t be overly adventurous, look for incremental, small successes in the beginning and get some early wins.” Staff at VCUHS echoed these sentiments, advising those embarking on improvement strategies “not to implement too many strategies all at once. Keep trying until you find something that works.” Many interviewees said that organizations must set realistic goals and not be overly ambitious with projects. For example, one Denver Health staff member said, “recognize that you can’t solve the ED divert problem with one rapid improvement event project. It is better to try to reduce diversion by 50 percent than to plan to never go on diversion again.” A central component of Denver Health’s strategy is to implement small,

relatively simple projects up front to achieve quick and impressive results and thereby increase staff buy-in.

### **Need for Flexible Staff**

Managers at each of these hospitals stressed the importance of having staff who have positive attitudes and are open to change. Interviewees reported that a small number of clinicians and other staff members reportedly were unwilling to participate in quality improvement activities (such as data collection and transparent performance review). In some cases, they were asked to leave the organizations. The commitment to quality was seen as paramount; uncooperative staff and clinicians were not allowed to undermine organizational improvement efforts. However, most staff came around when they saw real improvements that positively affected both patients and staff. According to an interviewee at one of the hospitals, “It takes a whole system transformation. There will be people who can’t get on the bandwagon. Move them out and hire people who can buy in and support the mission.”

### **Incongruity of the ED and Other Hospital Departments**

According to some of the interviewees, it can be difficult for ED staff to collaborate with staff in other departments, who are likely to have different approaches. Some described ED staff as being extremely proactive, working to move patients quickly because of a steady stream of new patients entering the ED doors. Staff in other departments may not have the same focus on patient flow and therefore may not be eager to accommodate requests from the ED to efficiently move patients into and out of inpatient beds. When faced with this challenge, ED staff stressed the importance of communication and commitment to working toward a common goal. According to one ED staff member, it is essential to make other departments understand that “it’s not an ‘us versus them’ situation. You must make staff understand that no department in the hospital can run without the ED because it represents the majority of admissions. So if ED crowding is addressed, it will help the whole hospital.”

## **LESSONS LEARNED**

This study highlights the experiences of five safety-net hospitals that have undertaken many different activities designed to improve the quality and efficiency of care in their ED operations. The following lessons emerged from interviews with key informants at each of the sites:

- 1. Safety-net hospitals can use performance metrics to improve quality and efficiency in the ED.** Each of the hospitals can point to successful strategies to improve an aspect of patient flow within the emergency department. They have

reduced diversion hours, reduced patient wait times, increased overall volumes, and decreased the percent of ED patients who leave without being seen. Several of the hospitals have seen savings associated with these initiatives.

2. **Safety-net hospitals do not use common metrics to track performance in the ED.** Each of the hospitals tracks various aspects of patient flow, but the nature and scope of performance measurement varies greatly across the organizations. Hospitals generally lack a common set of metrics that could be used to benchmark their performance against other hospitals in their markets or in similar markets across the country. Measures of ED performance are not publicly reported.
3. **CMS Hospital Compare data should not be used as a proxy for measuring ED quality.** We used performance measures publicly reported on the CMS Web site, Hospital Compare, as a proxy for quality in the ED, since two of the measures—time to PCI for heart attack patients and time to antibiotics for patients with pneumonia—rely heavily on the ED for at least part of the care process. However, we found that Hospital Compare data may not be a good proxy for quality in the ED because these measures reflect activities that often take place in conjunction with other departments (e.g., cardiac catheterization lab) and do not reflect the wide range of activities that occur solely in the ED. Without standard measures or composite measures of efficiency that include ED care, it is not possible to identify high-performing EDs, either within or outside of the safety net.
4. **Quality improvement efforts may not be as successful as regional policies in limiting diversion.** The two hospitals in the South Broward system have a no-diversion policy and therefore did not devote time and resources to developing interventions to limit hours on diversion. The other hospitals made inroads in reducing diversion but nonetheless continue to struggle with this challenge. Eliminating the option to go on diversion, through national or regional directives, evens the playing field for emergency departments within a community and forces hospitals to focus on reducing wait times once patients arrive at their doors.
5. **Quality improvement in the ED requires the participation of the ED team as well as other hospital staff.** Staff in the ED are accustomed to working in teams and so may work well on quality improvement projects. Yet, addressing patient flow requires the involvement of non-ED staff, who may not have experience interacting with ED staff or focusing on ED concerns. Having hospital leaders underscore the point that the ED is integrally connected to the rest of the hospital

should help bring a broader set of clinicians and staff into the quality improvement process.

- 6. Quality improvement in the ED requires investment.** The hospitals profiled in this report have made varying commitments of time and resources to interventions to improve ED efficiency, but all have invested in the process with both monetary and in-kind resources. Some of the EDs have made expansions in terms of space, beds, and personnel; others have reengineered existing spaces and staff responsibilities. Strategies at both ends of the cost spectrum can produce improvements in ED efficiency, but there needs to be an up-front recognition that quality improvement requires some investment of resources, is a long-term commitment, and entails the involvement of staff from across the organization.

## NOTES

<sup>1</sup> Institute of Medicine of the National Academies, *Future of Emergency Care: Hospital-Based Emergency Care at the Breaking Point* (Washington, D.C.: National Academies Press, 2007).

<sup>2</sup> Emergency Medical Treatment and Active Labor Act (EMTALA), 42 US C Sec. 1295dd (1990). Full text and regulations of EMTALA may be found at <http://www.emtala.com/#stat>.

<sup>3</sup> Institute of Medicine of the National Academies, *America's Health Care Safety Net, Intact but Endangered* (Washington, D.C.: National Academies Press, 2000). By definition, at least 25 percent of patients at core safety-net hospitals are uninsured or receive Medicaid.

<sup>4</sup> M. Regenstein and J. Huang, *Stresses to the Safety Net: The Public Hospital Perspective* (Menlo Park, Calif.: Henry J. Kaiser Family Foundation, June 2005).

<sup>5</sup> M. J. Wilson, B. Siegel, and M. Williams, *Perfecting Patient Flow: America's Safety Net Hospitals and Emergency Department Crowding*. Report commissioned by the National Association of Public Hospitals (Washington, D.C.: George Washington University Medical Center, May 2005).

<sup>6</sup> M. J. Wilson and K. Nguyen, *Bursting at the Seams: Improving Patient Flow to Help America's Emergency Departments. Lessons learned by the Urgent Matters Learning Network* (Washington, D.C.: George Washington University Medical Center, Sept. 2004). See also E. A. Kroch, M. Duan, S. Silow-Carroll et al., *Hospital Performance Improvement: Trends in Quality and Efficiency* (New York: The Commonwealth Fund, April 2007).

<sup>7</sup> R. M. Werner, L. E. Goldman, and R. A. Dudley, "Comparison of Change in Quality of Care Between Safety-Net and Non-Safety-Net Hospitals," *Journal of the American Medical Association*, May 2008 299(18):2180–87.

<sup>8</sup> The Centers for Medicare and Medicaid Services (CMS) collects data on 26 process-of-care measures associated with acute myocardial infarction, heart failure, pneumonia, and surgical care improvement. Hospitals that provide data on these performance measures do not receive a reduction in their annual payment update from CMS. [http://www.hospitalcompare.hhs.gov/Hospital/Static/InformationForProfessionals\\_tabset.asp?activeTab=1&subtab=3#measureset](http://www.hospitalcompare.hhs.gov/Hospital/Static/InformationForProfessionals_tabset.asp?activeTab=1&subtab=3#measureset).

<sup>9</sup> National Association of Public Hospitals and Health Systems, *NAPH Members Perform Well on CMS Core Measures*, Research Brief (Washington, D.C.: National Association of Public Hospitals and Health Systems, June 2007).

<sup>10</sup> Wilson, Siegel, and Williams, *Perfecting Patient Flow*, 2005. For another take on the I/T/O model, see B. Asplin, D. Magid, K. V. Rhodes et al., "A Conceptual Model of Emergency Department Crowding," *Annals of Emergency Medicine*, Aug. 2003 42(2):173–80. See also B. R. Holroyd, M. J. Bullard, K. Latoszek et al., "Impact of a Triage Liaison Physician on Emergency Department Overcrowding and Throughput: A Randomized Controlled Trial," *Academic Emergency Medicine*, 2007 14(8):702–08.

<sup>11</sup> *Urgent Matters* is a national initiative funded by the Robert Wood Johnson Foundation that is dedicated to finding, developing, and delivering strategies to improve patient flow and reduce emergency department crowding. *Urgent Matters* highlights patient flow best practices through its educational activities, including e-newsletters, web seminars, and regional conferences.

<sup>12</sup> J. Quinn J. S. Mahadevan, G. Eggers et al., "Effects of Implementing a Rapid Admission Policy in the ED," *American Journal of Emergency Medicine*, June 2007 25(5):559–63. See also T. Chan, J. Killeen, D. Kelly et al., "Impact of Rapid Entry and Accelerated Care at Triage on Reducing Emergency Department Patient Wait Times, Lengths of Stay, and Rate of Left Without Being Seen," *Annals of Emergency Medicine*, Dec. 2005 46(6):491–97. See also M. Gorelick, K. Yen,

and H. Yun, "The Effect of In-Room Registration on Emergency Department Length of Stay," *Annals of Emergency Medicine*, February 2005 45(2):128–33.

<sup>13</sup> G. Vilke, E. Castillo, M. Metz et al., "Community Trial to Decrease Ambulance Diversion Hours: The San Diego County Patient Destination Trial," *Annals of Emergency Medicine*, Oct. 2004 44(4):295–303; S. Schneider, F. Zwemer, A. Doniger et al., "Rochester, New York: A Decade of Emergency Department Overcrowding," *Academic Emergency Medicine*, Nov. 2001 8(11):1044–50; G. D. Kelen, J. J. Scheulen, and P. M. Hill, "Effect of an Emergency Department (ED) Managed Acute Care Unit on ED Overcrowding and Emergency Medical Services Diversion," *Academic Emergency Medicine*, Nov. 2001 8(11):1095–1100. See also E. Lee-Lewandrowski, D. Corboy, K. Lewandrowski et al., "Implementation of a Point-of-Care Satellite Laboratory in the Emergency Department of an Academic Medical Center. Impact on Test Turnaround Time and Patient Emergency Department Length of Stay," *Archives of Pathology and Laboratory Medicine*, April 2003 127(4):456–60; K. McConnell, C. Richards, M. Daya et al., "Effect of Increased ICU Capacity on Emergency Department Length of Stay and Ambulance Diversion," *Annals of Emergency Medicine*, May 2005 45(5):471–80.

<sup>14</sup> Schneider, Zwemer, Doniger et al., "Rochester, New York," 2001; and Kelen, Scheulen, and Hill, "Emergency Dept. Managed Acute Care Unit," 2001. See also Lee-Lewandrowski, Corboy, Lewandrowski et al., "Point-of-Care Satellite," 2003; and McConnell, Richards, Daya et al., "Effect of Increased ICU Capacity," 2005.

<sup>15</sup> American Hospital Association Annual Report of Members, 2006.

<sup>16</sup> Hospital Compare is an online tool provided by the Centers for Medicare and Medicaid Services that allows users to compare the quality of care that hospitals provide for patients with certain medical conditions or surgical procedures. It also displays results on a survey of patients' hospital experiences from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). <http://www.hospitalcompare.hhs.gov>.

<sup>17</sup> Centers for Medicare and Medicaid Services, Hospital Quality Initiative Overview, Draft May 2008. <http://www.cms.hhs.gov/HospitalQualityInits/Downloads/Hospitaloverview.pdf>, accessed May 29, 2008.

<sup>18</sup> When we chose the hospital study sites, the Centers for Medicare and Medicaid Services collected data on the percent of pneumonia patients given initial antibiotic(s) within four hours after arrival and within eight hours of arrival. Site selection was based on the four-hour data point. However, these two measures were subsequently replaced by a new measure: the percent of patients given initial antibiotic(s) within six hours after arrival, which is presented here.

<sup>19</sup> Wilson and Nguyen, *Bursting at the Seams*, 2004; R. Nuzum, D. McCarthy, A. Gauthier et al., *Denver Health: A High-Performance Public Health Care System* (New York: The Commonwealth Fund, July 2007).

<sup>20</sup> Personal communication with Boston Medical Center staff.

<sup>21</sup> Ibid.

<sup>22</sup> Boston Medical Center Web site: <http://www.bmc.org/about/ceo.html>.

<sup>23</sup> Boston Medical Center, Facts 2007: <http://www.bmc.org/about/facts07.pdf>.

<sup>24</sup> Personal communication with Denver Health staff.

<sup>25</sup> Virginia Commonwealth University Medical Center Web site: <http://www.vcuhealth.org/?id=5&sid=1>.

<sup>26</sup> Personal communication with VCUHS staff.

<sup>27</sup> C. Moylan, *Managing Care for Uninsured Patients: Five Success Stories from America's Public Hospitals and Health Systems* (Washington, D.C.: National Association of Public Hospitals and Health Systems, 2005).

<sup>28</sup> Ambulances continue to bring patients to hospitals on diversion if the distance to another hospital would result in catastrophic consequences for the patient.

<sup>29</sup> This two-step triage process is described by BMC staff in the following article: L. Fisher and K. C. Whalen, "A Look at a Two-Step Triage System: How One High Volume, Level 1 Trauma Center Decreased Long Triage Waits," *Journal of Emergency Nursing*, Dec. 2004 30(6):584–85.

<sup>30</sup> The creation of the IMCU was in part influenced by the peer-reviewed literature that indicates that increasing ICU capacity can reduce ED length of stay. Staff cited the following article as an example: McConnell, Richards, Daya et al., "Effect of Increased ICU Capacity," 2005.



**Appendix A. Emergency Department Dashboard  
Virginia Commonwealth University Health System**

<b>Metric</b>	<b>Definition</b>	<b>Benchmark</b>	<b>Results by Quarter/Year</b>	<b>Performance Improvement Activities/Comments</b>
ED registration	The total registrations for ED	20,620		Walkouts are included.
Total Diversion hours		>475 hrs ● 20.5–475 hrs ● <20.5 hrs ●		Green is UHC better performers' mean and Red is UHC all participants' mean.
Diversion hours Peds		26 hrs		400 hour reduction in FY07
Diversion hours Psych		157 hrs		400 hour reduction in FY07
Diversion hours adult		156 hrs		600 hour reduction in FY07
ED LOS (Overall, hours)	The average time from arrival in the ED to the time the patient leaves the ED, excluding outliers	>5.2 hrs ● 3.8–5.2 hrs ● <3.8 hrs ●		Green is UHC better performers' mean and Red is UHC all participants' mean.
ED LOS (Treat & Release, hours)	The average time from arrival in the ED to the time the patient is discharged from the ED, excluding outliers	>4.4hrs ● 3.5–4.4 hrs ● <3.5hrs ●		Green is UHC better performers' mean and Red is UHC all participants' mean.
Adult excl psych	LOS at 90th percentile, treat & release			
Adult Psych only	LOS at 90th percentile, treat & release			
Pediatric excluding psych	LOS at 90th percentile, treat & release			
ED LOS (Admitted, hours)	The average time from arrival in the ED to the time the patient is admitted as an inpatient, excluding outliers	>8.4 hrs ● 5.9–8.4 hrs ● <5.9 hrs ●		Green is UHC better performers' mean and Red is UHC all participants' mean.
Admitted, Peds	ED LOS at 90th percentile			
Admitted to Psych	ED LOS at 90th percentile			
Admitted to Medicine, Adult	ED LOS at 90th percentile			
Admitted to Surgery, Adult	ED LOS at 90th percentile			
AMA rate	Total no. patients who leave ED before completion of treatment, against medical advice/ED registrations	n/a		
Walk out rate	Total no. of patients who leave ED without being seen by a clinician/ED registration.	>5.4% ● 2.4%–5.4% ● <2.4% ●		Green is UHC better performers' mean and Red is UHC all participants' mean.
ED admissions	The total patients initially seen in the ED and later admitted as inpatients or OBS/ED registrations	<4,378 ● 4,378–4,607 ● ≥4,608 ●		Our goal (green) is to increase admission by 250 annually. Red is 5% below Green.
% ED admission	The total patients initially seen in the ED and later admitted as inpatients or OBS/ED registrations	<20.9% ● 20.9%–21.9% ● ≥22% ●		Red is 5% below Green.
Overall Quality of Care (back)	% Excellent	<45% ● 45%–48.9% ● ≥49% ●		45% and 49% are 50th and 70th percentile PRC norm. Our internal goal is 59.5% which is 25% increase from FY06

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